

Senator

**Smart network operator platform
enabling shared, integrated and
more sustainable urban freight
logistic**

[D5.5] Pilot Case 1 results and follow-up
(Zaragoza) Report 1



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List of abbreviations

ABBREVIATION	DESCRIPTION
UCC	Urban Consolidation Centre
ULL	Urban Living Lab

1 Executive Summary

Deliverable D5.5 – “*Pilot Case 1 results and follow-up (Zaragoza) Report 1*” is a document included in the SENATOR project, designated as “public” regarding the dissemination level, and which purpose is to report the results obtained in the Zaragoza pilot, considering its local requirements and peculiarities at month 30 (February 2023). This deliverable is alive and will be modified in a second issue according to the pilot’s needs. This deliverable has been prepared by CORREOS with the contribution of partners and based on internal procedures.

2 Introduction

2.1 Purpose

The main objective of deliverable D5.5 "Results of Pilot Case 1 and follow-up (Zaragoza) Report 1" is to report the results obtained in the pilot conducted in Zaragoza. It describes technical progress in terms of *Local market consolidation and cross-docking*, *Network balance (virtual load exchange)*, *Regional market (MercaZaragoza) consolidation* and *Smart management for loading bays around a public market and in parking areas in four strategic points around the city*. It also includes the barriers that have been solved and those that are still in process.

2.2 Relation to Other Project Documents

This deliverable is in consonance with the deliverable D5.3 Pilots cases requirements report Deliverable D5.3 – “Pilots cases requirements” is a document of internal use within SENATOR project, designated as “confidential” regarding the dissemination level, and which purpose is to clearly define the planning where first baseline scenario is defined considering main needs identification to be done under each Urban Living Lab scenario.

3 Progress in Zaragoza pilot

3.1 Zaragoza urban living Lab

The following chapters will describe the results obtained in ZGZ ULL pilot considering the city's local requirements and particularities.

3.1.1 Follow-up Local Markets

During the city's pilot case requirements definition back in early 2022, several action points were defined which progress are described in the next chapters

Pickup and distribution of orders. The online shopping platform of the municipal market. Shipments were planned for all available courier companies (in this phase CORREOS) to operate for a given period of time, run the route optimization system and quantify the savings (time, economic and operational process savings).

In this phase, functionality tests of the Mercadeando application have been carried out (and continue to be carried out).

The objective of Mercadeando is to be a support platform for municipal markets that includes a marketplace where retailers sell their products. A small group of alpha-testers (emulating future buyers) have made online purchases through the Mercadeando application to test its technical reliability and to check the delivery/receipt of the goods to the final recipients.

The application is currently being refined for its public release in March 2023.

Once in real operation, the application will be replicated in other municipal markets.



