Interreg North-West Europe | EUROPEAN UNION
REAMIT
European Regional Development Fund
www.reamit.eu

RESOURCE & MATERIALS EFFICIENCY

PICNIC

Picnic and the REAMIT Project

Pilot-test start date: November 2020

https://picnic.app/nl/

We are REAMIT

REAMIT is a transnational European territorial cooperation project funded by Interreg North-West Europe (NWE) Programme aiming to reduce food waste. The project focuses on fruits, vegetables, meat, and fish supply chains as these are wasted in large quantities. It is being carried out in Ireland, Germany, France, UK and the Netherlands due to the amount of interconnected food supply chains and huge food waste in these countries. The REAMIT project is using existing Internet of Things and Big Data technologies to best fit the needs of the food supply chain management system in the NWE region. Through testing and adaptation, these technologies are being enabled to continuously monitor and record food quality and signal potential food quality issues. Through analytics, owners of 'food at risk of becoming waste' are provided with decision support options to minimise food waste including redistribution to nearby customers. As part of the technology demonstrations, the REAMIT project team is working with Picnic, helping to reduce food waste.

We are Picnic

Picnic was founded in the Netherlands in 2015 and started with 4 delivery vans. In 2022 more than 1,000 electrical vans drive around in about 120 Dutch cities. With hundreds of thousands of customers and a monthly expansion to new cities, Picnic was named the fastest growing company in the Netherlands in 2019. Picnic thinks grocery shopping can be done differently: faster, easier and cheaper.

The idea is simple. Picnic arranges the groceries, so that you have more time for more fun things. At Picnic you can order all your groceries online within a few minutes. And all this for the lowest price and free home delivery. All groceries are delivered directly to the customers home, without expensive shops in expensive locations.

