THEROS project:
Sensing Trust: IoT Networks Safeguarding Every Step of the Food Journey

An integrated toolbox for improved verification and prevention of adulterations and non-compliances in organic and geographical indications food supply chain

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WIRELESSINFO

THEROS Vision & Concept

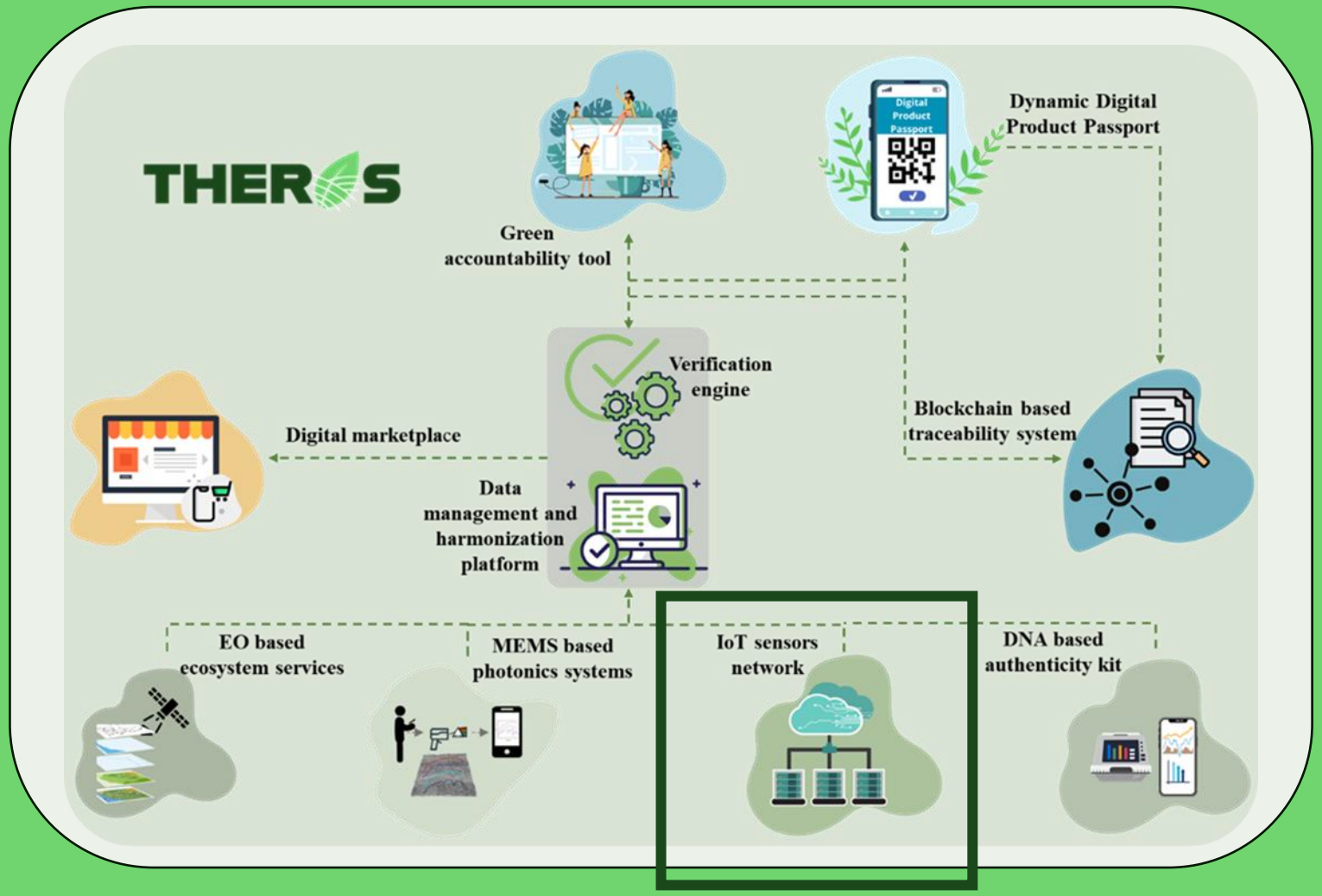
THEROS

Low-cost, digital and scalable solutions.

