

Senator

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

**D6.5 Business Models Canvas and CBA
Analysis Report 1**



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Table of contents

Executive Summary	2
1 Introduction.....	5
2 The product: summary of the SENATOR Platform.....	10
3 Potential value generated by the SENATOR Platform: Dublin Urban Living Lab.....	12
4 Potential value generated by the SENATOR Platform: Zaragoza Urban Living Lab	18
5 Potential value generated by the SENATOR Platform: Chester Case Study	21
6 Preliminary SENATOR Business Model based on canvas methodology	28

List of figures

Figure 1 Urban Freight Transport – Key Stakeholders	8
Figure 2 Potential logistics chain in Dublin	15
Figure 3 Pedestrianised zone in Chester city centre	22
Figure 4 Businesses’ issues related to deliveries in Chester city centre	23
Figure 5 Cargo-bike in Prague	25
Figure 6 Potential logistics chain in Chester city centre.....	26

List of abbreviations

ABBREVIATION	DESCRIPTION
API	Application Programming Interface
ESG	Environmental and Social Governance
HGV	Heavy Goods Vehicle
ICT	Information and Communications Technology
IT	Grant Agreement Information Technology
KPI	Key Performance Indicator
LGV	Light Goods Vehicle
NTA	National Transport Authority
UCC	Urban Consolidation Centre
UFT	Urban Freight Transport

Executive Summary

1 Introduction

This report is the first deliverable from Task 6.2 Emergent Business Models for the ‘on-demand’ economy and is the first draft of the Business Plan for the emerging SENATOR Platform. This first draft of the SENATOR Business Model describes the rationale for how an organisation that owns the SENATOR Platform can create, deliver and capture value.

2 The product: summary of the SENATOR Platform

Given the business-focussed nature of this report, the description of the SENATOR Platform - the ‘product’ that would be offered to the market - is summarised in terms of its Services Layer which provides the business functionality that would be perceived by users:

- On-demand Platform Manager
- Multimodal Fleet Manager
- Smart Routes Manager
- Diagnosis of Urban Infrastructure

The key sources of added value at a strategic level provided by the SENATOR Platform compared to in-house platforms operated by individual Transport Providers in urban areas are likely to be as follows:

- The ability to collaborate by transferring information between different operators to reduce costs and environmental emissions;
- The ability for demand to be met in a multimodal manner, whether by electric LGV, e-cargo bike or by walking depending on the choice of the user; these choices could, for example, be to minimise costs or minimise carbon emissions.

3 Potential value generated by the SENATOR Platform: Dublin Urban Living Lab

Potential benefits from the availability of the SENATOR Platform in Dublin would be that it could facilitate consolidation of loads to zero emission vehicles, which would allow the inbound Transport Provider to avoid its vehicles having to drive into the city centre; in addition, there would be continuing choice of providers for Receivers of goods as all Transport Providers are able, indirectly, to offer a last mile delivery service into central Dublin; environmental benefits would be secured for society through the zero emission last mile service (principally lower greenhouse gas emissions, improved air quality and adding to the quality of place in the city centre); there would also be potential ESG (Environmental and Social Governance) benefits for Shippers and Transport Providers in terms of helping them

to monitor and demonstrate that they are working towards meeting their carbon reduction targets.

4 Potential value generated by the SENATOR Platform: Zaragoza Urban Living Lab

The potential benefits of the service, focused on SENATOR facilitating a consolidation delivery service from Local Markets, could be that efficiencies would be available for several different Shippers (fresh produce stallholders) in that they do not have to devote their vans and drivers to make ‘last mile’ deliveries and could focus on serving their immediate customers at the markets; there would be a potential increase in demand for the Shippers as a result of making their produce available on-line via an e-commerce system, with deliveries facilitated by the SENATOR ‘last mile’ service; in the longer term the Shippers might be able to avoid having their own vans, as long as their inbound supplies can be delivered to them; there could be a reduction in the number of loading/unloading bays required at the Local Markets because the fleet is common and optimised; finally, the environmental benefits secured for society through the reduction in van movements and the use of zero emission vehicles for consolidated deliveries.

5 Potential value generated by the SENATOR Platform: Chester Case Study

The SENATOR Platform could, in principle, enable a delivery service into the pedestrianised city centre to be feasible throughout the working day by providing software to coordinate and plan a transfer of parcels from inbound Transport Operators to by e-cargo bikes.

The benefits of the service would be as follows:

- Potential efficiencies available elsewhere in the supply chain (generating cost savings for the inbound transport provider), due in particular to the inbound Transport Providers being able to avoid its vehicles having to drive into the city centre and carry out the deliveries, so that they are available to carry out other work;
- The quality of service benefits for Receivers with the greater flexibility and convenience from being able to receive deliveries throughout the day;
- The environmental benefits secured for society through the e-cargo bike service as a result of the availability of the zero emission service (principally lower greenhouse gas emissions, improved air quality and adding to the quality of place in the city centre).

6 Preliminary SENATOR Business Model based on canvas methodology

The SENATOR Business Model adopts the business model canvas methodology, which is a strategic management template for documenting a new business model that was developed by Business Model Foundry AG in Austria.

The canvas summarises all the elements of a company's business model, including its Value Proposition (its products and services and how they add value), along with its customers (Customer Segments), how the company relates to them and delivers the product/service (Customer Relationships and Channels). It also highlights the Key Activities required to deliver the Value Proposition and the human, physical and digital resources (Key Resources), as well as the financial resources (Revenue and Costs) that would be required to run the company.

1 Introduction

1.1 Objective of Report

This report is the first deliverable from **Task 6.2 Emergent Business Models for the ‘on-demand’ economy** and is the first draft of the Business Plan for the emerging SENATOR Platform. This first draft of the SENATOR Business Model describes the rationale for how an organisation that owns the SENATOR Platform can create, deliver and capture value.

It sets out the physical/operational business models that are being tested within the SENATOR Urban Living Labs in Dublin and Zaragoza and how the emerging SENATOR Platform can add value to these physical/operational models by reducing costs, generating more revenue or improving the quality of service. It also includes a case study for how the SENATOR Platform could facilitate – even be a requirement for - the development of an e-cargo bike service for ‘last mile’ deliveries in the city centre of Chester in the United Kingdom; this case study includes a quantitative assessment (based on assumptions in relation to demand) for Chester city centre of the potential value available for the owner of the SENATOR Platform based on the value generated for users.

The report then describes and summarises the potential business model for the SENATOR platform from a qualitative point of view based on the Business Canvass methodology.

A further more detailed assessment of the costs and benefits from the Living Labs in Zaragoza and Dublin will become available for the 2nd Report for Task 6.2, following the implementation and trialling of the platform later in the project. Similarly, a quantified Business Plan for the SENATOR platform will be produced for the 2nd Report.

1.2 Working Definitions

Urban freight transport

SENATOR is principally concerned with developing an Information and Communications Technology (ICT) platform that seeks to optimise the physical operations of **urban freight transport (UFT)** and UFT can be defined as:

The movement of goods into, out of, within and through an urban area.

From the point of view of developing a business model for the platform, key considerations relate to the demand for and supply of urban freight transport services and how the demand can be met in a way that minimises costs and maximises benefits for businesses, their customers and for society.

