inclusion

INCLUSION Project

Deliverable D4.6

Innovation Pilot Lab Barcelona: implementation and results - Intermediate version

Version: 1.0

Author(s): Lídia Sala, Eva Romagosa

Document Control Page

Title	Innovation Pilot Lab Barcelona: implementation and results - Intermediate version
Editor	Lídia Sala, Mosaic Factor
Contributors	Eva Romagosa, BUSUP
Nature	R
Dissemination Level	CO
Version number	1.0
Planned Delivery Date	M18
Version date	18 April 2019
Abstract	The focus of Barcelona Pilot Lab will be on lowering territorial accessibility barriers in the peri-urban area of the Barcelona Metropolitan Region (BMR) in the occasion of public events, due to poor or inflexible transport offer. Target users groups will be vulnerable users' categories such as young people, teenagers and people with no access to own mobility solutions, as well as the general public suffering from transport accessibility obstacles due to low public transport offer. The objectives of the Pilot Lab are to identify potential users' demand that want to attend to a socio-cultural events through social networks analysis as well as to identify potential geographical areas to propose the most suitable bus-stops locations for the uncovered demand.

Version	Date	Modified by	Comments
0.1	22 February 2019	Mosaic Factor	First draft
0.2	11 March 2019	Mosaic Factor,BusUp	Second draft
0.3	15 April 2019	Mosaic Factor,BusUp	Final version after peer review
1.0	18 April 2019	Softeco	Quality Review

Contents

List of figures

List of tables

1 Introduction

This document prepared by Mosaic Factor and BusUp, includes detailed and extended description of the Barcelona Pilot Lab.

The purpose of this document is to describe the object of the Pilot and the results of the pre-feasibility analysis done during phase 0, including mobility demand, mobility service operated in the site and stakeholders involved, target groups, etc.

Moreover, actions designed for the Barcelona Pilot Lab will be described within this document as well as the actors involved, the time-plan for the demo phase and the risk assessment for this pilot.

The final version of this Deliverable including all the results of the demonstration phase will be submitted on M34.

2 Site description

The focus of the Barcelona Pilot Lab is to reduce territorial accessibility barriers to attend cultural events located in peri-urban areas of the Barcelona Metropolitan Region, due to poor or inflexible transport offer.

Target users are occasional group of travellers (particularly young people), moving as individuals or small groups, travelling to common destinations such as music festivals.
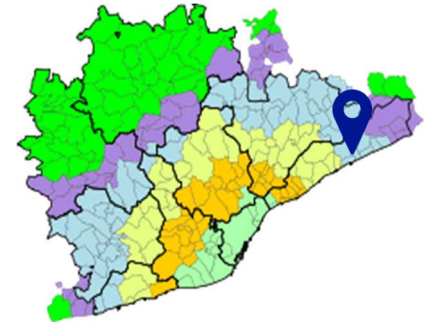
Figure 1: BMR Areas

The pilot area is the peri-urban area of Barcelona Metropolitan Region (BMR), differentiating 4 sub-areas:

- **Area 1** (First zone): comprising of other municipalities (outside Barcelona) in an official union of adjacent cities and municipalities called Barcelona Metropolitan Area (AMB), with a population of 3,220,071 in an area of 636 km^2 (Residential, Business, Leisure and Tourism).

- **Area 2** (Second and Third zone): considered as an urban and metropolitan adjacent area. It forms a belt of cities: Vilanova i la Geltrú, Vilafranca del Penedès, Martorell, Terrassa, Sabadell, Granollers, Mataró and their respective areas of influence. The Catalan government projects the interconnection by means of the Orbital Railway Line (Residential, Business, Leisure and Tourism).

- **Area 3** (Fourth, Fifth and Sixth zone): considered a territory of consolidated expansion. In the area, the expanse is of a radial type, spreading across fluvial corridors or depressions, as in the case of Manresa, Igualada and Vic, or continuing to the coast, as in the case of Blanes and El Vendrell (Residential, Business, Agriculture).

- **Area 4** (Seventh zone): Includes long distance trips to other metropolitan and/or urban areas located outside of zone 6 but inside Catalonia. i.e. Lleida, Girona, Tarragona, etc.

Transit authorities prioritise infrastructure investment in urban centres, which are more densely populated and amenable to public transportation with frequent, regular stops. There is a mounting demand for transport services to, from and around peri-urban areas. However, the mobility services offer in the Barcelona conurbation pilot area is affected by several weaknesses:

- Public transport services are operated on a radial routes structure linking peripheries and the metropolitan centres, which is not able to meet the needs of citizens in the outskirts of Barcelona and neighbouring towns, as services are inflexible and often infrequent, in particular during the night;

- Poor and fragmented info are available from previous customers and no real time information services are currently provided.

Therefore, in some cases car becomes the only option (if it is possible) despite the fact it is more expensive, less sustainable, unsafe (the concerts take place during night-times) or simply, no fun. Moreover, parking limitations or non-alcohol consumption during leisure activities can also push for considering transport alternatives.

Barcelona Pilot Lab aims to apply different ICT methods and tools in order to investigate the target groups transport demand through information mining from Social Networks and organise on-demand bus services to meet the identified mobility needs and improve transport accessibility.

In particular, Barcelona Pilot Lab will be focused in one specific festival, Canet Rock (http://canetrock.cat/). This festival takes place every summer in the village of Canet de Mar, located 45km north from Barcelona, within the fourth zone of the BMR (light blue in image above). The event gathers more than 20.000 attendees every year.

Barcelona – Canet de Mar by car: 40-55 minutes.

Barcelona – Canet de Mar by Public Transport: 1h 16 minutes aprox.

3 Mobility demand

The mobility demand for this event are return trips to go and come back to the event, which typically takes place the first Saturday of July. The event starts at 6pm and closes at 7am the next day.

Travelling by Public transport

Travelling with Public transport to the event shows two main limitations:

1) **Walking distance to Public Transport access:**

The closest Public Transport stop is located at 1,4km from the main event access point. This distance may not be a barrier during day time but it seems to be a high barrier for female event attendees, afraid to walk this distance during night time.

Walking distance to Public Transport offer: 16 minutes walking

2) **Limited direct access:**

The City centre of Barcelona and few other metropolitan cities are the only area that has almost direct access (1,4km walking distance will be never avoided) with Public Transport to the event.

Any other main important urban area is forced to use several transport modes, and since public transport system is radially organised towards Barcelona, any other event attendee not living in Barcelona city centre is forced to use several transport modes that increase the transport time to the event considerably multiplying by a factor of 2 and 5 the travelling time compared to car. Some examples below:

Example of BMR Zone 1:

Castelldefels (Barcelona): Located in BMR Zone 1, at 70km south of Canet Rock.

By Public Transport: 2h 3min (2 times longer than car)

inclusion

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 770115

One-way trip by PT: 4,2€

Example of BMR Zone 1 (Castelldefels) – By Public Transport

By Car: 1h 1min

Cost by Car: 11,23€

Example of BMR Zone 1 (Castelldefels) – By Car

Example of BMR Zone 2:

Terrassa (Barcelona): Located in BMR Zone 2, at 70km south of Canet Rock.