Challenges at Picnic

Based on the Picnic data driven weather regime, Picnic decides daily how many icepacks are added to every box that contains refrigerated items and how much dry ice is added to every box that contains frozen items. Picnic wants REAMIT to prepare a personalized cooling profile per box, using data from a.o. the Picnic weather regime, the duration of travel, such as shipment from Picnic regional fulfilment center to Picnic local hub and the duration of the last mile delivery of every box. Picnic is looking for a system which will perform the following:
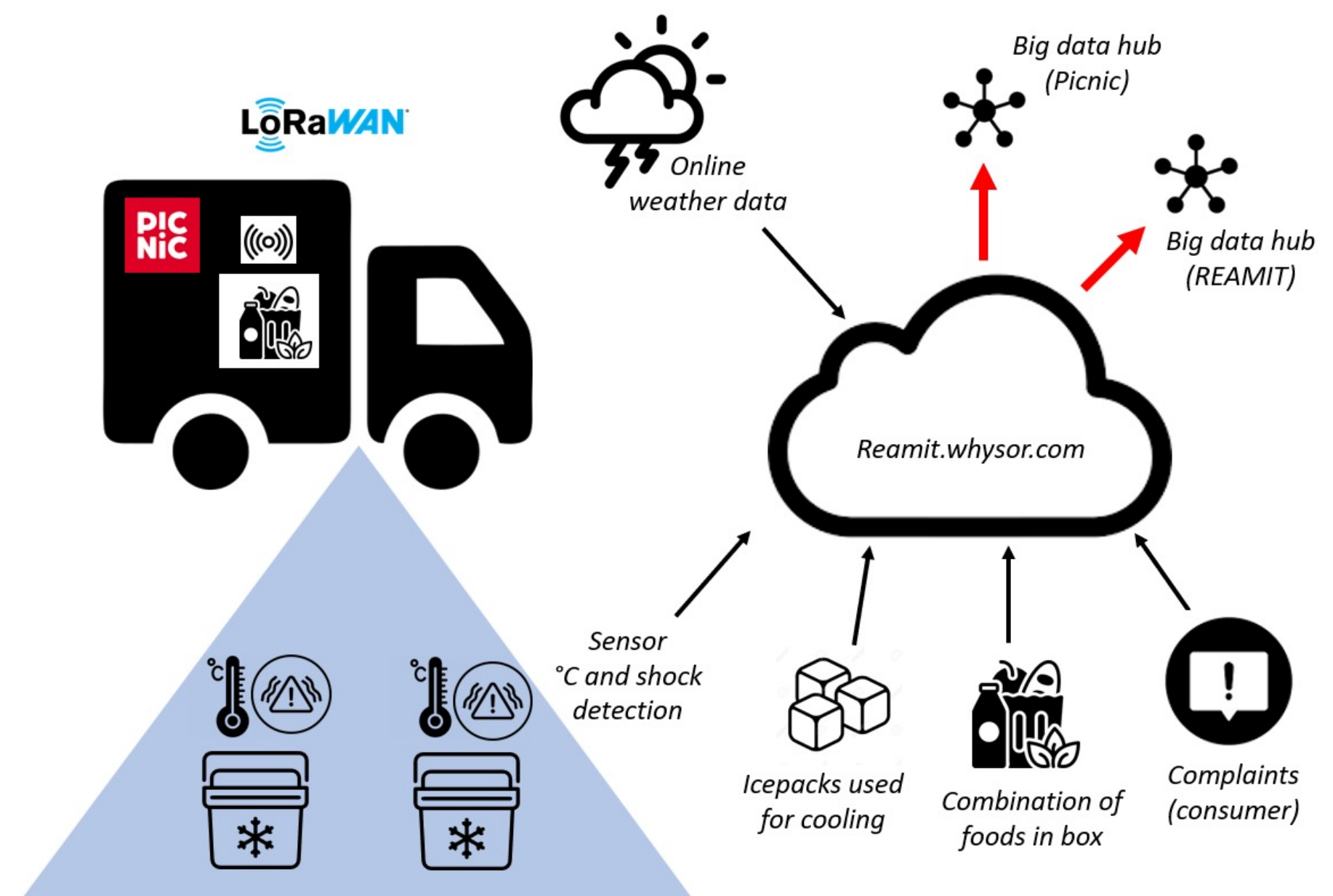
1. The boxes should be connected to the cloud to allow for (near) real-time data reporting / monitoring while the boxes are being transported.
2. The sensor housing should be able to withstand forces of heavy groceries and differences in temperature and humidity.
3. Development of a personalized cooling profile per box, based upon outside weather conditions combined with the difference in temperature inside the cooling box during transport.
4. The power consumption of the proposed system should be such that maintaining the equipment does not become an arduous task.