Demand and supply

In economics, **demand** is the quantity of a good or service that consumers are willing and able to buy at a given price in a given time period. The level of demand for particular goods and services is influenced by a number of factors, including necessity, quality, convenience, purchasers income and tastes/fashions.

Urban freight transport is a **derived demand** as the demand for deliveries and collections of freight is the result of demand for goods (which subsequently needs to be transported into an urban area from distant locations) rather than demand for urban freight transport services in their own right. Similarly, demand for the SENATOR Platform is a derived demand, as users will want to use it to reduce their costs or improve the quality of service they receive from transport operators.

Supply, on the other hand, refers to the total amount of a specific good or service that producers are able and willing to make available to customers at a given price. In relation to urban freight transport this generally refers to the amount of freight transport capacity that can be made available to shippers by transport operators. The total supply of freight transport capacity will be defined by the number and size of vehicles such as HGVs, vans or cargo bikes and human resources that operators can make available to shippers at a given price in order to cover their costs and make a profit.

Key types of organisations involved

Shippers are the organisations which physically despatch goods into urban areas as a result of demand from businesses and residents.

The end-customers of the urban freight deliveries are the **receivers** of the goods, whether they are businesses receiving, for example, retail stock or individuals receiving deliveries of e-commerce parcels.

The process of transporting goods into urban areas is undertaken by **transport operators** either directly by shippers (using their own transport fleet) or by specialist logistics service providers on behalf of shippers.

In the market for urban freight deliveries and collections, which is competitive and therefore cost-focused, the main potential users of the SENATOR Platform are Shippers, Receivers and Transport Operators. However, a fourth user is the public sector (generally represented in the context of UFT by the city authorities) for reasons explained in the next section of the report.

1.3 Generic Stakeholder Analysis

Urban freight transport involves the movement of vehicles in urban areas which generate economic externalities, such as greenhouse gas and pollutant emissions, congestion and noise, the latter being a particular issue if deliveries and collections are being made at night. These issues cause concern for residents in urban areas and for the city authorities that are responsible for environmental regulation and transport policy.

At the same time, however, residents want to have a wide range of goods available in the local shops, to visit bars and catering establishments and to receive e-commerce parcels at their homes or offices. They would also recognise that freight transport activity generates employment, as well as supporting city economies by providing an efficient low cost service. Taking these different perspectives into account, it is important that the regulatory/policy regime reflects the interests of local residents, as well as the private and commercial interests of the private sector freight transport industry.

The different expectations of the various actors in relation to urban freight transport can be described through stakeholder analysis, which categorises the different groups of people and organisations with an interest in the subject and highlights their different expectations.

The figure below shows the main stakeholder groups that are affected by freight transport in cities, with their main expectations. In very general terms, residents and visitors are seeking a high quality of life/experience ('quality of place'), while transport operators and their customers have a strong interest in achieving low cost, on-time deliveries. Having said that residents and visitors are also becoming increasingly aware of the impact of climate change and the impact they themselves have on carbon emissions as consumers; and many shippers are becoming increasingly conscious of their environmental and social responsibilities as well as the need to generate profits for their shareholders.

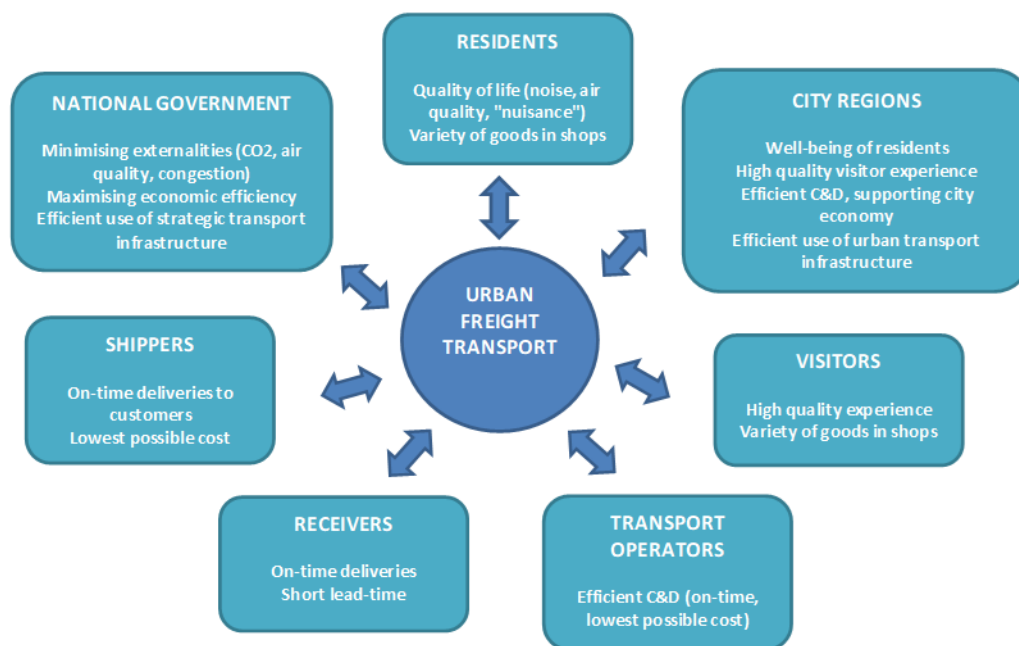


Figure 1 Urban Freight Transport – Key Stakeholders

These different stakeholder expectations can result in conflicts that need to be resolved through trade-offs between the private needs of the freight transport industry and its customers and public needs (improved air quality, lower congestion etc.) through the intervention in the market by city authorities. In economic terms, where the costs of private activities (so-called external costs) are not fully reflected in the user costs of the freight industry and their customers, there is market failure; the public sector therefore has a role in seeking to balance the needs of the private operators with the wider needs of society.

Where the SENATOR Platform facilitates a reduction in external costs (e.g. reduced carbon emissions or improved air quality through optimisation of the use of the logistics network capacity/resources and a reduction in vehicle kilometres within the urban area) or provides other more qualitative benefits such as enhancing the 'quality of place' on behalf of society, the relevant City Authority is a further potential user.

Split of costs and benefits

The above analysis of stakeholders highlights that any Business Model for the SENATOR Platform needs to take into account a number of different potential users which will be seeking to secure different benefits from the platform, while also potentially incurring additional costs. The appropriate sharing of the costs and benefits between these different stakeholders to provide the required incentives will be crucial to the commercial success of the SENATOR Platform.

1.4 The theoretical value proposition for the SENATOR platform

The business model for the SENATOR Platform has to be based on the software creating value for a potential user by:

- Reducing the user's financial (or non-financial, external) costs, which can usually be quantified; and/or
- Enabling a user to generate more revenue, which may be quantified based on some assumptions about future units of demand and/or an increase in the price charged; and/or
- Improving the quality of service provided for the user, which may be quantifiable or may be relatively intangible (and therefore unquantifiable).

A rational user will calculate the value generated as a direct result of using the software by comparing the WITHOUT SENATOR scenario with the WITH SENATOR scenario. This value generated is the theoretical maximum that the user should be prepared to pay for the SENATOR Platform, but normally the value would be shared between the provider of the software and the user.