By Public Transport: 2h 9min (4 times longer than car)

One-way trip by PT: 4,2€

Example of BMR Zone 2 (Terrassa) – By Public Transport

By Car: 32min

Cost by Car: 9,83€

Example of BMR Zone 2 (Terrassa) – By Car

Example of BMR Zone 3:

Esparreguera (Barcelona): Located in BMR Zone 3, at 80km west of Canet Rock.

By Public Transport:

Departure time: 7:00am
Arrival time: 10:16am
Total trip duration: 3h16min. (3,4 times longer than car)
One-way trip by PT: 4,2€

Example of BMR Zone 3 (Esparreguera) – By Public Transport

By Car: 57min

Cost by Car: 14,08€

Example of BMR Zone 3 (Esparreguera) – By Car

Example of BMR Zone 4:

La Garriga (Barcelona): Located in BMR Zone 4, at 39km north-west of Canet Rock.

By Public Transport:

Departure time: 7:00am.
Arrival time: 9:25am
Total trip duration: 2h25min. (4 times longer than car)
One-way trip by PT: 4,2€

Example of BMR Zone 4 (La Garriga) – By Public Transport

By Car: Departure time: 7:00am Arrival time 7:35 am. Total trip duration: 35min

Cost by Car: 6,87€

Example of BMR Zone 4 (La Garriga) – By Car

Example of BMR Zone 5:

Artés (Barcelona): Located in BMR Zone 5, at 103km north-west of Canet Rock.

By Public Transport:

Departure time: 7:00am.
Arrival time: 13:55am
Total trip duration: 6h55min. (5 times longer than car)
One-way trip by PT: 6,3€

Example of BMR Zone 5 (Artés) – By Public Transport

By Car: Departure time: 7:00am Arrival time 8:20 am. Total trip duration: 1h20min

Cost by Car: 22,11€

Example of BMR Zone 5 (Artés) – By Car

Example of BMR Zone 6:

Vic (Barcelona): Located in BMR Zone 3, at 103km north-west of Canet Rock.

By Public Transport:

Departure time: 7:00am.
Arrival time: 9:54am
Total trip duration: 2h54min. (3 times longer than car)
One-way trip by PT: 6,3€

Example of BMR Zone 6 (Vic) – By Public Transport

By Car: Departure time: 7:00am Arrival time 8:05 am. Total trip duration: 1h5min

inclusion

This project has received funding from
the European Union's Horizon 2020
research and innovation programme
under grant agreement No. 770115

Cost by Car: 10,00€

Example of BMR Zone 6 (Vic) – By Car

Example of Zone 7:

Girona (Girona): Located outside of the BMR and outside of the Province of Barcelona, at 70km north of Canet Rock.

By Public Transport:

Departure time: 7:00am.
Arrival time: 9:30 am
Total trip duration: 2h30min. (3 times longer than car)
One-way trip by PT: 6,15€

Example of BMR Zone 7 (Girona) – By Public Transport

By Car: Departure time: 7:00am Arrival time 7:50 am. Total trip duration: 50min

Cost by Car:7,28€

Example of BMR Zone 7 (Girona) – By Car

Travelling by Car

There are two main roads (C-32 and N-II) that provide access to the event. Due to the intensive use of car, by the festival attendees, the village and the region are consistently affected by yearly congestion problems that collapse the main roads that provide access to the event. In order to dissuade event attendees from using car, traffic authorities consistently close the highway's (C-32) exits/entrances that are closest to the event.

However, these measures seem to be inefficient in dissuading event attendees to keep on travelling by car, despite the safety issues that always arise when attending events where alcohol is served, and despite the huge problems of finding available parking spots in the area. In order to avoid car collapse in the village the event organizer and the city council are forced to offer several parking spots.

Given the lack of Public Transport options in the area, together with the fact that the closest Public Transport stop is located at 1,4Km from the preferred transport option is the car, despite huge safety risks associated driving after a sleepless night and alcohol consumption.
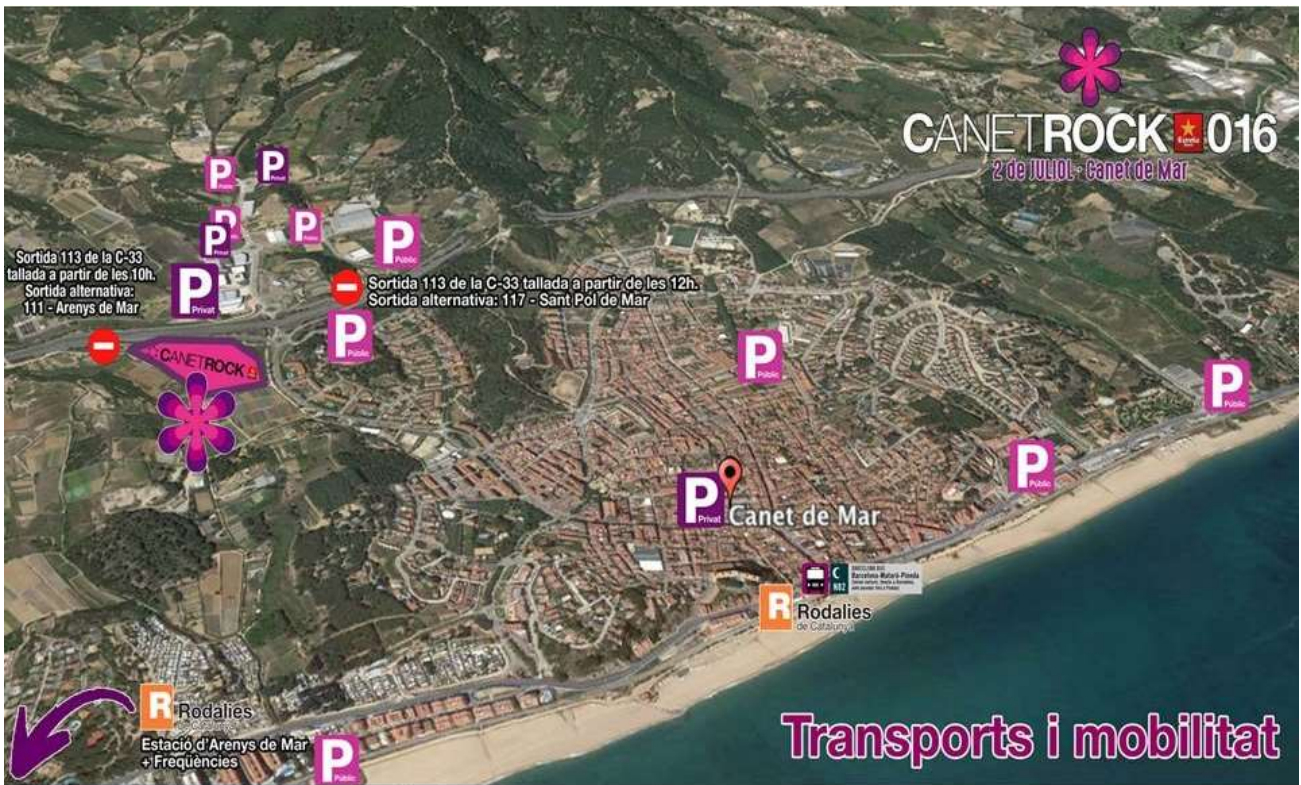
Source: http://canetdemar.cat/pagina.php?id=17345&per_imprimir=1

Figure 2. Parking areas in Canet

4 Mobility service operated in the site and stakeholders involved

Canet de Mar (08360) is placed in transport zone 4H, connected radially with Barcelona by train, line R1 (Table 1) and by regular night bus, N82 (Table 2). However, these events take place during hours that Public Transport is inflexible and often not frequent. Moreover, some areas have limited public transport as PT services are operating on a radial routes structure linking peripheries and metropolitan centres, which is not able to meet target users' needs (Figure 20) (e.g. 4G with 4H, 2D with 4H, etc.)