Picnic Fulfilment Center — Truck — Picnic Hub — Small electrical van — Customer's Home
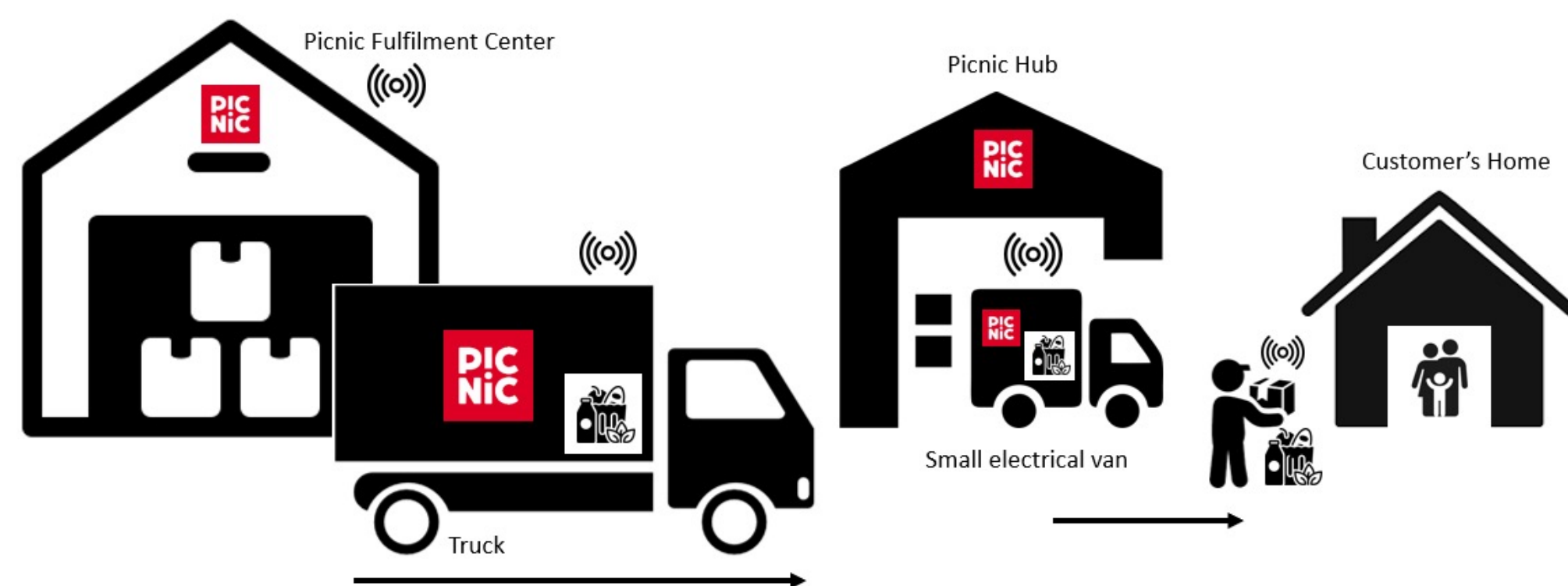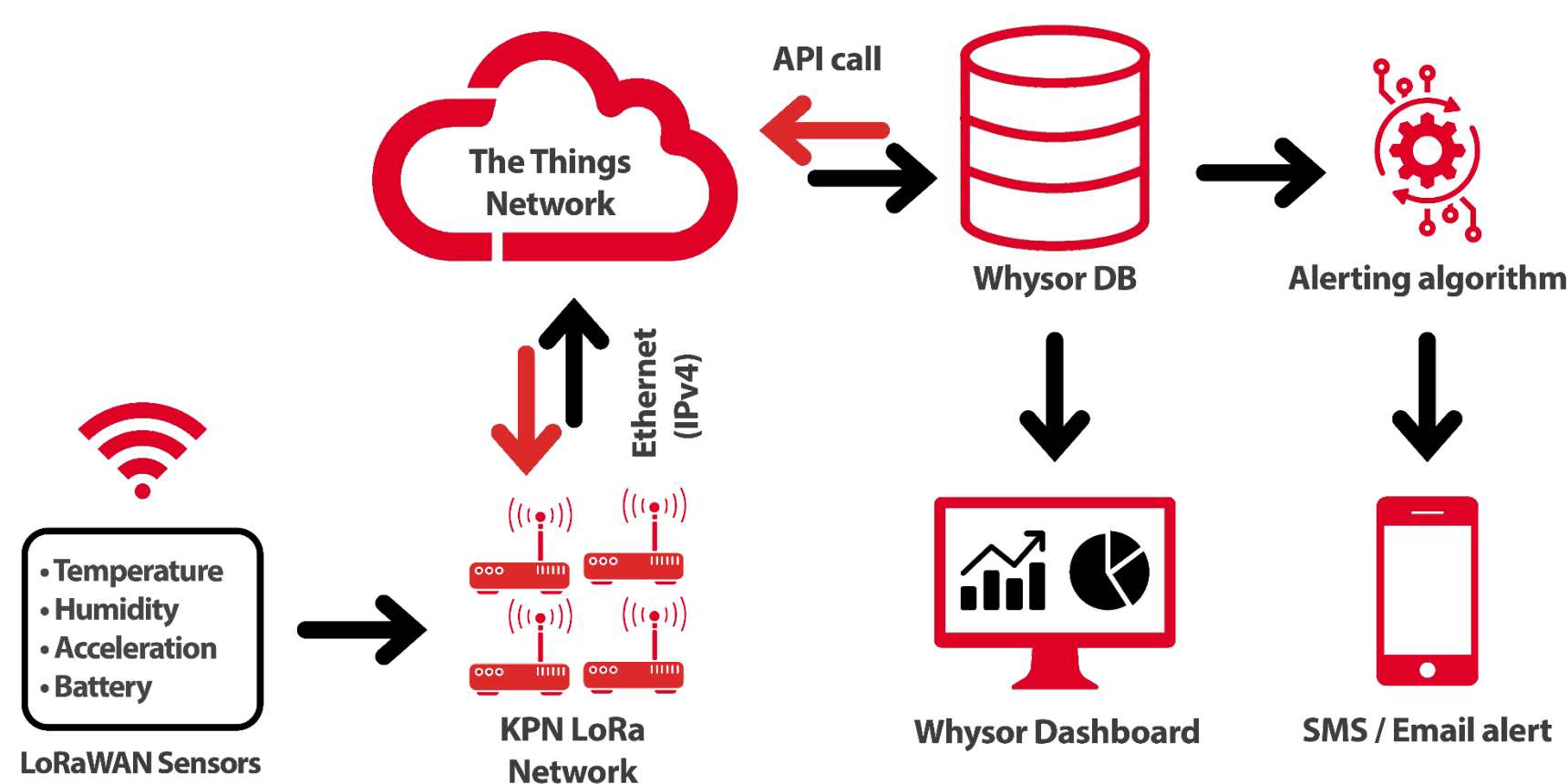
REAMIT's solution