The value generated for a particular user (in both quantitative and qualitative terms) is called the Value Proposition in the Business Model Canvas methodology that is being used by this project.

The following sections of the report will therefore set out the following:

- An outline of the SENATOR 'product': the SENATOR Platform itself (section 2);
- A description of the WITHOUT SENATOR scenario in each of Zaragoza, Dublin (the formal Urban Living Labs) and Chester (an additional case study) and then a comparison with the WITH SENATOR scenario to highlight the extent to which value is generated for potential users (sections 3, 4 and 5);
- The results of the application of the Business Model Canvas methodology to SENATOR as a whole, based on the lessons learned from the Urban Living Labs and Case Study in relation to the Value Proposition (section 6).

2 The product: summary of the SENATOR Platform

Given the business-focussed nature of this report, the description of the SENATOR Platform, which is the ‘product’ that would be offered to the market, is summarised in terms of its Services Layer. This layer provides the business functionality that would be perceived by users, without providing additional technical detail¹.

The four main services SENATOR will provide, and their functionality, are described below.

SENATOR service	Functional description	Main users
On-demand Platform Manager	<ul style="list-style-type: none"> To integrate the demand for shipments coming from different sources (principally from Shippers and controlled by Transport Providers) To match the demand from Shippers and Transport Providers with the offer made available by all Transport Providers available at that time on the SENATOR Platform To manage the interaction between Shippers and Receivers 	Shippers, Receivers & Transport Providers
Multimodal Fleet Manager	<ul style="list-style-type: none"> Aggregates the information of logistics companies and transport agents that would participate in SENATOR as service providers (Transport Providers), such as the available vehicles, their characteristics and capacity/capability Plans delivery routes taking into the demand and its features (e.g. level of service, user preferences, etc.), the fleet characteristics and available logistics services, as well as restrictions and preferences of authorities and managers. Assists the operators of Urban Consolidation Centres (UCCs) in consolidating orders and preparing the departure of delivery routes 	Transport Providers, including operators of the UCC

¹ Available in deliverable D3.6 SENATOR ICT platform integration and services implementation.

Smart Routes Manager	<ul style="list-style-type: none"> • The monitoring of delivery routes in real-time (e.g. location of vehicles, the status of consignments, etc.) • The monitoring of incidents that may affect the normal course of delivery routes • The load balancing of operators in cases of incidents that significantly affect the delivery of shipment • Monitoring of the status of the infrastructure in real-time (e.g. traffic, loading bays, etc.) 	Transport Providers
Diagnosis of Urban Infrastructure	<ul style="list-style-type: none"> • Monitoring and management of urban infrastructure involved in last-mile logistics (e.g., traffic, low emission zones, loading bays, etc.); • Monitoring and management of incidents related to urban infrastructure 	City Authorities

The services are designed to be provided to the different users via a web application, a mobile application and a web-based dashboard of KPIs, along with appropriate Application Profile Interfaces (APIs) to allow different ICT systems to communicate with each other. For example, while the manager of a Transport Operator is likely be using the web application to make capacity available in the Multimodal Fleet Manager, its delivery drivers are more likely to be using the mobile application to follow a route to make the deliveries and the City Authority is most likely to be using the Dashboard to view KPIs on estimated levels of carbon dioxide that are being generated.

The source of key added value at a strategic level provide by the SENATOR Platform compared to in-house platforms operated by individual Transport Providers in urban areas are likely to be as follows:

- The ability to collaborate by transferring information between different operators to reduce costs and environmental emissions;
- The ability for demand to be met in a multimodal manner, whether by electric LGV, e-cargo bike or by walking depending on the choice of the user; these choices could, for example, be to minimise costs or minimise carbon emissions.

The next section of the report considers the Value Proposition in a specific case, that of the Urban Living Lab in Dublin.

3 Potential value generated by the SENATOR Platform: Dublin Urban Living Lab

3.1 Introduction

Dublin is a major European capital city located on the east coast of Ireland. In 2018 it was designated as a global city by academics due to its status as a significant hub within the international economic and social system. The Greater Dublin Area, which encompasses the city of Dublin and its surrounding commuter hinterland, is estimated to have a population of 2.1 million. The city developed historically on the river Liffey at the mouth of which is the Port of Dublin, Ireland's largest port.

From the point of view of 'last mile' freight deliveries, most distribution centres are located close to the M50, the city's orbital motorway which circles around the city to its west. Goods are then transported into the city centre by all but the largest HGVs; the latter are banned to avoid freight to and from the port transiting the city centre rather than using the Port Tunnel, which is the start of the M50, linking the port under the city centre to the northern side of the city near Dublin Airport.

3.2 Stakeholder workshop

In May 2022 a stakeholder workshop was organised by Dublin City Council and AnPost to discuss the concept of a UCC for parcel deliveries in central Dublin. As well as some key public sector stakeholders, such as the Department of Transport and the National Transport Authority, a number of parcel operators and couriers attended.

The workshop allowed the key frustrations and pain points for deliveries in central Dublin to be highlighted by all stakeholders, which could act as an incentive to collaborate on ‘last mile’ distribution; these were defined as the amount of vehicle traffic and congestion which reduces operational efficiency and the difficulty in finding legal parking spaces in the city to make deliveries.

The workshop also highlighted the key barriers to collaboration in ‘last mile’ deliveries by means of consolidation, which were defined as:

- The cost: consolidation leads to additional costs in the door-to-door transport chain, which would need to be recovered or mitigated;
- Trust: the different operators compete with each other on price and service quality and the operators of the ‘last mile’ delivery service based on consolidation might gain a greater understanding of competitors’ customer relationships; in addition, each of the operators would need to trust the ‘last mile’ operator to provide a high quality service for their customers;
- IT: each of the operators has its own IT system, which would require integration with that of the ‘last mile’ operator.

Following the stakeholder workshop, a number of follow up meetings took place with logistics companies operating in Dublin to discuss collaboration for a trial of a UCC for central Dublin.

In parallel, Dublin City Council has undertaken work to map the location of legal opportunities for freight vehicles to park in Dublin and this information can be provided as an input to a SENATOR Platform in Dublin to assist in planning routes.

3.3 Urban Consolidation Centre solution – WITHOUT SENATOR

The solution would be the development of a UCC with a ‘last mile’ delivery service operated by AnPost using electric vans and e-cargo bikes in central Dublin.

In practical terms, the consolidation concept would work as follows:

- LGVs and HGVs belonging to multiple parcel operators would deliver consignments of parcels that are destined for central Dublin to the designated UCC on the outskirts of the city centre;
- The UCC operator would consolidate the consignments before loading them into electric vans or e-cargo bikes for onward delivery; and
- Electric vans or e-cargo bikes would be despatched into the city centre to complete the final deliveries.

As the ‘last mile’ deliveries would be carried out on behalf of several different Transport Providers, the operation would be branded as SENATOR.

