

Interreg North-West Europe REAMIT

European Regional Development Fund

WP T1 - Deliverable 2.2 Test Roadmap

Improving Resources Efficiency of Agribusiness supply chains by Minimizing waste using Internet of Things sensors (REAMIT)



REAMIT

Test Roadmap



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1 Introduction

REAMIT project aims to implement sensors and develop a big data solution collecting data from the pilot that will be launched all along the implementation of the testing phase.

Few technical partners from the consortium will provide sensors that will be installed and configured in the food supply chain process. It's foreseen to launch at least 5 pilots in the course of the project.

During the partners' workshop on sensors and big data held in Luton September 12th, 2019 and the pilots identified until now (4), the result is a combination of sensors from different suppliers to be deployed and configured.

REAMIT Pilot Tests Roadmap describes a minimum of four pilot tests carried out by the REAMIT project consortium in four countries of the North West Europe region: France, Netherlands, Germany and Ireland. The Roadmap illustrates key components of each pilot test (Short description, calendar, roles, and equipment) and steps taken in the execution of the pilot. The Roadmap is the REAMIT project delivery under Work Package Implementation T1 "Adapting and pilot testing sensor technologies in agri-food supply chains". It is a living document, developed jointly by the Lead Partner, the lead of WP T1 (pilot tests) and Project Partners throughout the REAMIT project lifetime and based on continuous dialogue and exchange between partners at all stages of each pilot test lifecycle.

A shared aim of all pilot tests is to assess how the proposed technology can improve monitoring of food quality in food supply chains and contribute to reducing food waste. Presentation of each pilot test is structured according to the scheme:

- ✓ Short pilot description
- ✓ Partners Involved
- ✓ Equipment
- ✓ Implementation time schedule

2 Overview of the technologies to be implemented

2.1 French Pilot

Short pilot description :

The objective of the pilot is to confirm when the transport company (STeF) picks up the food from the producer (Jean Routhiau), the quality respects the standards and when the food is delivered no degradation is noticed.

To do so Raman will be installed in the truck for on-going tracking and food quality checking. The pilot will be enriched using traditional sensors: “humidity and temperature” and will use a tool “Sym’Previus” (Sym’Previus is a complete tool for microbiological data prediction). The objective is to use data coming from the Raman to feed the tool in order to have real time reassessment.

At the end comparison will be made between the two technologies :

The first solution will have computer built inside the truck, where we can obtain results from the Raman Spectrum. In the second solution, data will be sent wireless to the cloud. Results of comparison will be sent to a driver. UoN will collaborate with UU and Levstone to develop smartphone application.

The challenge is using portable device (spectrometer) to detect data while moving

Meat monitored : chicken and shrimp

Partners Involved :

University of Nantes (France) : Raman Spectroscopy calibration and implementation

SenX (France) : Big Data analytics

I&R : As lead of WP T1 (pilot tests), I&R will coordinate the activities of all pilot tests by liaising with partners leading the pilot tests in different countries

BED: As the lead partner, BED will oversee all pilot tests for uniformity and consistency of data collected. BED will ensure timely communication of events of all pilot tests to all project partners

NTU: As the communication partner

Whysor : for bringing the data collected in the French pilot to the REAMIT cloud

Equipment :

- IQRF (UK) : temperature and humidity sensor, gateway
 - ✓ Gateway : [GW-WIFI-02A]
 - ✓ CO2/Temperature/RH Sensor [SN-THC-02]
- Raman : Ocean Optic
- Sym’Previus Tool

Implementation time schedule :

Before testing in working condition the Raman spectroscopy it’s mandatory to feed the database. First a lab campaign of calibration of the system is mandatory in order to have a database allowing to compare live data from the database for decision.

Pilot will start in April 2020 during 9 months.

2.2 UK Pilot

Short pilot description :

The aim of this pilot is to investigate the occurrence of dark-cutter beef within cattle. The cattle will be monitored with bolus sensors installed in the animal's reticulum which will track indicators of stress, a principal cause of dark-cutter beef.

Cattle that are stressed produce dark cutter beef, which is usually turned down by consumers, as they are not visually appealing. In consequence, retailers end up with a lot of wasted meat.

This sensor would indicate that the cow was stressed or hungry.

Note :

The sensors installation into one of the cows stomachs is being performed by Dunbia/Cottagequinn farms via their in-house vets so there is no risk for the animal

Partners Involved :

Ulster University's role (UK) will be to discovery and procure sensors and to perform data analytics on the produced sensor data

Dunbia (UK): Dunbia will provide information on the quality of the meat produced and oversee the installation of the sensors

Cottagequinn Farms (UK): Installation of sensors

I&R : As lead of WP T1 (pilot tests), I&R will coordinate the activities of all pilot tests by liaising with partners leading the pilot tests in different countries

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Equipment :

Smaxtec bolus sensors, base station and repeaters.