Source: https://www.mapametrobarcelona.com/mapas-metro/mapa-de-zonas-transporte-barcelona.pdf
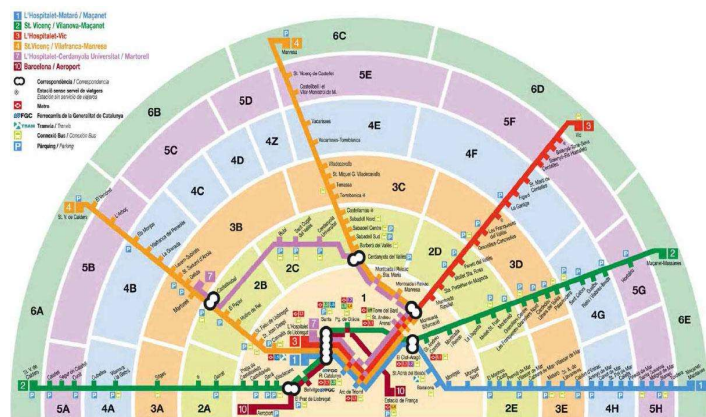
Figure 3: Barcelona conurbation PT map

inclusion

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 770115
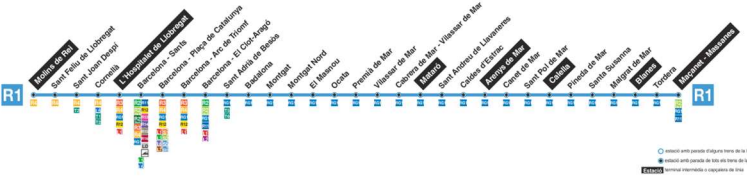
Conventional Public Transport	RENFE-Rodalies
Type of operator	Regional train services
Number of lines and fleet dimension	1 line (**R1**) from Barcelona to Maçanet-Massanes
Extent of the services	100km from Molins de Rei to Maçanet de la Selva
Operating hours	From 4:50h to 00:07h on weekdays and from 6:04h to 00:55h on weekends
Fares	One-way ticket is 4,1€

Table 1: Regional train service offer

Conventional Public Transport	Sagalés
Type of operator	Regular night bus
Number of lines and fleet dimension	1 line (**N82**) from Barcelona to Pineda de Mar (stop in Canet de Mar)
Extent of the services	100km from Barcelona to Blanes
Operating hours	From 23:12h to 06:20h on weekdays and from 22:57h to 06:25h on weekends
Fares	One-way ticket is 6,5€ and integrated ATM tickets are available

Table 2: Regular night bus services

Table 3 defines other options of possible mobility services in the area:

Taxis	Five local taxi drivers
Shared taxis	Available with near towns
DRTs	NOT available
Special services (e.g. for tourist, for children, etc.)	NOT available
Flexible Public Transport	NOT available
Bike/car sharing	NOT available
Voluntary car services	NOT available
Sustainable "individual" mode/ "soft" measures (e.g. personal bike, carpooling, etc.)	BLA-BLA CAR

Table 3: Other mobility services options

5 Target groups for Pilot Labs

As explained in the previous section, given the limited Public transportation options in the area, without the on-demand service proposed in this Pilot Lab, the only option for the music festival attendees is to either take their own car (if possible) or not going to the festival at all, being "Take their own car" the preferred option given the fact that the festival reaches almost full capacity each year (23.000 attendees), which implies a **high safety risk for the attendees** given the fact that alcohol is served during the event.

In 2016, The music festival carried a survey among attendees where 30% of the respondents declared that they would rather travel to the event by bus. Taking into account that the Festival counts with an average of 20.000 attendees, the festival assumed that there was an unattended demand of up to 6.000 attendees.

Given the fact that in the last two editions of the Festival, BusUp has managed to transport 400 (2017) and 800 (2018) passengers, respectively, we can assume that there still are up to 5.200 attendees whose mobility needs may have not been satisfied.

During the pre-feasibility analysis, we have identified which are the **target users' profiles of BusUp for this event:**

Demographic profile of Festival Attendees

This study is based on data provided by the Festival: 14.138 attendees, that correspond to the 61,5% of the total attendees of the music festival.

inclusion

This project has received funding from
the European Union's Horizon 2020
research and innovation programme
under grant agreement No. 770115

Event attendees by Gender Group (2018)
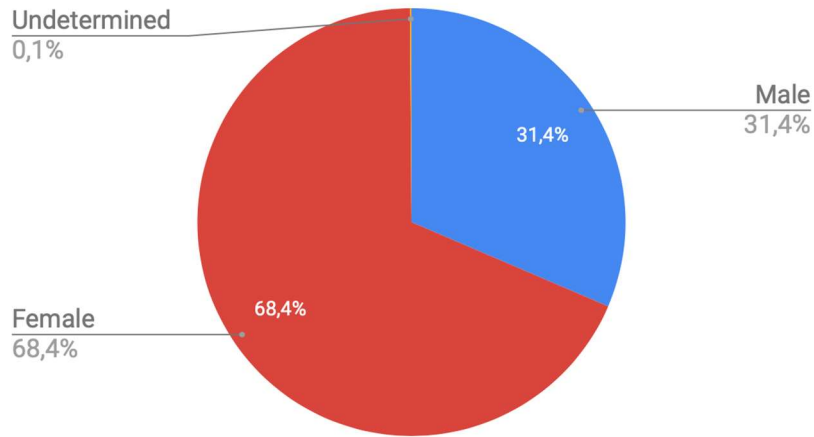
Figure 4: Event attendees by gender group (2018)

Event attendees by Age Group (2018)
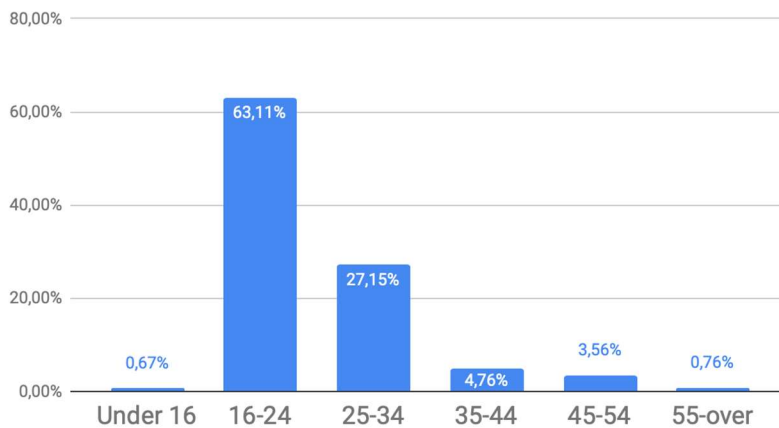
Figure 5: Event attendees by age group (2018)

The demographic profile that corresponds to the transactions made in the booking platform canetrock.busup.com are consistent with the data provided by the festival.