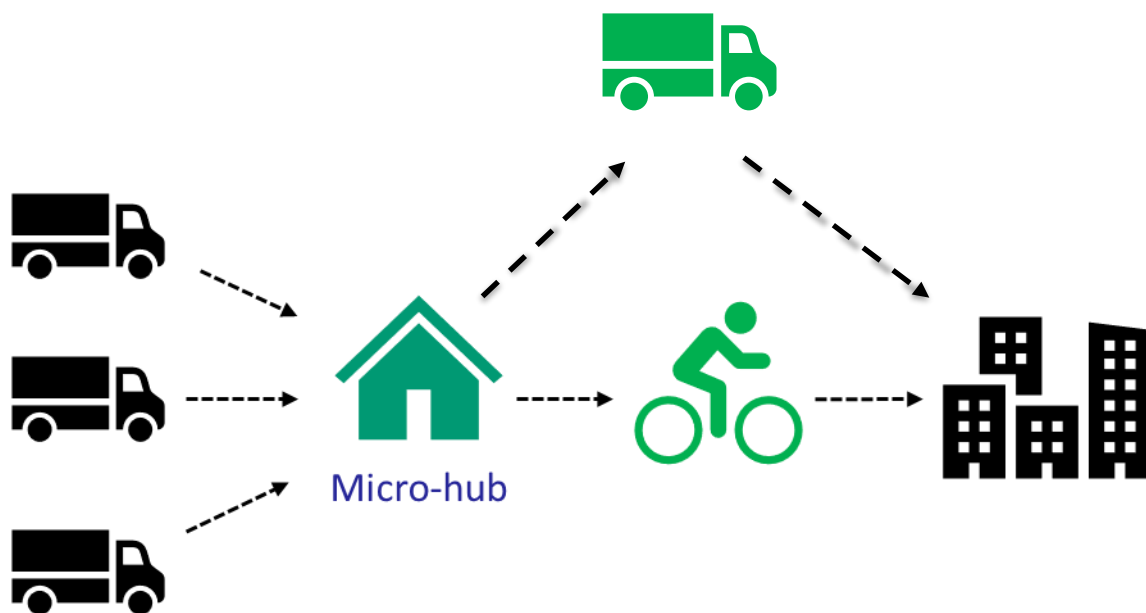


Figure 2 Potential logistics chain in Dublin

Without SENATOR (or a similar system) such an operation is unlikely to be possible because:

- The inbound parcel operators (Transport Providers) would want to have a digital record of when their consignments had been handed over to the ‘last mile’ operator at the UCC for reasons of security, insurance and liability claims;
- The inbound parcel operators (Transport Providers) would require a record of when the consignments had been delivered to the receivers; again, this would be to ensure the security of the consignments, to meet insurance requirements and to minimise issues over liability for the goods;
- The planning of the routing could be carried out ‘manually’, based on the knowledge of the staff of the ‘last mile’ Transport Provider in central Dublin, but it would be relatively inefficient as it would take time to carry out the planning exercise while the delivery vehicles would be stationary and therefore under-utilised;
- Receivers want to know when their parcels are going to be delivered and be able to track the delivery in order to plan for its arrival and avoid wasting time waiting for it

or missing the delivery. This is more difficult when the inbound Transport Provider is handing over responsibility for the final delivery to another operator;

- The inbound Transport Provider and the ‘last mile’ Transport Provider both want the Receiver to know when the delivery will take place to avoid a failed delivery, which increase their costs as a re-delivery has to be organised.

Overall, this suggests that for the WITHOUT SENATOR scenario, the ‘last mile’ delivery service might not be feasible without a suitable IT system. This conclusion is supported by the outputs of the workshop in Dublin in May 2022, when the issue of IT integration was raised as an issue that needed to be resolved.

3.4 Urban Consolidation Centre solution – WITH SENATOR

Introduction

The WITH SENATOR scenario would allow for the consolidation and ‘last mile’ delivery service to be feasible as described above by providing software to coordinate and plan deliveries that were originally sold by several different inbound Transport Providers but carried out in practice by a single ‘last mile Transport Provider using electric vans or e-cargo bikes into central Dublin.

The UCC operations would incur some additional costs related to the operation of the UCC itself, which is required for the physical transfer of parcels between the inbound Transport Provider and the ‘last mile’ Transport Provider. The cost of the ‘last mile’ delivery would also need to be covered.

However, the benefits of the service would be as follows:

- Potential efficiencies would be available elsewhere in the supply chain (generating cost savings for the inbound Transport Provider), due in particular to the inbound Transport Provider being able to avoid its vehicles having to drive into the city centre and carry out the deliveries, so that they are available to carry out other work (or to potentially reduce overall fleet size);
- Continuing choice of providers for Receivers because all Transport Providers are able, indirectly, to offer a last mile delivery service into central Dublin;
- Environmental benefits would be secured for society through the zero emission last mile service (principally lower greenhouse gas emissions, improved air quality and adding to the quality of place in the city centre);

- Potential ESG (Environmental and Social Governance) benefits for Shippers and Transport Providers in terms of helping them to monitor and demonstrate that they are working towards meeting their carbon reduction targets and generally embedding sustainability more holistically into their corporate culture.

The inbound Transport Provider would be likely to secure cost efficiencies through:

- Not having vehicles and drivers tied up in central Dublin to make the deliveries (reduction in fixed costs); and
- The reduced distance travelled (a reduction in variable, distance-based, costs) for the vehicles. The vehicles are able to avoid central Dublin and carry out deliveries and collections in other areas of the city.

4 Potential value generated by the SENATOR Platform: Zaragoza Urban Living Lab

4.1 Introduction

Zaragoza is the capital of Aragon and is located in the North-East of Spain. The city has a population of 0.7 million. The city developed historically on the banks of the river Ebro and was originally an Iberian tribal village and then a Roman town. Zaragoza is a heritage city, with some of the buildings forming part of the Mudéjar architectural style in Aragon, which has been recognized as a World Heritage Site by UNESCO.

From the point of view of 'last mile' freight deliveries, Zaragoza is an Urban Living Lab within the SENATOR project which tests two main concepts:

- Allowing two different parcels networks (Correos and Correos Express) with separate physicals networks and IT systems, to share capacity and then seek to minimise environmental emissions and costs when delivering parcels in the city. This allows, for example, the switching of parcels between vehicles at 'virtual hubs'² to increase efficiency.
- Allowing market traders at Local Markets to jointly use a temperature controlled delivery service (provided by Correos, but branded as SENATOR) from the market to their customers. The customers would be able to order their fresh produce using an e-commerce website (developed by the city council to facilitate e-commerce activity for stallholders at local markets) which may be integrated with the SENATOR Platform, so that it receives data on the consignments that have been ordered for delivery.

A further element of the Zaragoza Urban Living Lab is the potential development of a consolidation service for the Regional Market, but this is less developed and so is not considered further in this Report 1 of the Business Model.

² Where vehicles operated by two different Transport Providers transfer parcels between them in suitable locations 'in the street', rather than at a fixed location such as a warehouse.

4.2 Fresh produce delivery solution – WITHOUT & WITH SENATOR

WITHOUT SENATOR

At present the market stall holders selling fresh produce in the San Vicente de Paul local market in Zaragoza may have regular customers for whom they make deliveries using their own vans, which are likely to be parked adjacent to the market. Customers can order their deliveries on the telephone, but then the stall holder has to have a member of staff available to make the delivery with their van.

In practical terms, without the SENATOR platform the following physical operations would occur:

- The customer (the final Receiver) telephones the market stall holder (Shipper) to place an order;
- The market stall holder (Shipper) makes up the order and sends a member of staff to deliver it to the Receiver using their own van.