Figure 1 Mercadeando screenshot 1

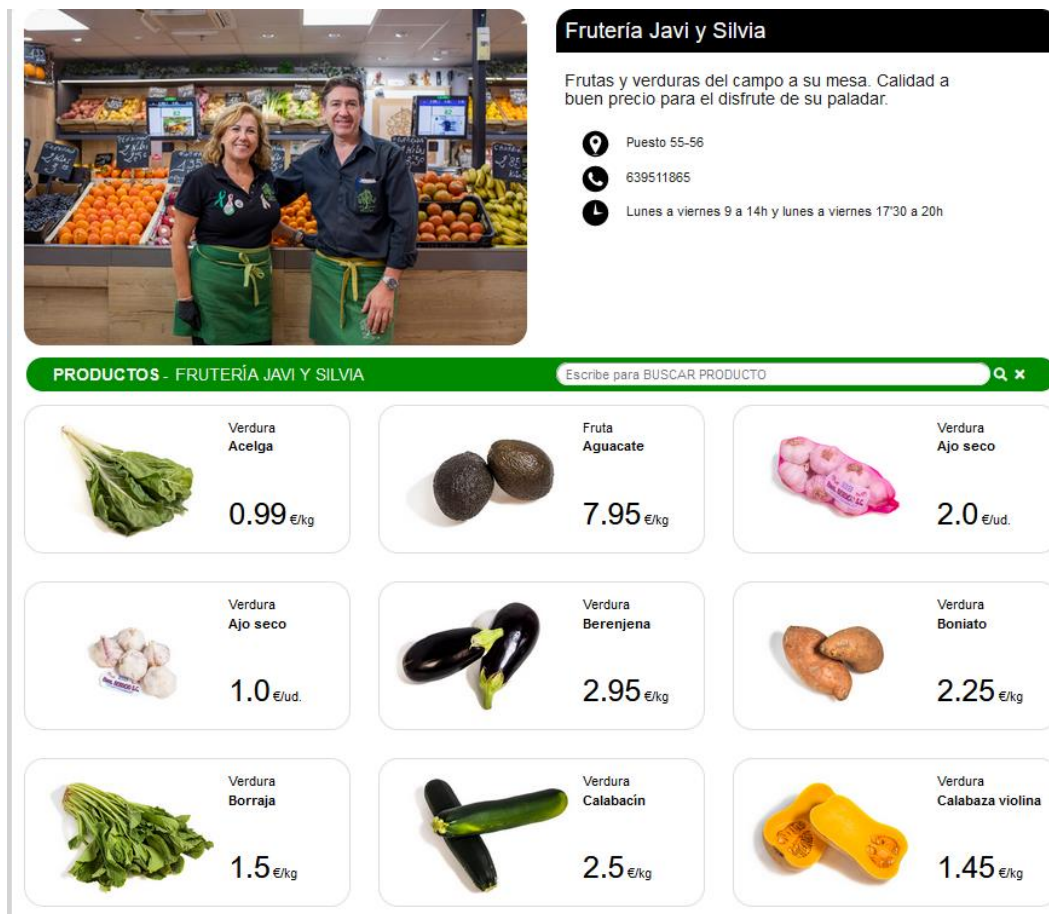


Figure 2 Mercadeando screenshot 2

The pilot is being theoretically developed by means of simulations that allow enriching the route optimiser, and incrementally by including new functionalities (Small Scale), based on previous analysis that includes:

After the feasibility analysis, an optime route was configured to pick up the shipments from the three municipal market and to perform the deliveries. In this sense, the next figure illustrates the location of the given markets and the direction of the track.