Blockchain enhanced traceability system.

Platforms and algorithms allowing management and harmonization.

Interfaces to facilitate monitoring and inspections.



Pilot 1: Serbia

Pilot 2: Greece

Pilot 3: Czech Republic

Pilot 4: Spain

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IoT Sensors Network

03. IoT sensors enable the monitoring of climate parameters related to the transport of organic foods, including the effective recording of all key tracking events and thus preventing potential misuse of the trademark.

- Designed and deployed an IoT network to **monitor quality and climate parameters** during the *transport* of organic foods, addressing both intentional and unintentional adulterations.
- Monitored air temperature, humidity, and package integrity, with real-time data transmission to the central data storage and the THEROS platform.
- The integrity status of the package represents the opening or closing of the package by the connection or disconnection of a magnetic button in the cover of the box.

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- Monitoring unit based on control data logger AgroNode
- Measuring sensors (AM2320 Digital Temperature and Humidity Sensor, Magnetic button)
- Frequency of 10 minutes of measurement

- Observed phenomena:
- Air temperature, Relative humidity, Status of the integrity of the package
- Radio module for LoRa network operated by national provider CRA
- Exchangeable radio module (LTE, GSM, NB-IoT)

- Tested LoRa, GSM, NB-IoT
- Tested small in-box antenna, standard outer antenna

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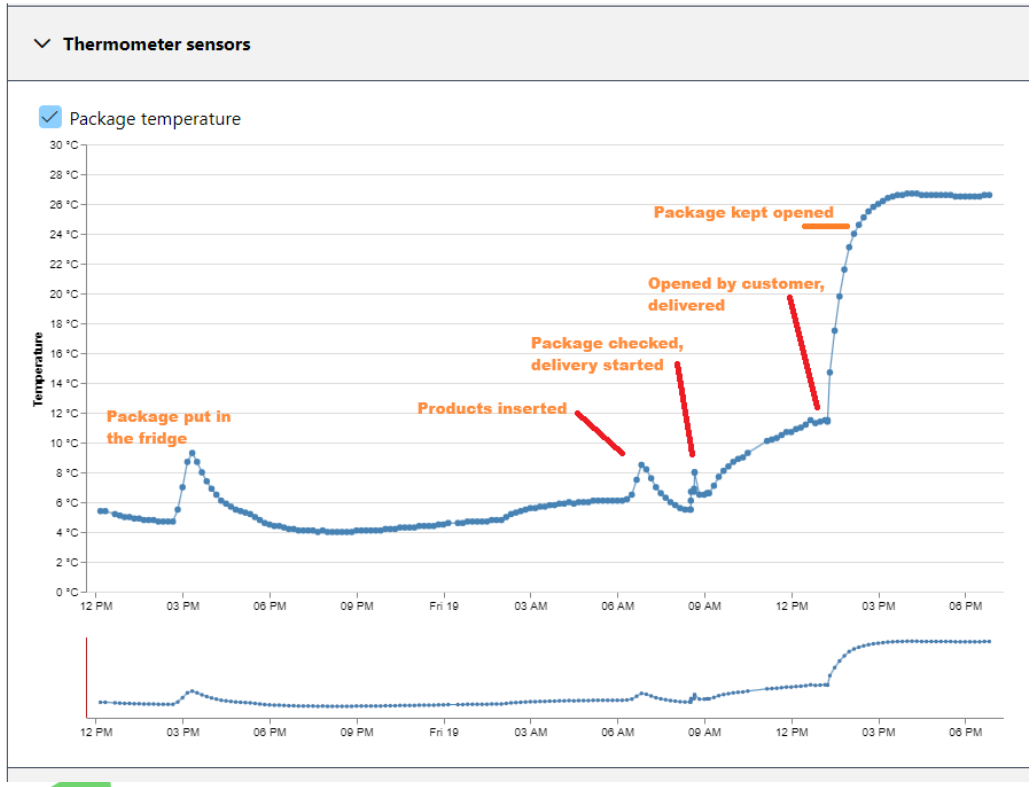