This means of operation is feasible, but may be sub-optimal for the stallholder (Shipper) and for wider society for a number of reasons:

- The stall holder has to have a van available and a member of staff has to be deployed to make the delivery;
- As all the stall holders may be offering the same service, many van journeys will be required to serve all their customers. The volume of movements generated leads to higher volumes of traffic and therefore greater traffic congestion and environmental emissions for the city.

WITH SENATOR

In order to offer a cost effective service to all the fresh produce stall holders, the SENATOR service needs to make maximum use of digital technology. This would involve:

- The customers (Receivers) placing their orders online using an e-commerce system provided by the city;
- The stall holders (Shippers) accepting the orders via the e-commerce system and making up the orders, with details of the orders being sent to the SENATOR Platform;
- The 'last mile' Transport Provider delivers all the fresh produce orders to the Receivers in a consolidated load and following a route which is optimised by the Platform.

The 'last mile' Transport Provider (or the city authority or market itself, depending on the circumstances at each market) would incur some additional costs related to the operation of the centralised cold storage at the local market and the operation of the refrigerated van deliveries.

The benefits of the service would be as follows:

- Potential efficiencies available for several different Shippers (fresh produce stallholders) in that they do not have to devote their vans and drivers to make 'last mile' deliveries; they can therefore focus on serving their immediate customers at the market.
- Potential increase in demand for the Shippers as a result of making their produce available on-line via an e-commerce system, with deliveries facilitated by the SENATOR 'last mile' service;
- Potential, in the longer term, for the Shippers to avoid having their own vans, as long as their inbound supplies can be delivered to them;
- Potential reduction in the number of loading/unloading bays because the fleet is common and optimised;
- The environmental benefits secured for society through the reduction in van movements and the use of zero emission vehicles for consolidated deliveries (principally lower greenhouse gas emissions, improved air quality and adding to the quality of place in the city centre).

5 Potential value generated by the SENATOR Platform: Chester Case Study

5.1 Introduction

Chester is small heritage city in the North-West of England, which was founded as a Roman fortress in about 74AD and then developed as a port and commercial centre in the Middle Ages. In the 18th Century the city became a major service and retail centre for wealthy residents who would live on their country estates in the surrounding countryside while the arrival of the railway in 1840 allowed the city to develop a tourism industry. The city chose not to develop any significant manufacturing industry in the 18th and 19th Centuries and has retained its Medieval street pattern and therefore has an attractive heritage city centre.

In the mid-20th Century, an Inner Ring Road was built to allow local road traffic to circulate around the city without passing through the heritage core of the city and this allowed the city centre to be pedestrianised during most of the working day. Pedestrianisation has, in turn, provided a safe and attractive environment for shopping, eating and drinking and has allowed a café culture to develop during the summer.

The city centre is therefore closed to almost all road traffic (including delivery vehicles) between 10:30 and 20:00 throughout the year, with an extension in the evening to 22:00 for a Christmas market for a few weeks a year. The area covered by the restrictions is bordered by the red line on the map below. For freight deliveries and collections this means that the city centre retail outlets and hospitality venues generally have to be served early in the morning, with all LGVs and HGVs leaving the pedestrianised area before about 10:30 when automatic barriers are raised and the city centre is closed to vehicular traffic. This is similar to the concept of a Low Emission Zone (LEZ), but the regulatory provisions are driven more by the motivation of creating an attractive urban and heritage environment rather than to restrict access to polluting vehicles.

5.2 Survey of businesses

An online survey of businesses located in the city centre was carried out with the assistance of the local Business Investment District (BID, a body which has the role of promoting economic activity in the city) to establish whether the businesses experienced particular issues with deliveries and collections of freight.

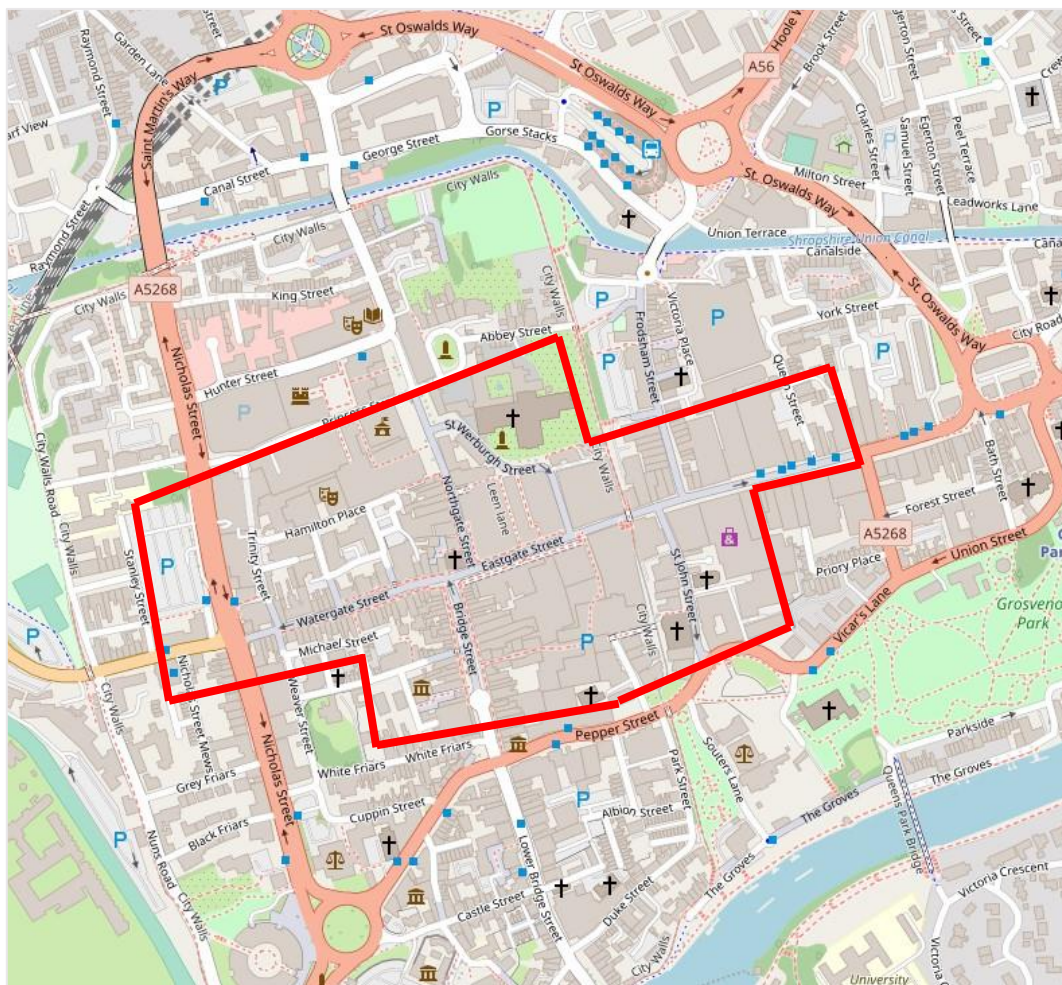


Figure 3 Pedestrianised zone in Chester city centre

The businesses that responded to the survey (8% of all businesses located in the area) were mainly retailers, with a large number of small independent retailers as well as some large national retail chains.