Figures 23 shows that **40,83%** of the sales made in the platform correspond to **users aged under 25 years old.** Moreover, **76,25%** of the sales made in the platform correspond **female users** (Figure 24).

inclusion

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 770115

|	Edat	Adquisició			Comportament			Conversions Comerç electrònic ▾		
		Usuaris ↓	Usuaris nous	Sessions	Percentatge de rebots	Pàgines/sessió	Durada mitjana de la sessió	Transaccions	Ingressos	Percentatge de conversions de comerç electrònic
		6.292 % del total: 44,24% (14.223)	6.113 % del total: 43,33% (14.109)	8.062 % del total: 43,29% (18.625)	39,01% Mitjana de visualitzacions: 37,55% (3,90%)	4,55 Mitjana de visualitzacions: 4,39 (3,60%)	00:01:39 Mitjana de visualitzacions: 00:01:40 (-1,30%)	264 % del total: 43,71% (604)	8.540,60 € % del total: 43,36% (19.696,60 €)	3,27% Mitjana de visualitzacions: 3,24% (0,98%)
☑	1. 25-34	2.619 (41,47%)	2.533 (41,44%)	3.406 (42,25%)	38,61%	4,00	00:01:33	92 (34,85%)	2.683,20 € (31,42%)	2,70%
☑	2. 18-24	1.315 (20,82%)	262 (20,64%)	1.769 (21,94%)	26,91%	4,40	00:02:08	103 (39,02%)	3.487,50 € (40,83%)	5,82%
☑	3. 35-44	1.036 (16,41%)	1.006 (16,46%)	1.231 (15,27%)	46,30%	5,35	00:01:28	28 (10,61%)	1.006,40 €	2,27%
☑	4. 45-54	705 (11,16%)	687 (11,24%)	891 (11,05%)	41,75%	5,76	00:01:35	26 (9,85%)	949,70 € (11,12%)	2,92%
☑	5. 55-64	394 (6,24%)	384 (6,28%)	456 (5,66%)	46,71%	5,98	00:01:27	5 (1,89%)	185,50 € (2,17%)	1,10%
☑	6. 65+	246 (3,90%)	241 (3,94%)	309 (3,83%)	64,40%	2,60	00:01:14	10 (3,79%)	228,30 € (2,67%)	3,24%

Figure 6: BusUp users' transactions by age group

	Sexe	Adquisició			Comportament			Conversions Comerç electrònic ▾		
		Usuaris ↓	Usuaris nous	Sessions	Percentatge de rebots	Pàgines/sessió	Durada mitjana de la sessió	Transaccions	Ingressos	Percentatge de conversions de comerç electrònic
		6.559 % del total: 46,12% (14.223)	6.369 % del total: 45,14% (14.109)	8.399 % del total: 45,10% (18.625)	38,48% Mitjana de visualitzacions: 37,55% (2,49%)	4,53 Mitjana de visualitzacions: 4,39 (3,15%)	00:01:41 Mitjana de visualitzacions: 00:01:40 (0,77%)	295 % del total: 48,84% (604)	9.602,80 € % del total: 48,75% (19.696,60 €)	3,51% Mitjana de visualitzacions: 3,24% (8,31%)
☑	1. female	4.361 (66,78%)	246 (66,67%)	5.717 (68,07%)	34,25%	4,82	00:01:50	221 (74,92%)	7.322,50 € (76,25%)	3,87%
☑	2. male	2.169 (33,22%)	2.123 (33,33%)	2.682 (31,93%)	47,50%	3,91	00:01:23	74 (25,08%)	2.280,30 € (23,75%)	2,76%

Figure 7: BusUp users' transactions by gender

Geographic dispersion of event attendees

According to the data provided by the music festival, 35% of the attendees come from Zone 1. This may be explained by the large demographic concentration of population of that area (4M Inhabitants.)
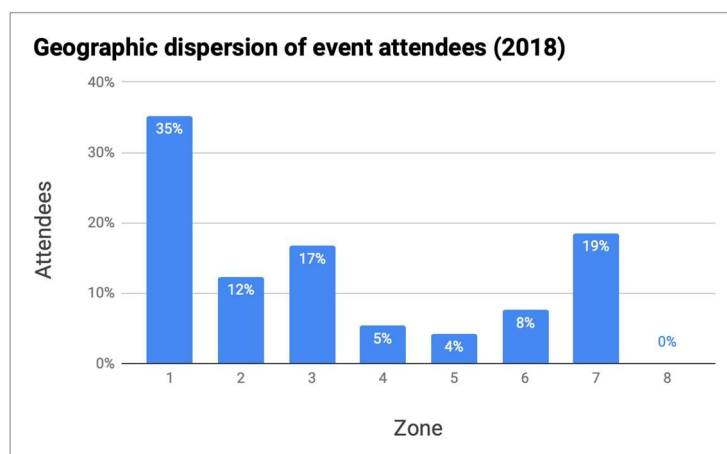
Figure 8: Geographic dispersion of event attendees

Top 20 Municipalities of origin of event attendees:

Barcelona	2744
Sabadell	366
Terrassa	348
Mataró	268
Badalona	208
Girona	199
Manresa	187
Sant Cugat del Vallès	143
Canet de Mar	134
Vic	134
Olot	117
Berga	110
Granollers	105
Molins de Rei	97
Castellar del Vallès	96
Solsona	95
Tarragona	90
La Garriga	87
Cerdanyola	81

Table 4: Top 20 origin Municipalities

6 Identification of the Pilot Lab actions

The Barcelona Pilot Lab actions aim to create a model to identify and classify areas with potential demand to attend to Canet Rock using BusUp on-demand services. This pilot will be based on an iterative approach to predict Canet Rock 2019 and Canet Rock 2020. The main needs to be addressed are:

- On-demand services from point X to Canet Rock location (08360-Canet de Mar) because of the public transport limitations (inflexible and not frequent during night-time).
- There is the need to increase transport accessibility in different vulnerable areas with a safer, cheaper and more comfortable ways to travel to avoid taking private car to attend the event.
- Pseudo real-time and dynamic information of mobility services.

We have carried out a first approach: the pre-feasibility analysis; to understand which the unsatisfied bus mobility demand for Canet Rock is, which is the demographic profile of attendees and finally, which are the areas with the most limited transport options to attend to the event.

Mosaic is now developing the model to identify geographical areas with potential demand to attend to the event and to propose the most suitable bus-stops locations for this uncovered demand. This model takes into account (Table 5):

- Canet Rock interest on Social Networks (Twitter). Including two different studies: the first one, analysing twitter relationships of users connected with the "festival accounts core"; and the second one, analysing non-structured data of tweets.

- Context and demand understanding by analysing and fusing different data sources such as transport connectivity, demographic distribution, historic of attendees and political situation.