- Temperature measurement shows in detail the behaviour of the package
- Can be recognised in different stages of the package:
  - Cooling of the package
  - Products inserted
  - Final check
  - Opening by the customer
  - Leaving the package in a room temperature

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- Magnetic button
- Provides information about the closed or open lid of the package
- Accidental opening is prevented by duct tape
- When the lid is being opened, measurements are promptly sent apart from regular frequency

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- Delivery options

- Regional customers are served by a small van
- Tracking the van and pairing with package measurements
- Tracking started by scanning of QR code

- Customers from a longer distance by commercial delivery company – FOFR, PPL
- Tracking limited by the delivery company – tracked by transit nodes

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- Client application providing an overview of all active packages in selected time period

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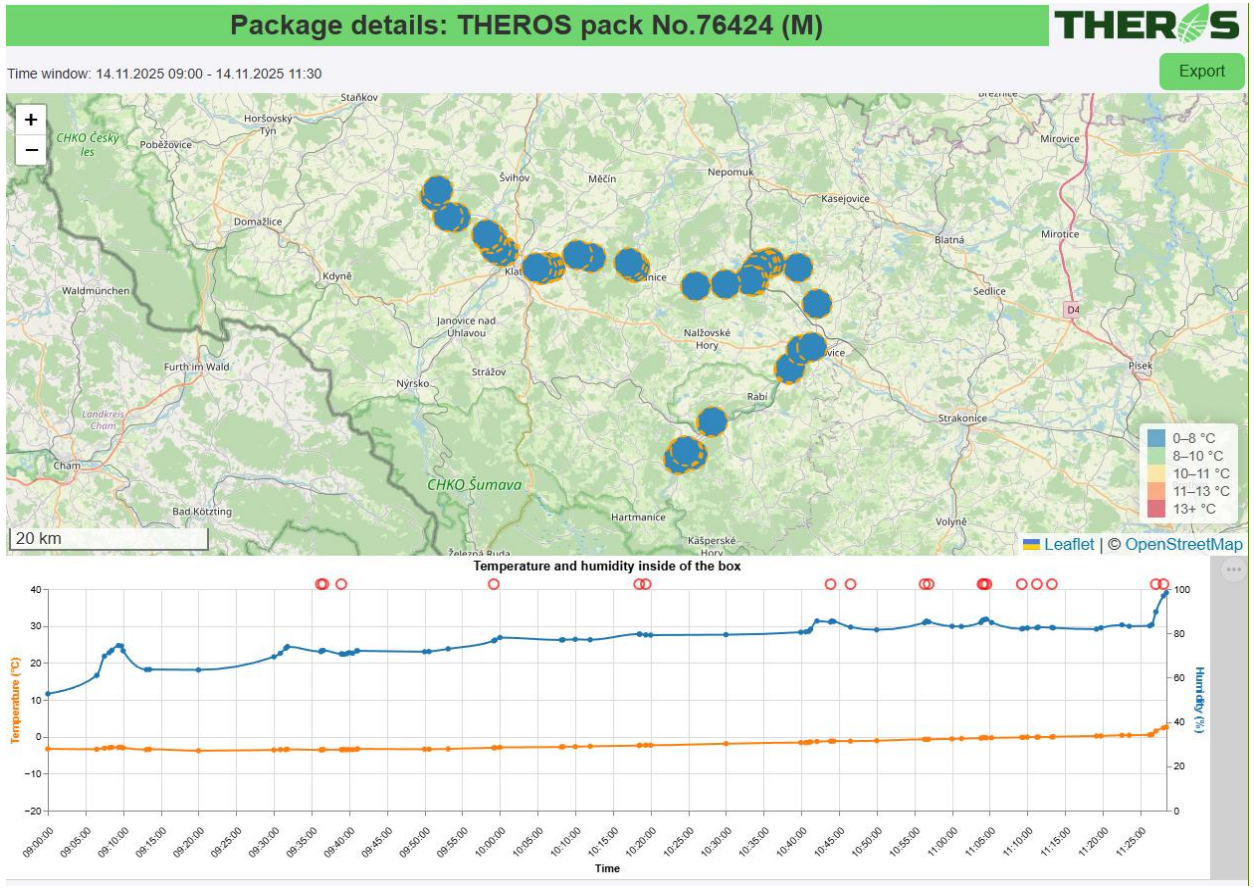