The REAMIT team at Whysor (the Netherlands) examined Picnic's system requirements and proposed a real-time monitoring and alerting system for anomaly detection during the complete transportation process of cooling boxes. The EMS sensor (Elsys, Sweden) was selected as the sensor of choice to measure temperature and humidity. The EMS is slightly larger than an AA-battery and runs on 1 x 3.6 V AA Lithium battery, with an expected battery life of up to 10 years (depending on configuration and environment). The EMS is connected to the cloud by the LoRaWAN network, provided by KPN in the Netherlands.

Whysor developed the REAMIT dashboard for real time monitoring and alerting, which was utilized by each pilot study in the project. The dashboard runs on both desktop computer and smartphone. The alerts can trigger an e-mail or SMS notification.

LoRaWAN — Online weather data — Big data hub (Picnic) — Big data hub (REAMIT) — Reamit.whysor.com — Sensor °C and shock detection — Icepacks used for cooling — Combination of foods in box — Complaints (consumer)

System Architecture

API call — The Things Network — Whysor DB — Alerting algorithm — Ethernet (IPv4) — Temperature, Humidity, Acceleration, Battery — LoRaWAN Sensors — KPN LoRa Network — Whysor Dashboard — SMS / Email alert

Sustainable sensor housing. After the first testing period with the EMS sensor, the REAMIT team noticed that the original housing of the sensor was not sustainable enough to withstand the heavy forces of groceries inside the box. The team developed several prototypes of 3D-printed flexible rings to better protect the sensor.

Power consumption. The EMS sensors are configured to send data every 10 minutes. A lower transmission speed has been chosen because there is no consistent signal quality in the trucks. With the current configuration of the sensors, battery life is expected to be 1-2 years.

First conclusions

Conclusions after first and second testing round

1. The technical specifications of the sensors meet the expectations of Picnic. The sensor responds well to changes in temperature and has a stable signal during all phases of the transport.
2. Protecting the sensor when the boxes are filled with groceries, has appeared to be challenging, due to the frequency of handling and the impact of heavy groceries.
3. The tracing of sensors that are not working needs more research because of the complexity of the Picnic box routing method.