The results suggested that:

- Most businesses only received deliveries, but about 20% also despatched goods (requiring collections);

- Most businesses received only one or two deliveries each day, with 55% only having a single delivery and a further 16% two deliveries each day;
- The typical consignment received is a parcel or a box of goods, rather than goods being delivered in ‘bulk’ form such as in pallets or garments on rails;
- 61% of businesses currently receive their deliveries between 09:00 and 10:30 in the morning, leading to a peak period of freight activity at this time before the automatic barriers are raised and the city centre is closed to vehicular traffic;
- Deliveries are typically made by parcels operators using light goods vehicles (LGVs) rather than larger freight vehicles; however, some of the largest retail outlets also receive deliveries in an HGV.

The respondents were asked to assess the extent which they suffered from typical issues related to freight deliveries and collections.

What issues do you have with freight deliveries? Please tick all that apply and indicate level of importance.

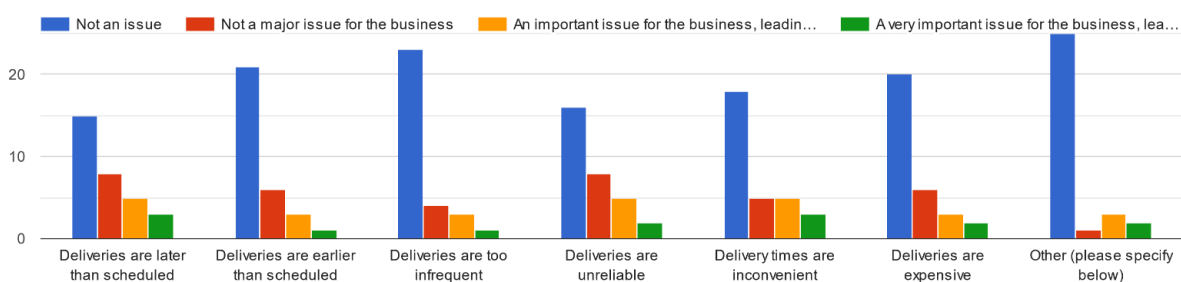


Figure 4 Businesses’ issues related to deliveries in Chester city centre

Most businesses did not report having ‘significant’ issues (defined as ‘important issues’ or ‘very important issues’ (green and yellow bars on the above histograms). The most significant issues reported were late deliveries, unreliable deliveries and inconvenient delivery times.

Overall, the results of the survey of businesses receiving deliveries in the city centre suggest that the final customers of the freight services are generally reasonably satisfied with the service they receive, but with some issues being raised about delivery timing and reliability. Further follow-up work is required through targeted face-to-face interviews, but this may reflect the fact that:

- Their transport service providers have adapted to the restricted hours for deliveries;
- The receivers regard the time window in the city centre for deliveries as a ‘fact of life’ as it has been in place since the mid-1970s; and

- Many of the receivers benefit directly from the attractive environment that pedestrianisation provides.

There is some initial evidence, however, that the potential to have some additional flexibility about when they can receive deliveries would be useful to some of the businesses.

The businesses' freight transport operators will be contacted later in the project, but it is possible they would welcome the opportunity to be able to spread their deliveries more evenly during the day as this might allow them to use their resources (LGVs, staff) more efficiently.

The conundrum is how to achieve greater flexibility in delivery times, while not damaging the attractive 'quality of place' benefits that are provided by the pedestrianisation of the city centre.

5.3 Cargo-bikes solution – WITHOUT SENATOR

One potential solution that is being considered is the development of an additional 'last mile' freight delivery service for the city centre within the time window using e-cargo bikes. These would be zero emission and are likely to be more acceptable in relation to 'quality of place' considerations.



Figure 5 Cargo-bike in Prague

The key underlying principle of the concept is that it would provide continued access to the historic city centre during the current 10:30 to 20:00 vehicle restrictions period for the delivery of parcels and other small/medium sized consignments (and equally the collection of similar packages for delivery outside Chester), using zero-emission cargo bikes.

In practical terms, an e-cargo bike operation would work as follows:

- LGVs and small HGVs belonging to multiple distributors or their 3PLs (including parcel couriers) would hand-over consignments of pre-sorted cargo that are destined for the historic city centre to the e-cargo bike operator at the designated micro-hub located close to the city centre;
- The e-cargo bike operator would consolidate the consignments before loading them onto the relevant e-cargo bikes for onward delivery; and
- E-cargo bikes would be despatched into the city centre to complete the final deliveries.

As the e-cargo bike deliveries would be carried out for a several different 3PLs, the operation would need to be out-sourced to and managed by a separate, specialist logistics operator.

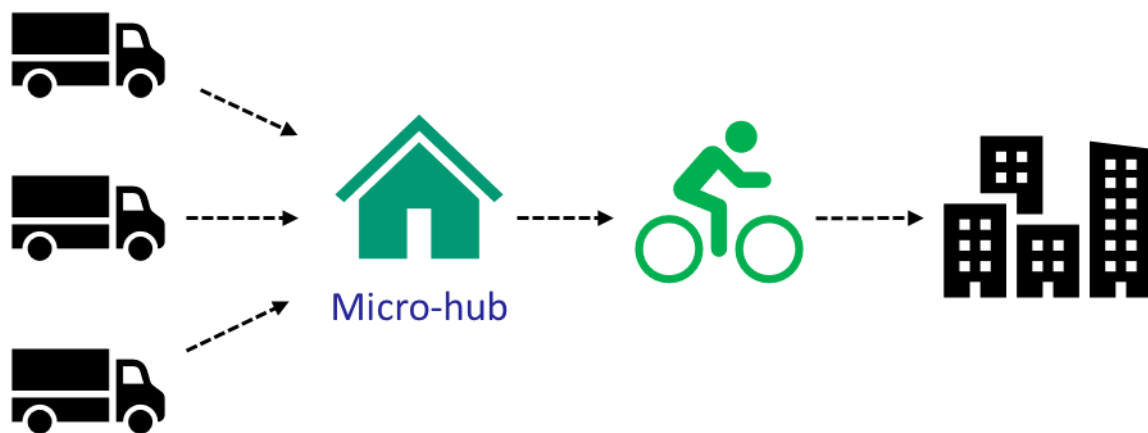


Figure 6 Potential logistics chain in Chester city centre

In order to achieve the required volumes to minimise the cost per parcel of the e-cargo bike service, the 'last mile' Transport Provider would need to capture a sufficient critical mass of cargo and therefore only a single operator is likely to be required to manage the operation; multiple operators could dilute volumes to the point where the strategy would not be commercially viable. A tender would therefore need to be held to appoint an appropriate and competent logistics operator for a fixed period (say 5 years), after which the operation would have to be re-tendered.

In addition, the IT system of the inbound parcels operators would need to be integrated with that of the e-cargo bike service and, without SENATOR (or a similar system) a cargo-bike operator is unlikely to be able to provide a service because:

- The inbound parcel operators would want to have a record of when their consignments had been handed over to the e-cargo bike for reasons of security, insurance and liability claims.;
- The inbound parcel operators would require a record of when the consignments had been delivered to the receivers; again, this would be to ensure the security of the consignments, to meet insurance requirements and to minimise issues over liability for the goods;
- The planning of the routing could be carried out 'manually', based on the knowledge of the rider of the city centre, but it would be relatively inefficient as it would take time while the cargo-bike would be stationary.