- Application providing an overview of the individual package in the selected time range
- Map window with package location provided by the delivery van
- Location points coloured by temperature
- Chart with temperature and humidity values

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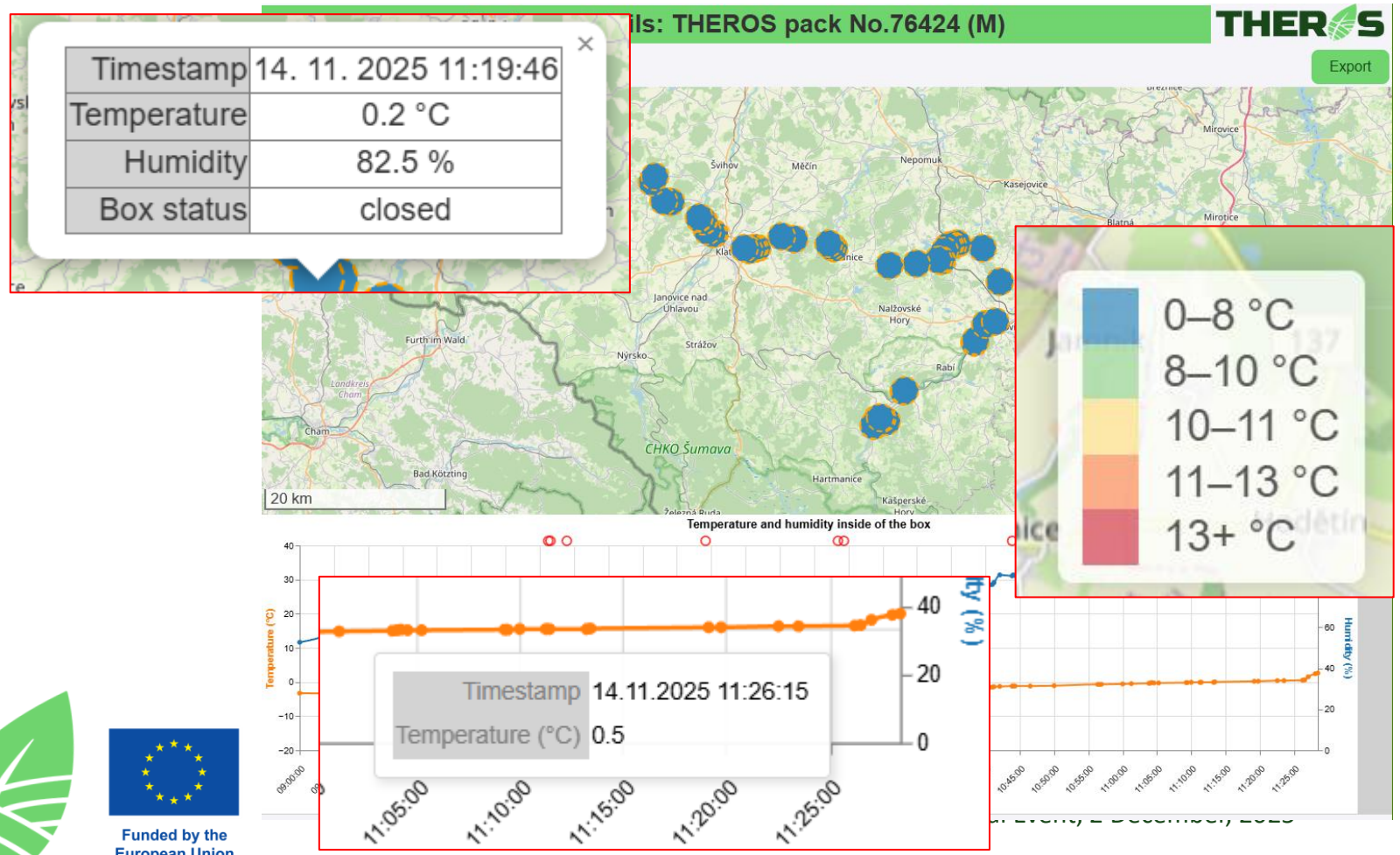