Objective	Analysis	Data Source
Analyse Canet Rock interest on social networks	Festival interests on twitter analysing followers	Twitter
	Festival interests on twitter analysing tweets content	
Data fusion based on different data sources analysis to identify and classify potential areas	Demographic distribution	IDESCAT
	Transport connectivity	Google Maps
	Historic of attendees	Canet Rock and BusUp
	Politics	IDESCAT

Table 5: Model structure

To do that, the actions that will be implemented in the Barcelona Pilot Lab will be:
- Enhance specific data analytics tools.
- Propose existing smart mobility solutions to specific user groups of leisure travellers to specific events.
- Consider the whole peri-urban area of Barcelona Metropolitan Region for these smart mobility solutions.
- Testing the digital and social communication strategy on the web and social media.
- Testing the smart mobility solution with specific user groups of leisure travellers to specific events.
- Assess the level of acceptance and satisfaction of the proposed smart mobility solution in targeted area, by its targeted users, in terms of social inclusion, environmental sustainability and quality of live, etc.
- Assess the perceived benefits of the proposed smart mobility solution in targeted area, by its targeted users, in terms of social inclusion, environmental sustainability and quality of life, etc.

Solutions to be demonstrated in the Pilot:
- Identify potential users' demand that want to attend to a socio-cultural event through social networks analysis.

- Identify potential geographical areas with aiming to propose the most suitable bus-stops locations for the uncovered demand.

![inclusion logo]

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 770115

7 Design of the Pilot Lab

Pilot area:

Pilot area is the peri-urban area of Barcelona Metropolitan Region (BMR), where the event takes place.

Service design:

Pre-planned on-demand bus service to go from point X (inside or outside BMR) to Canet Rock (inside BMR) enabling all the potential attendees of the event, to have a faster and easier transport alternative, compared to other public transport alternatives, as well as a cheaper, safer and more sustainable alternative than car.

Users can request new routes on the booking platform (canetrock.busup.com). New routes are created based on the number of requests received on the platform and are optimized based on the number and dispersion of the requests.

Once routes are published on the platform, event attendees can purchase their bus tickets online and only routes that reach a minimum 70% of capacity (of the bus size selected) are finally confirmed. BusUp General Terms and Conditions set that BusUp has to notify the cancellation of the route between 8 and 15 days ahead the festival. This period allows attendees to find an alternative way to go to the festival.

Need for alternative transport: safety, transport accessibility, alcohol, night hours, parking, price, time, etc.

canetrock.busup.com (link in official festival channels)

Search for available routes

In case you find a suitable route, buy the ticket. In case you don't, propose your route

In case you buy the ticket, download it from the e-mail (PDF format: paper or mobile)

BusUp operators team will notify exact logistics information

In case of route cancellation, you will be notified 8-15 days ahead of the festival

Download (if need it) the BusUp App and check the geolocation and information of the route

Get to the bus, show your ticket to the driver (he/she will validate it)

For the return trips, BusUp staff will be at the festival providing service to all the attendees
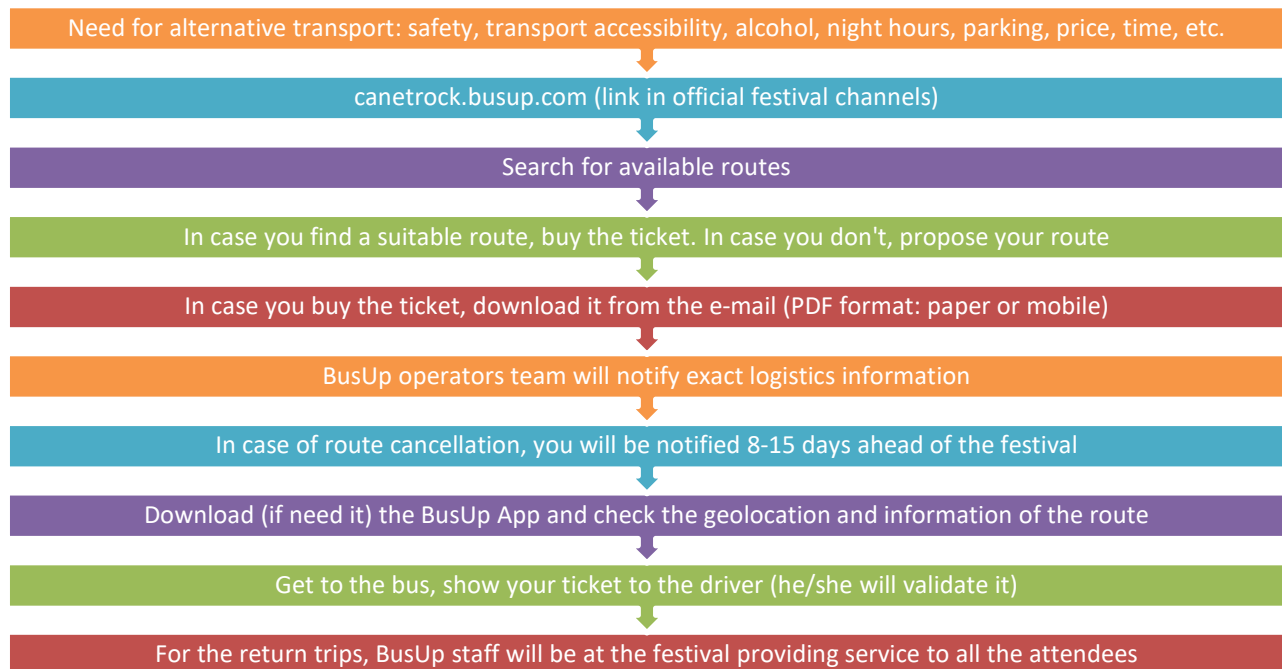
Figure 9: How BusUp service work from customers (end-user) perspective

New service for customers:

By predicting users' demand in advance, we expect to improve the probability of a larger alternative of on-demand bus options, in terms of origins, stops and schedules, and the probability to increase the number of confirmed routes (reaching 70% occupation).

This mobility service will meet target users' needs by improving transport accessibility, access to culture, reduce environmental impact and increase safety.

ITS specifications:

- Historical data analysis from past events and surveys
  o Demographic distribution

The target areas are medium-high population level towns which have ability to attract population of surrounding towns.

The key indicators are:

Relevant towns based on following town-region relations	- Population of town - Relation town-region for population - Relation town-region for density - Relation town-region for surface
Population of town	

Data Source: Instut d'Estadística de Catalunya (Idescat)

  o Historic of Canet Rock assistants and BusUp users

The target areas are those regions of study zone which have a solid base of audience for that festival. At the moment, this is the most realistic data about festival audience in our hands, so our aim is to use it to validate other data about festival audience.

The key indicators are:

Number of assistants to CanetRock 17 per town
Relation between number of assistants to CanetRock 17 per town and population of that town

Data Source: Canet Rock, event organizer

  o Transport connectivity

The target areas are towns that have high-medium public transport trip duration to festival location and/or low relation between private and public transport trip duration, that means private transport is properly faster than public one.

The key indicators are:

Private transport trip duration
Public transport trip duration
Relation between private and public transport trip duration

Data Source: Google Maps

- Analyse festival interest through information mining from Social Networks (Twitter) using Artificial Intelligence to identify potential users' transport demand that want to attend to a socio-cultural event.