Overall, this suggests that for the WITHOUT SENATOR scenario, the cargo-bike service might not be feasible at all.

5.4 Cargo-bikes solution – WITH SENATOR

The WITH SENATOR scenario allows the e-cargo bike service to be provided as described above by providing software to coordinate and plan deliveries by e-cargo bike into Chester City Centre throughout the working day, while the city centre is closed between 10:30 and 20:00, and allowing all relevant parties to understand the costs and benefits.

The benefits of the service would be as follows:

- Potential efficiencies available elsewhere in the supply chain (generating cost savings for the inbound transport provider), due in particular to the inbound Transport Providers being able to avoid its vehicles having to drive into the city centre and carry out the deliveries, so that they are available to carry out other work;
- The quality of service benefits for Receivers with the greater flexibility and convenience from being able to receive deliveries throughout the day;
- The environmental benefits secured for society through the e-cargo bike service as a result of the availability of the zero emission service (principally lower greenhouse gas emissions, improved air quality and adding to the quality of place in the city centre).

The inbound Transport Provider would be likely to secure cost efficiencies through:

- Not having a vehicle and driver tied up for (say) an hour in Chester to make the deliveries (leading to a reduction in fixed costs) and so is able to ‘escape’ from the centre of Chester earlier to carry out deliveries and collections in other areas; and
- The reduced distance travelled (a reduction in variable, distance-based, costs).

The potential for the SENATOR platform to assist in integrating the IT systems and facilitating the achievement of cost efficiencies and quality of service benefits are addressed in the following section.

6 Preliminary SENATOR Business Model based on canvas methodology

6.1 Introduction

Following on from the development of the understanding of the SENATOR Platform's value to its potential customers through analysis of the Urban Living Labs and Case Study, this section of the report develops a first draft of a Business Model for an entity (probably a company) which would seek to commercialise the platform in the future.

The Business Model adopts the business model canvas methodology, which is a strategic management template for documenting a new business model that was developed by Business Model Foundry AG in Austria. It summarises in a visual way all the elements of a company's business model, including its Value Proposition (its products and services and how they add value), along with its customers (called Customer Segments), how the company relates to them and delivers the product/service (Customer Relationships and Channels). It also highlights the Key Activities required to deliver the Value Proposition and the human, physical and digital resources (Key Resources), as well as the financial resources (Revenue and Costs) that would be required to run the company.

6.2 Value proposition

In the development of the Value Proposition for the SENATOR platform, based on the canvas model methodology, there is a focus on the specific jobs ('Customer Jobs') that the Platform can carry out for different 'Customer Segments'. Value is created where the Platform is able to provide benefits to one or more Customer Segments by 'Relieving a Pain' or 'Making a Gain' when a Customer Segment carries out a particular 'Customer Job'.

Customer Segments

As explained in sections 3-5 above the key relevant customer segments identified in the Urban Living Labs and Case Study and catered for by the SENATOR Platform are as follows:

- **Transport Providers**, who are providing a freight transport service to move goods between Shippers and Receivers; this includes the operators of Urban Consolidation Centres and specialist 'last mile' Transport Providers.
- **Shippers** of goods that have contracted the Transport Providers to deliver goods in urban areas.

- **Receivers** of goods: the businesses and residents receiving the deliveries in the city centre.
- **City Authorities**, which are concerned with securing wider benefits for society.

Customer Jobs

The SENATOR Platform would need to be able to perform the following required generic Customer Jobs to meet the key requirements of the Customer Segments in relation to deliveries of goods in urban areas. These Customer Jobs are irrespective of any data sharing or collaboration between Transport Operators that might be facilitated by the SENATOR Platform.

Customer Job	Customer Segment
Plan delivery route to minimise costs	Transport Providers
Plan delivery route to minimise carbon emissions	Transport Providers
Re-plan route following an incident (e.g. road traffic accident or vehicle breakdown)	Transport Providers
Inform receivers when delivery likely to be made	Transport Providers & Receivers
Inform shipper when delivery made	Transport Providers & Shippers
Inform shipper and receiver when delivery failed & rescheduled	Transport Providers, Shippers & Receivers
Record costs incurred in making deliveries	Transport Providers
Record environmental emissions in making deliveries	City Authorities, Transport Providers & Shippers

Customer pains & pain relievers

The SENATOR Platform is designed to allow different Transport Operators to collaborate and share data in order to secure benefits for both themselves and for society through operational concepts such as:

- Consolidation of consignments from different Transport Providers at an Urban Consolidation Centre into full loads for delivery by a single Transport Provider using zero emission modes of transport (e.g. Dublin);
- Consolidation of consignments from different Shippers into full loads for delivery by a single Transport Provider using zero emission modes of transport (e.g. Zaragoza local market);
- Transfer of consignments from different Transport Providers to a single or multiple Transport Providers for ‘last mile’ deliveries using another zero emission mode of transport to avoid regulatory restrictions (e.g. Chester).

As data sharing and collaboration between commercial operators is required, this creates additional potential ‘customer pains’ related to lack of information on the services provided by other Transport Providers and a potential lack of trust between Transport Providers which might normally compete with each other. This means these additional potential ‘customer pains’ need to be addressed, as well as addressing potential customer pains related to the key customer requirements set out under Customer Jobs.

In this context customer gains are usually the same as avoiding a customer pain and, for this reason, only customer pains are shown for each of the four Customer Segments.

Customer pains	SENATOR service	Value creation of SENATOR service
Transport Providers lack visibility of the availability of multimodal services offered by other Transport Providers	Multi-modal Fleet Manager	Transport Provider/Shipper is able to find alternative multimodal services and book the service.
Transport Providers lack visibility of the cost of alternative/multimodal services offered by other Transport Providers	Multi-modal Fleet Manager	Transport Provider/Shipper is able to see the cost of the service on the platform.
Lack of operational coordination between different Transport Providers so that transfers are not possible or lead to delays.	On-demand Platform Manager /Smart Routes Manager	Transport Providers share messages about estimated arrival times of vehicles at transfer points or UCCs.

