



INCLUSION Project

D4.6 (Final version)

Innovation Pilot Barcelona:
implementation and results - Final version

Version: 1.0

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Abstract	The focus of Barcelona Metropolitan Region 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.		
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1 Introduction

The focus of this Pilot Lab was 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. There was the need to increase transport accessibility in different vulnerable areas with a safer, cheaper and more comfortable ways to travel to avoid taking private cars to attend the events.

Public transport services have been operated on a radial routes structure linking peripheries and the metropolitan centres, which have not able to meet the needs of citizens in the outskirts of Barcelona and neighbouring towns, as services have been inflexible and often infrequent, in particular during the night. Moreover, information on Public Transport Services has been poor and no real-time information services are currently provided.

Therefore, in some cases car has become 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 have also pushed for considering transport alternatives.

The goal of this pilot was to develop ICT tools that would allow BusUp and the event organizer to gather a better understanding of the existing mobility demand to the event (in terms of geographical location) so as to be able to offer better tailored bus routes and increase the overall accessibility of a specific target group young adults attending leisure and cultural events located in areas where limited Public Transportation is available.

2 Recap of the Pilot Lab characteristics

2.1 Brief description of the pilot area

The focus of the Barcelona Metropolitan Region Pilot Lab has been to reduce the territorial accessibility barriers to attend cultural events located in the peri-urban fringe of Barcelona, due to poor or inflexible transport services offering. This pilot has provided tailored on-demand public transport between the Canet Rock annual music festival (<http://canetrock.cat/>) location and the different prioritised areas of transport demand willing to attend the event.

This festival takes place every summer in the village of Canet de Mar, 50km north-east of the Barcelona city centre. The Canet Rock festival attracts 25,000 attendees and is held in July every year.



Figure 1 – Barcelona-Canet de Mar by car.

Source: (Google Maps, 2020)

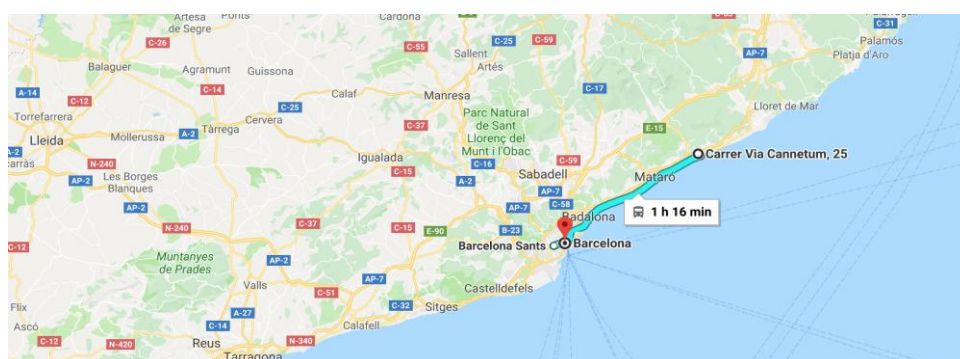


Figure 2 – Barcelona-Canet de Mar by Public Transport.

Source: (Google Maps, 2020)

The pilot area chosen corresponds to the whole peri-urban area of Barcelona Metropolitan Region (BMR), including urban, peri-urban, rural and deprived areas. There are four sub-areas clearly differentiated:

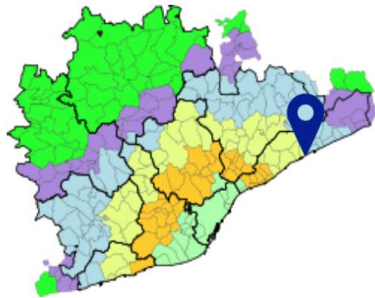


Figure 3 - Barcelona Metropolitan Area.

Source: (Viquipèdia, 2020)

Area 1 (First zone): comprising 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 km² (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.

The Barcelona conurbation pilot area is affected by **structural transport deficiencies** which have led its inhabitants to be highly car dependent, thus directly impacting its net income and highly limiting its access to jobs and/or cultural events taking place in those areas:

Lack of PT investment in Peri-urban areas: Transit authorities prioritise infrastructure investment in urban centres, which are more densely populated and amenable to public transportation with frequent, regular stops.