○ **Festival interests on twitter analysing follower-relationships**

Target Areas are towns with a relevant number of twitter users following what we call "Twitter festival accounts core", which contains the official twitter accounts of the festival itself, sponsors and artists who played there in last edition or current one.

The key indicators are:

Weighting of users based on which accounts of core they follow
Number of users per town on core network of influence
Scoring of towns based on weight of users located on that

Data Source: Twitter

○ **Festival interest on twitter analysing tweets content:**

Target Areas are towns with a relevant number of twitter activity related with Canet Rock festival, which contains specific key-words previously defined.

Identification and analysis of different areas based on users' activity in social networks by analysing tweets content (no-structured data) through a query to a public API. This study uses Moriarty tool and is structured in different phases (see Figure below):

Figure 10: Festival Interest on twitter analysing tweets content phases

▪ Dictionary creation

To be able to analyse twitter content, a dictionary has been created to analyse twitter key-words (Annex B). This dictionary differentiates two different categories: general case and concrete case (see Table 6) and aims to be used in other similar events.

General Case	Concrete Case
Transport	Canet Rock
Music	

Table 6: Dictionary categories

▪ Crawling

During this phase, queries to different Twitter accounts with relevant tweets related to different categories (Transport, Music, Canet Rock) will be carried out and the relevant information of these different categories will be extracted.
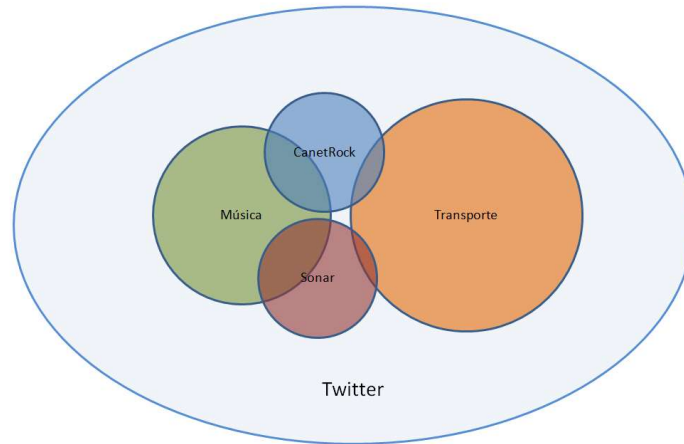
inclusion

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 770115

Figure 11: Dictionary categories

- Data Analytics

Data Analytics aims to analyse tweets content (non-structured data) trough:

Natural language processing (PLN)	• General processing: general text processing techniques for cleaning and analysis, such as: removing stop words, URLs and punctuation, lemmatisation, synonym usage, etc. • Semantic classification: classifying documents based on a previously configured dictionary. • Entity extraction: localizations, organizations and persons of interest…
Geographic location of the tweets and users	Geolocation information contained on Twitter is usually very limited. It is estimated that only the 2% of Twitter users label their location on their publications.[1,2,3] In order to find out the geolocation of a given twit, the user profile location (if available) and its text is extracted to associate this information with the most probable municipality where the twit was written. Then then its localization is estimated.

Figure 12: Data Analytics phases

- Data Storage

After the processing and the analytics of the text, the data is stored in a NoSQL database called Solr, which is specifically built for querying into text files and also feeds a visualization interface.

---

[1] https://www.quora.com/What-percentage-of-tweets-are-geotagged-What-percentage-of-geotagged-tweets-are-ascribed-to-a-venue

[2] https://twittercommunity.com/t/geolocation/91389

[3] Sloan, Luke, et al. "Knowing the tweeters: Deriving sociologically relevant demographics from Twitter." *Sociological research online* 18.3 (2013): 1-11.

Definition of internal processes/procedures:

In order to offer bus routes adapted to the real demand of target users, we need to be able to predict the demand.

This pilot lab will be focused on the prediction of on-demand bus services potential demand for Canet Rock 2019, taking into account the output of the previous analysis done for Canet Rock 2018. Moreover, an initial draft for the on-demand bus services demand prediction of Canet Rock 2020 will be carried out to continue improving the model.

Demand prediction can be identified through the collection and analysis of the following data:

- HISTORICAL DATA

    o Demographic profile of the targeted users

    o Demographic distribution of the targeted users

    o Demographic distribution of the event attendees on previous years

    o Demographic distribution of the event attendees that attended the event by bus on previous years

- DYNAMIC DATA

    o Transport connectivity to the event

    o Interest in the event and related artists shown by targeted users on social networks

Once data is collected and analysed, it will be necessary to compare different outputs as well as identify and classify the areas where there might be potential unattended demand. This will be done through a deep and multilayer analysis.

Once demand results are ready, will be compared with existing bus routes and actions will be taken to adapt the existing routes to serve the unattended demand.

Any changes/adaptation to institutional/regulatory level:

The government policy is open to more on-demand oriented Public Transport, under both, private or public frameworks. Leisure activities such as festivals are mainly private initiatives willing to respond to the following business and operational needs:

- Reduced car overcrowding

- Reduced parking space

- Increase security of assistants and pedestrians in the area

- Avoiding logistic issues and costs (negotiations with local authorities or customer care)

8 Actors to be involved in the Pilot Lab, roles and responsibilities

Stakeholders	Roles and responsibilities
Mosaic (Technology provider, data and mobility expert)	- Lead the task providing its expertise and knowledge on the development of innovative IT solutions - Develop Data Analytics tools necessary for processing of social network data
BusUp (Transport Service provider)	- Implement and realise actions, measures and activities foreseen in the pilot according to the objectives
ITAInnova (Technology provider)	- Develop Data Analytics tools necessary for the processing of social network data
Canet Rock event organiser	- Data input from previous editions
Bus Operators	Transport operators coming from different areas, approx. 6-7