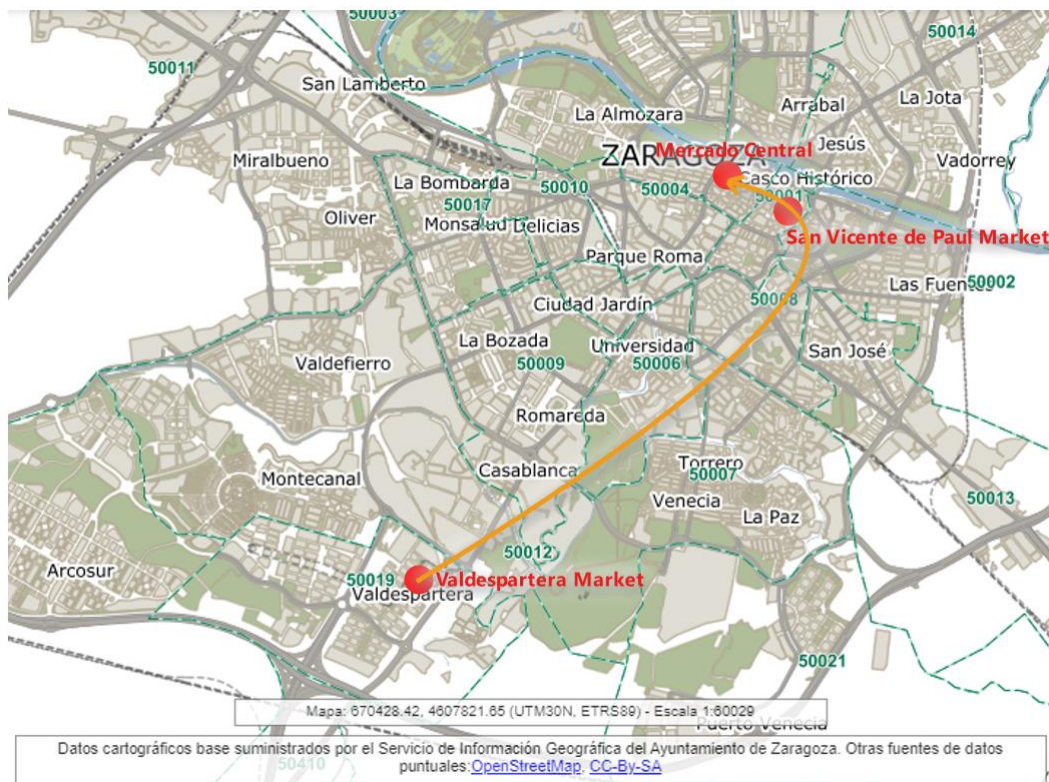


Figure 3 Location of the three municipal markets and planned delivery route (in orange)

These tests are part of the identification of the necessary developments to be carried out by Correos Correos in order to execute the real pilot. (Large Scale). Following this one, a large pilot will be executed with real deliveries by merging a day of operation of Correos.

Integration to the current environment

Several meetings have taken place with local communities as per identifying the requirements and barriers of local market shops and nearby shops to enter their orders on the SENATOR platform. It is expected that during next March 2023, the co-creation meetings with the communities (market merchants, neighbourhood merchants and last-mile transporters) will begin, where the future of the Zaragoza markets will be discussed.

Next steps. Consolidation of the shipment track

After the results reported in the given test, it will be crucial to identify the requirements and barriers of Correos to deliver orders from the market and shops, which will arrive via the SENATOR platform, as well as.

It is foreseen to carry out, for at least one month, tasks of reception and consolidation of orders from the San Vicente de Paul market in the premises located at street level by Correos, as well as their delivery both by refrigerated vehicle and by traditional vehicle.

3.1.2 Follow-up measures linked to smart mobility

The main problem of loading and unloading of goods in Zaragoza has to do with the inadequate use of parking areas and the lack of control of timetables and vehicles. For this reason, a control system is being developed (mobile application - virtual ticket) for those areas of Zaragoza that suffer from problems of space for loading and unloading or for other areas of the city that have a high demand for parking. Some of the improvements that would be achieved are:

- 1) Optimisation of available spaces and loading/unloading operations by allowing drivers to book in advance.
- 2) Promoting and encouraging the sharing of trucks or vans and any other measures aimed at streamlining the use of vehicles.
- 3) Minimisation of incidents and irregularities detected.
- 4) Reduced traffic congestion and consequently reduced CO2 emissions.

Three or Four (3-4) points will be available in the city where the solution will be implemented. Each of these parking points will have several parking spaces available for loading and unloading. Parking time will be controlled by using bluetooth sensors and a mobile app.

Each of these 4 points contains a series of sensors that will read the number plate of the vehicles entering the zone, which will provide parking time control.

Drivers can book in advance to make sure they have a parking space. But SENATOR should be also capable to book slots automatically depending on required delivery points.

In this way, congestion is avoided in the area around these points of the city that have very few parking spaces and a lot of traffic as they are places where many people go to do their shopping.

The pilot is proposed to be carried out in the following phases:

- A) Identification of the requirements needed to integrate the booking management application with the SENATOR platform

- B) Analyse the feasibility of integrating the booking management into SENATOR route optimisation vs. booking the delivery person directly from their app/PDA on the spot (Large Scale).



Figure 4 Location of requested spaces

3.1.3 Difficulties, challenges and/or deviations

The implementation of the Mercadeando initiative involves three different municipal departments, which implies difficulties in timing.

On the other hand, the detection and subsequent correction of errors detected in the online purchasing platform may entail delays depending on the difficulty to be solved.

The deployment of space reservation for loading and unloading is not yet fully defined.