Wrong goods transferred or incomplete transfer of consignments	On-demand Platform Manager/Smart Routes Manager	Transfer of each consignment recorded and communicated to both Transport Providers and Shipper.
Route planning carried out manually, leading to delays	Multimodal Fleet Manager/ Smart Routes Manager	Plans most efficient route based on delivery addresses for shipments.
Transport Provider carries out deliveries in an inefficient manner (more time and energy required)	Multimodal Fleet Manager & Smart Routes Manager	Plans most efficient route based on delivery addresses for shipments & feedback available on actual versus planned performance.
Transport Provider carries out deliveries in an inefficient manner due to an incident (e.g. road traffic accident, vehicle breakdown)	Smart Route Manager & Multimodal Fleet Manager	Re-plans most efficient route in real-time, including transfer between vehicles.
Receivers do not know when their deliveries are going to arrive	Smart Routes Manager	Provides shipment tracking so that Receivers know the location of their shipment with estimated delivery time.
Inbound Transport Provider and Shipper do not know whether their consignment has been delivered	Smart Routes Manager	Inbound Transport Provider & Shipper notified of successful delivery (or failed delivery).
Inbound Transport Provider & Shippers do not know what has happened to a consignment after a failed delivery.	On-demand Platform Manager	Inbound Transport Provider & Shipper notified of the location of the consignment and re-scheduled delivery time
Shippers & inbound transport Provider does not know whether the correct Receiver has received the shipment.	Smart Routes Manager	Secure identification of the ID of the Receiver during delivery.
City Authority lacks visibility of progress in reducing carbon emissions and other KPIs	Diagnosis of Urban Infrastructure	Data available via a web-based dashboard on KPIs such as estimated carbon & nitrogen dioxide emissions

Customer relationships

In order to market the SENATOR Platform in a particular city it is likely that **personal relationships** will be required with some key users in order to create sufficient critical mass of supply and demand for the Platform to make implementation cost effective. At this stage, the critical first relationship might be with the City Authority to demonstrate that the Platform can secure wider benefits to society by facilitating data sharing and collaboration between Transport Providers to provide a market-based service to Shippers and Receivers in cities. The City Authorities will have some regulatory role and powers, which could be used to encourage the Transport Providers and Shippers to develop a relationship of mutual trust to share data and collaborate to secure wider benefits for society and minimise costs for Transport Providers. The personal relationships could be developed by an in-house business development team or could be outsourced to a network of specialist software distributors.

Once the SENATOR Platform is implemented in a city, the customer relationships should be largely **automated** and it is through the automation that much of the value is created. The SENATOR Platform would facilitate the development of a community of users to secure benefits based on mutual trust, data sharing and collaboration and taking advantage of automated processes to minimise costs.

Channels

Developing **awareness** of the SENATOR Platform is likely to be via an initial approach to City Authorities, such as in Dublin and Zaragoza, to develop communities of potential users in each city and would need to be based on case studies of the practical benefits of implementation that can then be marketed via a website, social media and a press campaign.

In order to allow other potential customers to carry out an **evaluation** of the benefits of the Platform, these case studies would need to include quantified benefits from implementation, such as reductions in costs for identified users and enhanced quality of service KPIs. A simple financial evaluation model might need to be developed to quantify the potential benefits, based on assumed levels of demand in a particular city. The sales process could be carried out by an in-house business development team or could also be outsourced to a network of specialist software distributors.

Purchasing the Platform would probably be based on one or both of two types of charging:

- One-off charge to a City Authority for implementation, where the City Authority takes the demand-side risk and the user community is then developed by the City Authority with free access to the Platform based on authenticated logins; and/or
- A charge applied for each use of the Platform by Transport Providers, Shippers and Receivers, where the company that owns the SENATOR platform takes the demand-side risk but perhaps has the regulatory support of the City Authority to introduce a regime which encourages the introduction of collaborative operations facilitated by a

Platform to share data and collaborate based on mutual trust to complete ‘last mile’ deliveries.

The services provided by the SENATOR Platform would be **delivered** digitally via web-based applications, applications on mobile phones, via web-based dashboards and with system integration provided by APIs.

After sales support would be provided by means of a centralised technical support team, which would respond to enquiries by web chat, email and, if necessary, on the telephone.

6.3 Operations and activities

Key partnerships

The key business partnership for a company operating the SENATOR Platform might be with a software distributor, which would have greater marketing reach than would be possible for a start-up software company and would be incentivised to develop businesses and make sales.

Another key partnership could be with associations and networks of city authorities around Europe and at a national level. For example, in the EU the CIVITAS network might offer opportunities to reach a wide range of city authorities.

Key activities

The key activities of a start-up company that could manage the SENATOR platform would be likely to be:

- Product development: continuing to develop/improve and maintain the SENATOR Platform;
- Business development: raising awareness of the SENATOR product and sales and marketing to potential users; even if this was mainly outsourced to a distributor, it is likely that a business development director or manager would be required to manage the link between the product and its market;
- After-sales support: ensuring that users are fully supported in using the platform.

Other functions, such as human resources (principally to recruit and retain high quality staff), accounting (to ensure that users are charged correctly for their use of the Platform and costs are managed) and legal (to manage the company’s intellectual property) could be outsourced but would need to be managed effectively by the company’s senior management.

Key resources

The key resources required for such a start-up would be as follows:

- Physical resources: minimal physical resources would be required, but it would probably be advisable to have an office to provide a ‘home’ where staff can physically meet to share ideas and foster creativity;
- Digital resources: cloud-based server space and computers;
- Intellectual property: legal advice would be required to protect and manage the intellectual property of the company and licensing of the software;
- Human resources: likely to focus on technical IT staff and senior management to cover Operations, Business Development and Finance/Legal;
- Financial: initial seed funding would be required to fund technical development and business development activities.

6.4 Finances

Cost structure

A company that would commercialise and market the SENATOR platform itself would have an essentially fixed cost structure, with not only technical staff and senior management but also the fixed cost of the sales force (while they could also be given commission on sales as an element of their pay, which would therefore be variable).

Using a network of software distributors to market and sell the SENATOR Platform to City Authorities (on commission) would reduce the fixed costs of the company.

Revenue streams

More work will be carried out on this crucial element of the Business Model for Report 2 , but initial analysis from the Chester Case Study suggests that from a financial point of view the key beneficiaries from the SENATOR Platform would be Transport Providers, either traditional Transport Providers that could reduce their costs or ‘last mile’ Transport Providers whose operations would be facilitated by the Platform.

In some circumstances, Receivers may benefit if the quality of service improves (perhaps because they can receive goods at more convenient times of the day) but these benefits may be more difficult to monetise as they may not be valued sufficiently by potential customer segments such as final consumers.

City authorities may also be prepared to facilitate the implementation of the SENATOR Platform, given the potential reductions in external costs and the more intangible benefits of improving the ‘quality of place’ and the difficulty in monetising the value of improved service quality received by Receivers.

The SENATOR Platform Business Model Canvas

The SENATOR Platform Business Model Canvas is summarised on the following page.

Key partners Software distributors for marketing and sales? Networks of City Authorities for awareness?	Key activities Product development & maintenance Business development & sales After-sales support	Value Propositions Reducing costs for ‘traditional’ Transport Providers Enabling operations of ‘last mile’ Transport Providers Enhancing the ESG credentials of Shippers Increasing service quality for Receivers Enabling a reduction in external costs and enhancing ‘quality of place’ for City Authorities	Customer Relationships Business development: personal relationships with City Authorities Focus on automated day-to-day operations	Customer Segments Transport Providers (‘traditional’) Transport providers (specialist ‘last mile’) Shippers Receivers City Authorities
	Key Resources Physical: office? Digital: cloud-based server space Human: technical & senior management Financial: start-up funding		Channels Awareness: promotion to networks of City Authorities? Evaluation of benefits: case studies & evaluation model Purchasing: one-off set-up costs & pay per use Delivery: digital After-sales support	
Cost structure More fixed cost structure if in-house salesforce More variable cost structure if sales made via software distributors		Revenue Streams Contribution to implementation by City Authorities? Pay per use by Transport Providers, Shippers & Receivers?		