Table 7: Actors Involved in the Pilot Lab

9 Timeplan for the demo operation (M19-M34)

Figure 31 , explains the iterative approach planned for Barcelona Pilot Lab. After the pre-feasibility analysis, Phase 1 aims to identify geographical areas with potential demand to attend to the event and to propose the
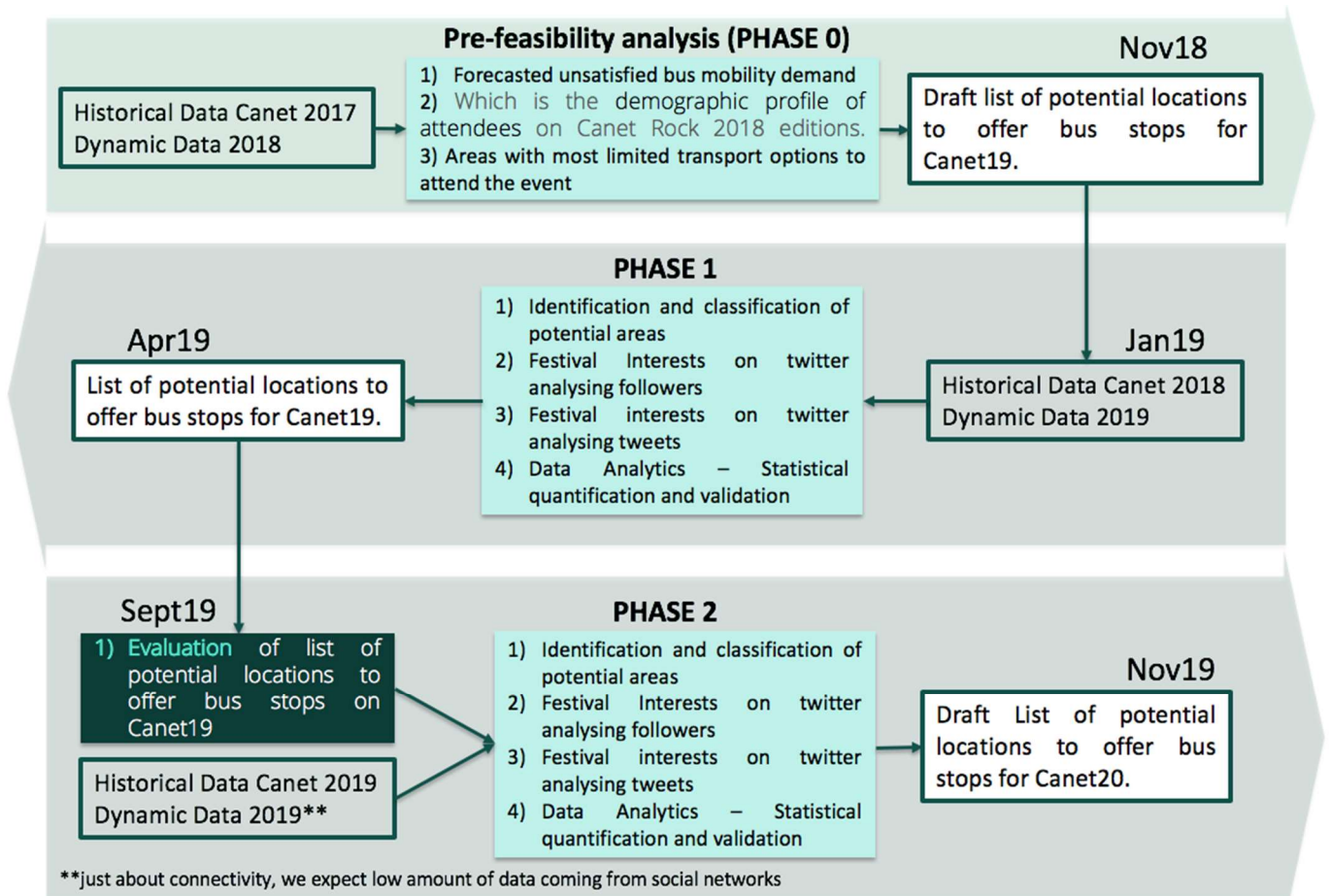
Figure 13: Timeplan for the demo operation

Figure 14: Timeplan for the demo operation

Phase 2 will be the second iteration of this model aiming to predict and identify geographical areas with potential demand to attend to the event and to propose the most suitable bus-stops locations for the uncovered demand of Canet Rock 2020. This first initial draft will be finalised by November 2019.

The main actions of this Pilot lab are summarised in the following Gantt chart:

	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34
First draft of potential locations to be compared with the real case.		M1																				
Identification of potential bus stops locations for Canet'19							M2															
Festival Canet'19										▓												
Evaluation of potential bus stops locations for Canet'19												M3										
Identification of potential locations for Canet'20														M4								
Festival Canet'20																						▓

M1 = First draft of potential locations to be compared with the real case.

M2 = List of potential locations to offer bus stops for Canet'19

M3 = Evaluation of list of potential bus stops locations for Canet'19

M4 = Draft list of potential locations to offer bus stops for Canet'20

Table 8: Timeplan for the demo operation of the Barcelona Pilot Lab

10 Risk assessment

Risk	Likelihood the risk indicated will occur	Mitigation measures planned
Miss the appropriate social network to be considered according to each target event	Medium	Taking into account users that are not active in the social networks but have an account. Complementary

This project has received funding from
the European Union's Horizon 2020
research and innovation programme
under grant agreement No. 770115

		analysis of attendees' postcodes
Lack of data accuracy and data quality (e.g. poor volume of data - insufficient demand for the proposed event, contradictions, etc.)	Medium	To aggregate historical info from other years as well as info from social networks
Seasonality of event may require an advance or delay of the proposed pilot activities	High	No direct impact on WP4 and WP5. In case of not being able to analyse this event, a new similar event will be analysed

Table 9: Risk assessment

This project has received funding from
the European Union's Horizon 2020
research and innovation programme
under grant agreement No. 770115

11 INCLUSION consortium

For further information

www.h2020-inclusion.eu

@H2020_INCLUSION
#H2020INCLUSION

This project has received funding from
the European Union's Horizon 2020
research and innovation programme
under grant agreement No. 770115

Annex A: Barcelona Local Pilot Action Plan

1. Object of the Pilot Lab		

1.1	Actions (to be) demonstrated in the Pilot Lab - Overview	In order to be able to offer bus routes adapted to the real demand of target users we need to be able to predict the demand.
		
		Demand prediction can be identified through the collection and analysis of the following data:
		
		1) HISTORICAL DATA
		- Demographic profile of the targeted users
		- Demographic distribution of the targeted users
		- Demographic distribution of the event attendees on previous years
		- Demographic distribution of the event attendees that attended the event by bus on previous years
		
		2) DYNAMIC DATA
		- Transport connectivity to the event
		- Interest in the event and related artists shown by targeted users on social networks
		
		    a. Festival interest on twitter analysing "Followers"
		    b. Festival interests on twitter analysing "Tweets"
		
		Once data is collected, it will be necessary to compare the different data sets and identify and classify the areas where there might be potential unattended demand. This will be done through a deep and multilayer analysis.
		
		Once demand results are ready, will be compared with existing bus routes and

		actions will be taken to adapt the existing routes to serve the unattended demand.
1.2	What will be demonstrated in the Pilot Lab?	☒ **Improvement of mobility services** ☒ **Implementation of innovative ITS supporting mobility services operation/offer**

1.3 (a)	In case the answer to 1.1) is "improvement of mobility services", please detail which is the change involved in the mobility offer	☒ **Enhancement of a mobility service already operated**
		
		    ☒ **Extension in terms of covered area**
		
		    ☒ **Extension in terms of covered time**
		
		    ☒ **Other**: Demand prediction to improve the quality and quantity of offer (area and time)

1.3 (d)	In case the answer to 1.1) is "implementation of ITS supporting systems", please detail which is the ITS involved	☒ **Service planning** (matching of demand/offer, scheduling of "on demand" services, etc.) ☒ **Data mining system**
2. Pre-feasibility analysis		
2.1	Please describe the current status of needs analysis and the actions already carried out for the identification of requirements the demo actions will comply with. Is the analysis of the requirements completed?	During the pre-feasibility analysis we have identified: 1) Which is the forecasted unsatisfied bus mobility demand based on a Survey made buy the Music festival in 2016 and the Passengers transported by BusUp in 2017 and 2018. 2) Which is the demographic profile of BusUp passengers attending the event during the 2017 and 2018 editions. 3) Which are the areas with most limited transport options to attend the event
2.2	Please resume the main results of the requirements analysis	The main results of this analysis are the following:

![inclusion logo]