PT investment is on Radial routes only, connecting peri-urban areas to Barcelona: There is a mounting demand for transport services to, from and around peri-urban areas. However, 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;

Low levels of digitalization of the currently available PT solutions, leads to poor and fragmented information available and thus to lower levels of PT transportation use and more car dependency.

Due to these structural transportation deficiencies, in many cases car becomes the only option (when available) 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.

However, attendees to cultural events are young adults living in remote peri-urban areas with limited access to cultural events or even jobs. For this target group mobility is key, however, due to their young ages most of them do not own a car and many of them do not even have a driving license. As a consequence, the limited offer of Public Transportation and digital information extremely limits its access to jobs and cultural events. As a consequence, there is an excruciating need to provide these young adults with a safe, cheap and sustainable alternative to car use and car ownership.

2.2 Brief summary of the objectives of the Pilot Lab

General objective of the Pilot Lab

These **young adults that live in remote areas with limited access to PT services** (inflexible services and often infrequent, particularly at night), with high car dependency and limited access to jobs and cultural and social activities were the **targeted vulnerable user group** of this Pilot Lab.

Barcelona Pilot Lab has applied different ICT methods and tools in order to **investigate the target groups transport demand to attend a cultural event** (Canet Rock, a music festival located in the peri-urban area of Barcelona with limited access by PT), **through information mining from Social Networks and organise on-demand bus services** to meet the identified mobility needs and improve transport accessibility.

The goal of this work was to develop a model for demand prediction that allows BusUp (a PT service provider) and the event organizer (Canet Rock) to gather a better understanding of the latent mobility demand to the event (in terms of geographical location) prior to event ticket purchase. Then, this information has been used to provide more informed design and delivery of tailored bus routes that better meet the demand and increase the overall transport accessibility.

Specific objectives related to the different actions implemented

Two different measures have been developed and implemented during this pilot:

- **Measure 1:** Using social media to identify unmet needs/demands of people that wanted to attend Canet Rock festival. This measure has been implemented by MOSAIC FACTOR.

Four different actions have been carried out to be able to identify the latent mobility demand and understand vulnerable users' needs.

- Identify interest on social networks (Twitter): (i) Identifying the festival accounts core, which contains the main official festival accounts. (ii) Analyse Twitter non-structured data aiming to detect Twitter activity related to the event in different geographic areas.
- Prediction of potential demand that wanted to attend to the festival through interest detection based on Twitter demographic distribution, transport connectivity, historic information, etc.
- Identification of potential geographical areas to be able to propose the most suitable bus-stops locations for the uncovered demand for Canet Rock 2019 event.

- **Measure 2:** Introduce new on-demand services to meet identified mobility needs of people willing to attend Canet Rock. This measure has been implemented by BUSUP.

Four different actions have been carried out to be able to offer new on demand services to meet the previously identified (Measure 1) vulnerable users' needs:

- 1) Filter and publish new proposed bus stops to attend the Canet Rock festival 2019 on BusUp's booking website (canetrock.busup.com), based on previously identified demand
- 2) Confirm new bus stops and routes to attend the Canet Rock festival 2019 when minimum demand is reached (minimum 70% capacity of the bus).
- 3) Provide new on demand bus services on the day of the event (7th of July 2019)
- 4) Define a communication strategy and prepare the necessary marketing material to reach the target audience.
- 5) Survey distribution to event attendees, targeting two different user groups (BusUp users and non-BusUp users, during the day of the event).