Implementation time schedule :

Pilot to start on delivery on equipment, estimated start date will be February 2020.

- Procure the sensors (which are now about to be ordered)
- Dunbia install them
- Begin gathering data
- In 60-90 days Dunbia will process those animals and provide measurements of meat quality
- Bolus sensors can be retrieved and reinstalled in new animals

2.3 Germany Pilot

Short pilot description :

The German pilot partner Weyers GmbH is a company for customer-oriented procurement and sale of vegetables. The aim of this pilot is to continuously monitor the quality of the goods. From grower, to warehouse, during transportation and at arrival in the supermarket. Weyers GmbH stored vegetables in warehouses and transported them from warehouses to supermarkets.

Sensors would be fit in trucks. Farmers can provide data such as photos of fresh fruits. Sensors will collect data on smell and appearance of fruit. Sensors will also monitor VOC, carbon dioxide and pressure. Data from sensors will be sent to a gateway.

This system uses GPS sensors but does not work so well when a vehicle is moving so we will need to find a new sensor that works better in transit. In future, data collected in cloud will be sent to Big Data Hub at BED for analysis. Whysor has produced a cloud server called whysor.reamit.com for this purpose.

Partners Involved :

Whysor: first contact of the pilot partner, collects data from the project and forwards the data to the Reamit big data hub.

Partner for analytics of the data: yet to be determined

I&R : As lead of WP T1 (pilot tests), I&R will coordinate the activities of all pilot tests by liaising with partners leading the pilot tests in different countries

BED: As the lead partner, BED will oversee all pilot tests for uniformity and consistency of data collected. BED will ensure timely communication of events of all pilot tests to all project partners

NTU: As the communication partner

Equipment :

- Sensor MCF-LW12CO2 by manufacturer mcf88
- GPS sensor by manufacturer Digital Matter
- Gateway MTCDDT-L4E1-246A-868-EU-GB by manufacturer Multitech

Implementation time schedule :

Pilot to start in December 2019. First data are expected in the 2nd half of January.

Duration of the pilot has not yet been determined.

2.4 Dutch Pilot

Short pilot description :

The Dutch pilot partner Picnic is a data-driven online supermarket who delivers groceries from their fulfillment center directly to their customers at home. Data are already collected at different stages of their process, but not yet during transportation. The aim of this pilot is to monitor the quality of fresh foods, transported in special cool boxes, during transportation and link it to customer complaints. Each truck is fitted with GPS sensors.

Data collected from sensors (temperature, GPS location) will be combined with weather data and uploaded into cloud. All data will be transferred to UOB's Big Data hub and to Picnic's data hub.

<p>Partners Involved :</p> <p>Whysor: first contact of the pilot partner, collects data from the project and forwards the data to the Reamit big data hub.</p> <p>Partner for analytics of the data: yet to be determined</p> <p>I&R : As lead of WP T1 (pilot tests), I&R will coordinate the activities of all pilot tests by liaising with partners leading the pilot tests in different countries</p> <p>BED: As the lead partner, BED will oversee all pilot tests for uniformity and consistency of data collected. BED will ensure timely communication of events of all pilot tests to all project partners</p> <p>NTU: As the communication partner</p>
<p>Equipment :</p> <ul style="list-style-type: none"> • Temperature sensors by manufacturer Fontys Greentechlab (prototype) • GPS sensor by manufacturer Digital Matter • Gateway by manufacturer Fontys Greentechlab (prototype)
<p>Implementation time schedule :</p> <p>Yet to be determined.</p>