3.2 Required data

The purpose of SENATOR is to establish a monitoring mechanism that optimises the city's logistics, beyond the optimisation that can be carried out at an individual level by each of the operators. The functionality of this control tower will allow competing operators to collaborate to improve joint efficiency, with the main beneficiary being the cities in which it is established, in this case: Zaragoza and Dublin.

Among the outstanding advantages of using this control tower are: saving emissions, improving air quality, improving traffic, promoting local trade, supporting the sustainable growth of e-commerce, reducing congestion and the occupation of urban space by multiple logistics operators, concentrating shipments in designated operators.

Among the biggest challenges of this project is to identify and securely share information between competitors. This requires a range of data such as:

- Information on shipments, both historical and in real time, in order to develop optimal route optimisation for the logistics operators involved in the Zaragoza pilot (Correos and Correos Express).
- Traceability information, and how the blockchain can add value to the quality of refrigerated shipments in this city and the exchange of loads between operators.
- Real-time geo-positioning information on routes, both motorised and on foot.
- As well as data to assess the effectiveness of the project, such as: distances travelled, consumption, type of vehicles used, deliveries made, among others.

All the information exchanged, in addition to being harmonised in a common format, is in line with the European and Spanish RGPD.

At the end of the pilot phase, a test will be conducted with real shipments by merging a day's operation of Correos and Correos Express.

3.3 Local market consolidation and cross-docking

Currently work is underway on the route optimisation algorithm that allows the route that consumes the least resources and has the least environmental impact. Along these lines, work is being carried out on the exchange of cargo between operators with the aim of global logistics optimisation.

In addition to this line of work, the collection and shipment of grocery products from local markets, as well as temperature-controlled products from local and neighbourhood traders, is included in this line of work. This will be supported by existing local marketplaces.

The logistic procedure has been defined in order to start the pilots of delivery with real shipments in March 2023.

During 2023, the shipment of products to the final recipient will begin, in order to improve the efficiency of the collection of orders at the markets, and the cargo that will be collected by Correos ready for delivery will be consolidated.

3.4 Network balance (virtual load exchange)

As two different use cases will be explored, one route is in trouble and need help from other vehicles to fulfil the day deliveries and the same idea but transferring load to another operator, the routes carried out by Correos and Correos Express will be monitored. No problems are foreseen, but it will take time and the final impact will be the slowing down of the pilot.

Use cases will be explored during 2023 between Correos and Correos Express:

- i) Single operator: one route is in trouble and need help from other vehicles to fulfil the day deliveries.
- ii) Operator transfer: the same idea but transferring load to another operator. What information is needed? How we will deal with the security of shipments (how we can rely in other networks? eID and physical security will be assessed. SENATOR “control tower” should enable communication between both networks and suggest the best point for load exchange (dynamic planning).

The route optimizer has been developed and have been trained with real data to improve the algorithm that will be work during 2023.

3.5 Regional market (MercaZaragoza) consolidation

Regional market (MercaZaragoza) consolidation: The pilot will explore how to stimulate the consolidation for outbound regional market to attend the small retailers simplifying the number of connections between the central market and small markets (N single vans, one per retailer to one single route for all of them).

For this activity, the parameters to be considered for the definition of a virtual pilot to be studied by Correos based on the current market situation and the needs of retailers are being defined.

4 Conclusions

SENATOR is a challenging pilot because it unites the needs of the final recipient, local businesses, logistics operators, as well as the needs of the city council, seeking to unify these processes in accordance with the laws and regulations of GDPR.

One of the key components of the project is to be able to test the urban hubs as consolidation centers, bringing the end customer closer and integrating them with zero-emission logistics. For this, the tests are planned to start in March 2023.

One of the challenges is to integrate all this operation with the technological part, creating a definitive solution according to the needs of all project stakeholders.

Until now, work has been done on the development of the different components of the final solution (logistics process, front and backend of the platform, compliance with the GDPR, etc.) and in the coming months the integration of all these components into the SENATOR platform is planned. responding to the new changing needs of the urban environment of cities.