Expectations

The solution applied information mining from Twitter to identify the demand from potential users who want to attend the festival event. This approach involved two different types of analysis: first, establishing the Twitter accounts that were relevant to the analysis: this involved identifying Twitter relationships of users connected with the "festival accounts core"; and second, analysing non-

structured data of Tweets to infer users who displayed intention to attend the event. The social network data was then combined with data on demographic distribution (highlighting the key geographic areas in the region), transport connectivity (between each geographic area and Canet de Mar), and historic data of festival attendees from previous years. This analysis enabled planners to identify in advance where the potential mobility demand (potential event attendees) may come from, so to be able to offer new bus stops and routes, based on the forecasted demand, and to be able to better respond and aggregate this mobility demand (potential event attendees) from different geographic areas which were poorly served by existing PT service provision. and use this to propose the most suitable demand responsive tailored bus routes and bus-stop locations for the unserved demand

2.3 Main outcomes of the design phase

As detailed in Section 2.2.2., the Design Phase, also called Phase 0, consisted in performing a pre-feasibility analysis of the mobility demand. The goal of this phase was to detect any unsatisfied mobility demand and to understand where it was located.

This pre-feasibility analysis was performed based on data available for the Canet Rock festival 2008 Edition including number of routes, tickets sold, occupation rate per route, transport connectivity between Canet Rock and different regions and the quality of the connection between Public Transport and Private Vehicle, based on traveling time.

The results of this pre-feasibility analysis showed that in the 2018 Edition there were at least 16 municipalities that showed significant mobility demand to attend the Canet Rock Music festival and that only 89% of them were covered by BusUp in the 2018, edition.

More details can be found in section 2.2.2.

3 Pilot Lab implementation activities, timing and milestones

3.1 Overall services explanation

BusUp's Service scheme for the Barcelona Pilot:

BusUp operates crowdsourced bus routes to attend cultural and sporting events such as concerts located in isolated areas with limited PT access. BusUp partners with event organizers to become

the official bus service provider to the event. Being crowdsourced, routes are not confirmed until minimum capacity (70%) is reached, otherwise, the route is cancelled 15 days prior to the event and money is immediately returned. BusUp promotes its services on the official website of the event (canetrock.cat), where users can have information about the services and can have direct access to the booking platform to make their bus requests and purchase their tickets. This service scheme has not changed as a result of the pilot, but the quality of the service provided in terms of served destinations and travelling time has.

See below Canet Rock's webpage announcing BusUp's service:



Figure 4 – Canet Rock's webpage announcing BusUp's service.

Source: www.canetrock.cat

Event attendees can purchase their tickets on a BusUp booking platform specifically personalized for the event.

See below BusUp booking platform specifically designed Canet Rock's webpage announcing BusUp's service:



Figure 5 – Another Canet Rock's webpage announcing BusUp's service.

Source: www.canetrock.busup.com

Mosaic New ICT Tools for the Barcelona Pilot

Mosaic Factor, as technology provider, has the focus of identifying potential users' demand that want to attend Canet Rock 2019 and identify potential geographical areas to propose the most suitable bus-stops locations for the uncovered demand.

The solution applies information mining from Twitter to identify the demand from potential users who want to attend the festival event. This approach involves two different types of analysis. The first one establishes the Twitter accounts that are relevant to the analysis: this involves identifying Twitter relationships of users connected with the "festival accounts core" defined by organizers, partners and music artist that participates to the event. The second one, analysing unstructured data of Tweets to infer users who display intention to attend the event.

The social network data is then combined with data on demographic distribution (highlighting the key geographic areas in the region), transport connectivity (between each geographic area and Canet de Mar), and historic data of festival attendees from previous years. This analysis enables planners to aggregate the mobility demand (potential event attendees) from different geographic areas which are poorly served by existing PT service provision and use this to propose the most suitable demand responsive tailored bus routes and bus-stop locations for the unserved demand. These three distinct phases are illustrated in Figure 11:

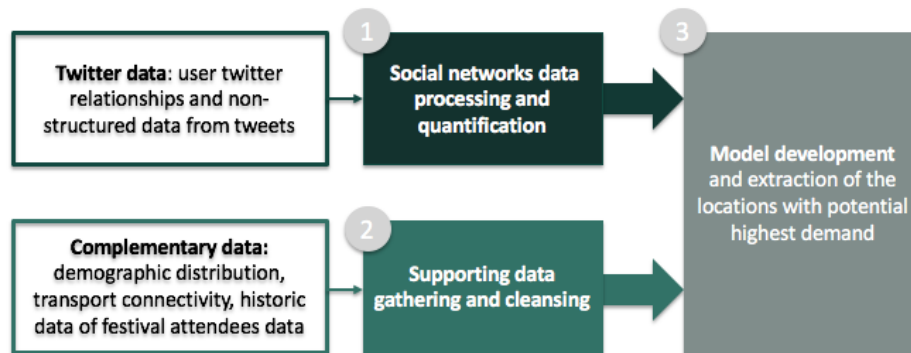


Figure 6 – Three phases of analysis.