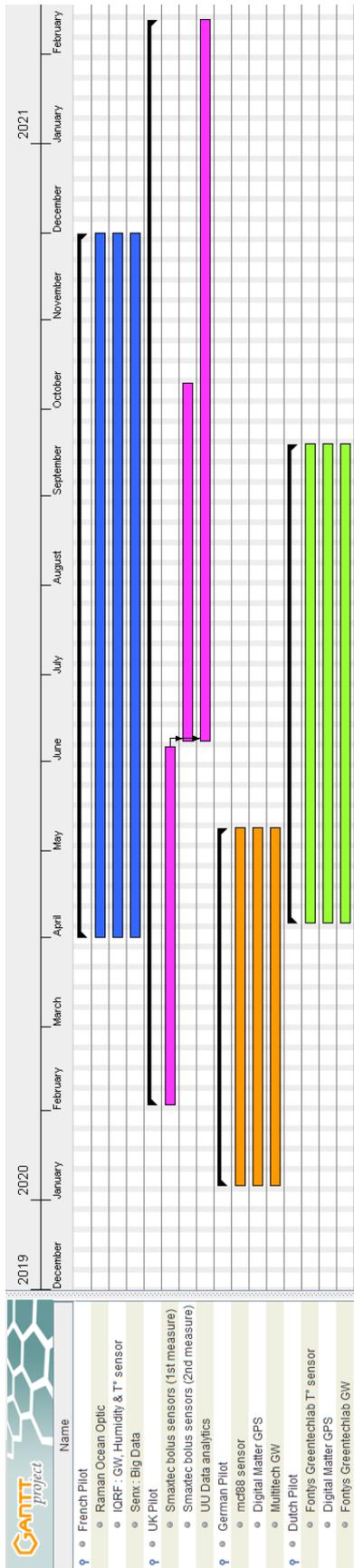
2.5 Pilot using Cyberbar Technology

Until now, no pilot is scheduled but University College Dublin will start demo towards end of the year. UCD are also working with a large food processor in Ireland on demonstration of the pilot. UCD also discussed imprinting chicken meat without damaging the meat. A pilot integrating this technology still needs to be worked.

2.6 Pilot using 3D Fluroescence Technology

No pilot yet identified and work to be done to find an end-user willing to test the solution. University of Ulster is in charge of it.

3 Test roadmap



4 The REAMIT Consortium

	<p>The University of Bedfordshire is the lead partner of the REAMIT project. They have expertise in making business sense of big data and internet of things technologies, applied to agriculture, aquaculture and other sectors.</p>
	<p>Images et Réseaux is an ICT Cluster in western France , and we are focused on cores digital technologies (5G & next generation infrastructures, big data and AI, immersive & interactive content, cyber physical system, digital trust, and photonics) in 5 sectors (health, agriculture & farming, digital fab & services, digital territory, and digital entertainment)</p> <p>https://www.images-et-reseaux.com/</p>
	<p>University College Dublin (UCD) is Ireland’s premier university, with over 24,000 students and a research budget in excess of €100 million per annum. The UCD members have expertise in food engineering, have developed IoT based sensors (e.g., the CyberBar system) and lead life cycle assessment modelling for the analysis of environmental impacts of a range of production systems.</p>
	<p>The GEPEA laboratory of University of Nantes participates mainly in the development of optical sensor for REAMIT project. The laboratory has solid scientific skills in optical biosensors applied to food and environmental fields.</p> <p>https://www.gepea.fr/</p>
	<p>Levstone Ltd a software house specialising in high-security, cutting edge mobile software and cloud big data solutions. Levstone are winners of InnovateUK (Gov) research projects. Our solutions are used in logistics, transportation, and health and social care for vulnerable citizens. We focus on real-time data acquisition (inc. IoT sensors), data privacy and ensuring data authenticity.</p>
	<p>Nottingham Trent University is one of the leading higher education institutions in East Midlands, UK. We are liaising with local businesses for our curriculum enrichment and practice-based education. Our primary activities in this REAMIT project are dissemination of results to wider community and communication to internal & external stakeholders through various media. We will also be involved in implementation of IoT technology in agri-food supply chains of local food businesses.</p>
	<p>Whysor’s main activities are in the Internet of Things and Big Data area. They connect IoT devices to the cloud, by providing a long-range (LoRa) infrastructure for the Internet of Things. For the REAMIT project, Whysor will work with pilot tests in all five countries to collect data from sensors and put them in the cloud and also work on analytics along with other partners. Next to being a broker we will be providing dashboarding functionality to view the gathered data in realtime as well as the ability to generate alerts based on that data.</p>

	<p>The IMaR Research Centre, based in Institute of Technology Tralee, has at its core expertise in electronic and mechanical hardware, software, IoT and data analytics. This expertise is applied across a large range of verticals including manufacturing, agriculture and food sectors. IMaR has previously developed sensor platforms for environmental monitoring and analysis in the food supply chain through their involvement in the Life+ funded Freshbox project.</p> <p>www.imar.ie</p>
	<p>SenX is the software developer and publisher of Warp 10, an Open Source solution to manage and to analyze data from sensors / IoT. Warp 10 is based on a Geo Time Series technology and propose a Time Series database and a library of more than 900 data analytics functions in an horizontal, performant, neutral, secured and industrial perspective.</p>
	<p>The University of Ulster is a partner of the REAMIT project. They have expertise in sourcing and developing sensors as well as intelligently analysing data from sensors with applications in agriculture, health, tourism and other sectors</p>
	<p>Dunbia (Northern Ireland) is a processor red meat situated in Co Tyrone NI with locations throughout the UK. With annual processing of 60,000 cattle and 200,000 lambs, the Dungannon based facility performs slaughter, deboning and retail packing of meat products at its sites. Combined with externally purchased products its annual turnover of £220m includes markets across the UK (retailers) and export (Europe and Asia), serving markets with carcass, primal and retail packed products. In the REAMIT project, Dunbia will be one of the end-users. They will provide access for fitting sensors that track quality of raw meat in trucks and food processing warehouses to facilitate data download from sensors for further analysis to eventually reduce food waste.</p>

5 Contact

Website: www.reamit.eu



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