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 770115

		There is a potential unsatisfied bus mobility demand of 5.200 attendees. More than 40% of the ticket acquirers have less than 25 years old. More than 75% of the ticket acquirers are female The attendees of the event come from many different places (not only from the Metropolitan Region) but only the coast line (from Barcelona to Maçanet) is covered by public transport (train and bus). The rest of areas are not covered by any direct Public Transport alternative and forces most of the attendees to travel to Barcelona in order to be able have access to a Public Transport option to attend the event
2.3	Please describe the actions to be carried out in the future to complete the requirements analysis and the milestones	Phase 1 (Jan 19 – Apr19): - Data collection: Historical data of Canet 2018 and dynamic data of 2019 - Data Analytics: All the studies explained in 2.1 will be carried out and outputs will be available on April19
3. Design of Pilot Lab		
3.1	Please describe the current status of design activities of Pilot Lab actions. Is the design completed?	The design phase is completed: In **phase 0** (Aug18-Nov18), data collection from Canet'17 and dynamic data of 2018. Initial study to start building the algorithm and understand the model. First draft of potential locations to be compared with the real case. In **phase 1** (Jan19 – Apr19), we will collect all the data required to predict potential demand for Canet'19. We will carry out all the studies explained in 2.1 and also, the main

		outputs of Canet'18 analysis will be considered. A final list of potential bus stops will be the output of this study allowing BusUp to update their offer of bus routes for Canet'19. In **phase 2** (Sept19 – Nov 19), we will collect all the data required to predict potential demand for Canet'20. We will carry out all the studies explained in 2.1 and also, the main outputs of Canet'19 analysis will be considered. A initial draft list of potential bus stops will be the output of this study allowing BusUp to design the first offer of bus routes for Canet'20.
3.2	Please resume the main results of the design of the Pilot Lab	3.2.1 Design of new mobility services/ Definition of improvements to a mobility service already under operation / Service integration Service model: covered area, opening time, routing, scheduling, pick up-drop off points,
		3.2.2 Design of new customers services Service specifications: Predicting users' demand so as to be able to offer demand responsive offer in terms of origins, stops and schedules Data/resources required: Identify users interests expressed in Social Media, identify the availability of public transport options in the area to get to/from the Actors involved, role and responsibilities: - Mosaic: Data gathering, data mining and demand prediction based on users' interests and transport availability

		- BusUp: specifications and requirements, data gathering, pilot validation and testing, users' validation.
		3.2.3 Specifications of new internal processes Description of the processes: Some questionnaires may be necessary to assess users' needs, preferences and behaviours, as well as feedback about the services available. Resources required/involved: Incentive actions to push the users to fill the questionnaire (we need some budget in case we want to carry out this action?). Supporting data/tools/material: on-line/paper questionnaires Allocation of responsibilities: In case we will be able to do it, BusUp will circulate these surveys
		3.2.4 Definition of ITS specifications Technical specifications: To set up the Moriarty Framework and arrange/improve the database needed (demographic distribution and transport connectivity) Functional specifications: demand should be able to be predicted with at least 2-3 months in advance of the event.
		3.2.5 Definition of new funding/business models/commercial agreements
3.3	Please describe the actions to be carried out in the future to complete the design of the Pilot Lab and the milestones	Design Phase has already been completed
4. Implementation Plan of the Pilot Lab		
4.2	Please fill in the following GANTT with the main actions occurring in the demo months for the setup of demo actions included in the Pilot Lab, the implementation of the preparatory	

	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34
activities and the operation. Please highlight the milestone to be achieved up to the launch of Pilot Lab and during the operation of the demo.																						
First draft of potential locations to be compared with the real case.		M1																				
Identification of potential bus stops locations for Canet'19							M2															
Festival Canet'19										▓												
Evaluation of potential bus stops locations for Canet'19												M3										
Identification of potential locations for Canet'20														M4								
Festival Canet'20																						▓

M1 = First draft of potential locations to be compared with the real case.

M2 = List of potential locations to offer bus stops for Canet'19

M3 = Evaluation of list of potential bus stops locations for Canet'19

M4 = Draft list of potential locations to offer bus stops for Canet'20

5. Local stakeholders and partnership (to be) involved during the Pilot Lab design, implementation and operation

Name	Typology (e.g. Transport/Mobility Operators, Local Authorities, Service Contracting Authority, Funding Agencies/Bodies, Citizen associations…)	Role
Mosaic	*Technology provider* *Data and mobility expert*	Lead the task providing its expertise and knowledge on the development of innovative IT solutions. Data analytic tools necessary for processing of social network data
BusUp	*Service provider*	*Implement and realize the actions, measures and activities*

		foreseen in the pilot according to the objectives
ITAInnova	*Technology provider*	*Develop the data analytics tools necessary for the processing of social network data*
6. Contingency plan		
Please list the risk that you envisaged in the implementation/operation of the Pilot Lab	Please indicate the likelihood the risk indicated will occur	Please indicate mitigation measures that you have plan for the risk indicated
Miss the appropriate social network to be considered according to each target event	Medium	Taking into account users that are not active in the social networks but have an account. Complementary analysis of attendees' postcodes.
Lack of data accuracy and data quality (e.g. poor volume of data (insufficient demand for the proposed event), contradictions, etc.)	Medium	To aggregate historical info from other years as well as info from social networks.
Seasonality of event may require an advance or delay of the proposed pilot activities	High	No direct impact on WP4 and WP5. In case of not being able to analyse this event, a new similar event will be analysed

inclusion

This project has received funding from
the European Union's Horizon 2020
research and innovation programme
under grant agreement No. 770115

Annex B: Festival interest on twitter analysing tweets content - Dictionary generation phase

CONCRETE CASE	MUSIC CASE	TRANSPORT CASE
CANET	Música	Transport
CANET ROCK	Festival de música	Cotxe
CANET DE MAR	Festival d'estiu	Peatge
@CanetRock_		AP7
PD busquets		NII
@enderrock		C32
@txarango		AP2
@jarabeoficial		A2
@amicsdelesarts		Tren
@sopadecabra		Renfe
@doctorprats		Rodalies
@ItacaBand		R1
@ZooPosse		RodaliesR1
@gossosgrup		Bus
@soclaiaia		Autocar
@buhosoficial		Autobus
@horadejoglar		BusUp
@raskaoficial		BusExpress
@MiqueldelRoig		ALSA
@ernestcodina		Sarfa
@elscatarres		@Renfe
@laraizband		@inforenfe
@animalgrup		@rodalies
@LaSraTomasa		@rod1cat
@GrupSensesal		@rod2cat
@PupilesOficial		@rod3cat
@lasoulmachine		@rod4cat
@brodasbros		@rod7cat
@radioflaixbac		@rod8cat
#canetdemar		@rod11cat
#CanetRock		@rod13cat
#CanetRock018		@rod14cat
#CanetRock017		@rod15cat
#CanetRock016		@rod16cat
#CanetRock015		#CANETROCKBUS
#CanetRock014		BlaBlaCar
#FlaixbacCanetRock		

This project has received funding from
the European Union's Horizon 2020
research and innovation programme
under grant agreement No. 770115

#miqueldelroig SORTIRELSOL SURTIELSOL EstrellaDamm Rac105 Adolescents.cat Enderrock		