The methodology described in this section establishes the bus stop locations most likely to provide passengers for new tailored bus services to and from the event. The tool developed is based on two different phases, as it is shown by different colours in the process flow diagram in Figure 14.

The first one corresponds to the *data extraction and processing*, where the data is acquired, cleaned and processed to feed the model which will extract the potentiality of success when considering a bus stop by a given municipality. In this phase, key procedures are carried out such as the construction of Canet Rock-influencer social network in Catalonia, the public private transport connections from municipalities to Canet Rock, among others.

The second one applies a stochastic model which implements an *ad hoc cluster technique utilizing wisely the processed data* to extract the potential stops. This enables planners to aggregate the mobility demand (potential event attendees) from different geographic areas which are poorly served by existing PT service provision and use this to propose the most suitable demand responsive tailored bus routes and bus-stop locations for the unserved demand.

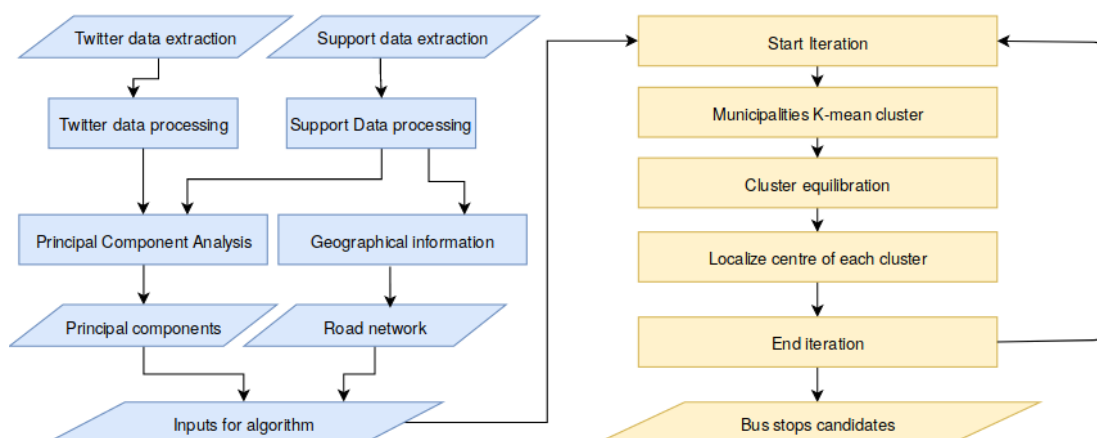


Figure 7 – Algorithm for searching potential stops.

3.2 Timeline and Milestone

3.2.1 Overview and main Phases

The pilot has been structured in three main Phases, depicted in the Figure below, and further developed in forthcoming sections.