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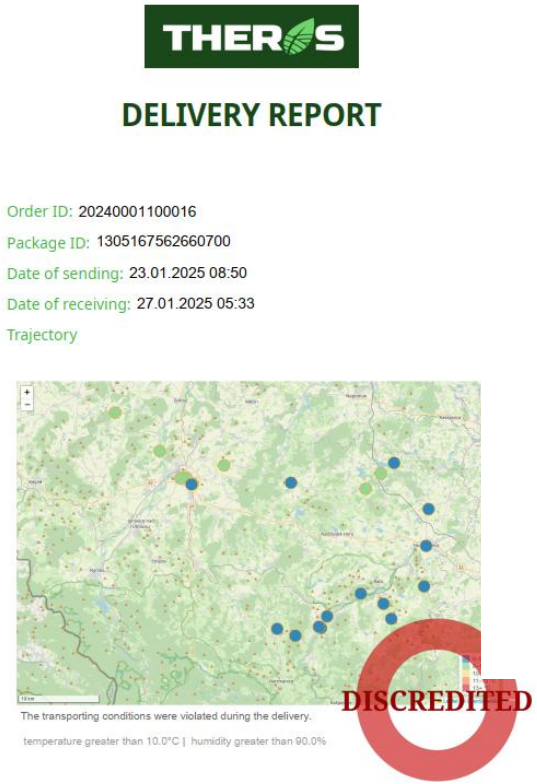
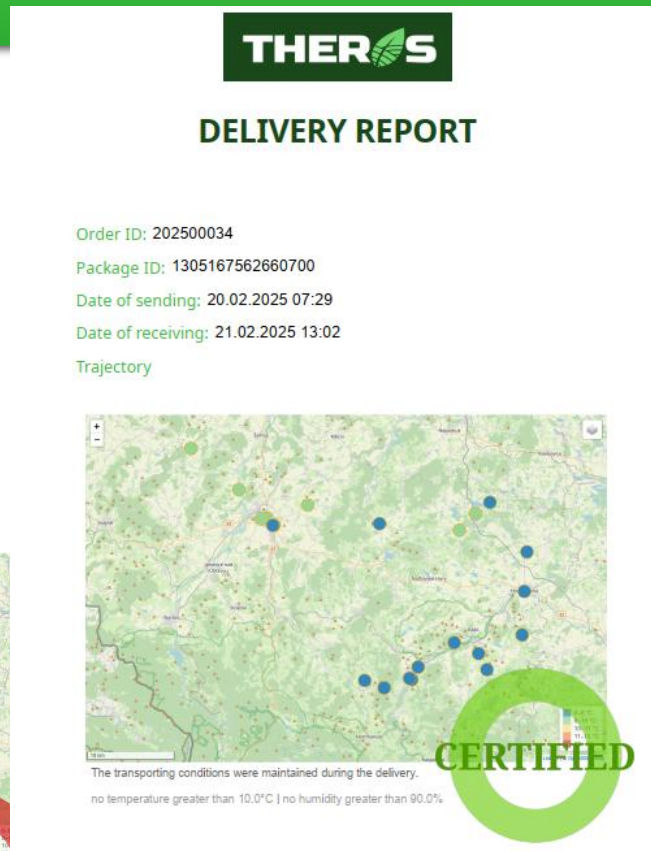
- Integration with Digital Marketplace
- Package assigned to the Order in the Marketplace, provided tracking ID
- Finish tracking by scanning the QR code or an event by the delivery company‘s logging system
- Proof of suitable conditions for transport provided by a certificate issued after delivery





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Thank you for your attention!

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