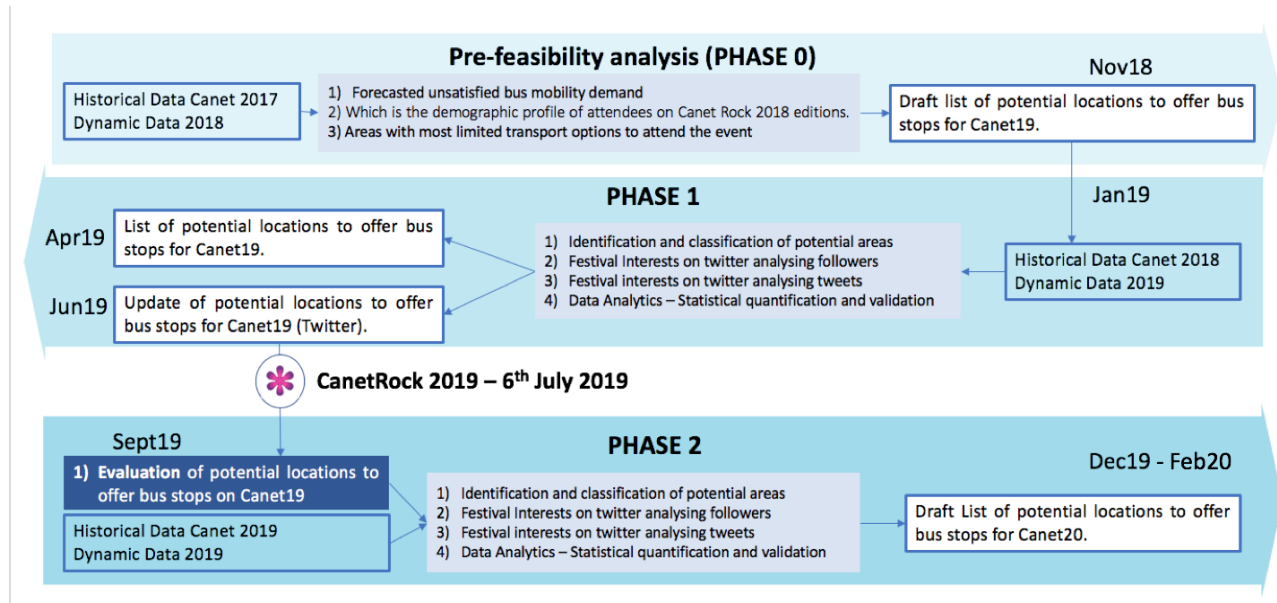


Figure 8 – Timeline Barcelona Pilot Lab.

3.2.2 Phase 0 (December 2017 - November 2018)

September to November 2018 (7-9 months before the event):

The first task of the pilot consisted in data compilation of the main KPIs of the services provided for Canet Rock previous edition (2018). Main results of this data compilation were: 1) 1572 sold tickets 2) 15 routes (2 doubled) and 23 stops. More details in the table hereafter.

Table 1 – Main results for the services provided.

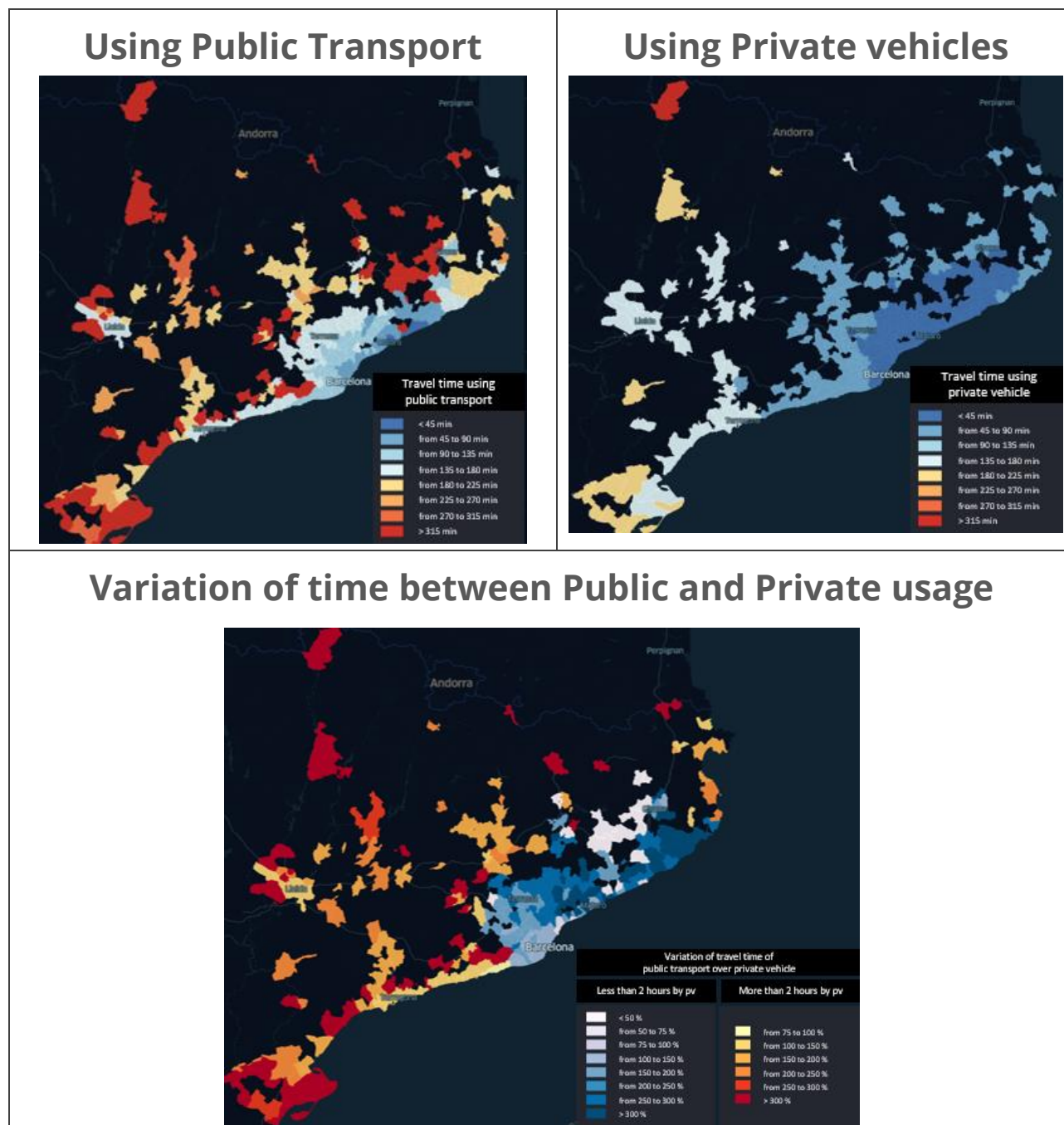
CANET ROCK 2018 TICKETS				
	OUTBOUND	INBOUND		
BARCELONA PROVINCE			BARCELONA PROVINCE	
BARCELONA - CR	54	58	CR - BARCELONA	
BARCELONA - BADALONA - CR	50	53	CR - BADALONA - BARCELONA	
TERRASSA - SABADELL - CR	100	108	CR - SABADELL - TERRASSA	
VIC - CR	59	59	CR - VIC	
VIC - ARBÚCIES - CR	49	50	CR - ARBÚCIES - VIC	
GRANOLLERS - CR	37	54	CR - GRANOLLERS	
VILANOVA - VILAFRANCA - MARTORELL - CR	39	54	CR - MARTORELL - VILAFRANCA - VILANOVA	
GIRONA PROVINCE			GIRONA PROVINCE	
FIGUERES - GIRONA - CR	52	53	CR - GIRONA - FIGUERES	
OLOT - BANYOLES - CR	54	53	CR - BANYOLES - OLOT	
LLEIDA PROVINCE			LLEIDA PROVINCE	
LLEIDA - MOLLERUSSA - IGUALADA - CR	108	108	CR - IGUALADA - MOLLERUSSA - LLEIDA	
SOLSONA - BERGA - CR	52	54	CR - BERGA - SOLSONA	
TÀRREGA - MANRESA - CR	54	54	CR - MANRESA - TÀRREGA	
TARRAGONA PROVINCE			TARRAGONA PROVINCE	
TARRAGONA - REUS - CR	53	53	CR - REUS - TARRAGONA	
TOTAL	761	811		
TOTAL (OUTBOUND + INBOUND)		1572		

The second task of the pilot consisted in performing a pre-feasibility analysis of the mobility demand. Based on 2018 edition data, and in order to implement improvements for 2019 edition, we analysed the occupation rate per route, number of routes, tickets sold, complaints & suggestions of BusUp users.

The next step of this pre-feasibility analysis targeted the identification of the potential demand by analysing the transport connectivity between Canet Rock and different regions. The analysis of the quality of the connection between Public Transport and Private Vehicle is carried out based on the time of traveling.

The following maps show the estimated travel time to Canet Rock settled in Canet de Mar from any municipality populated with more than 3,000 inhabitants in Catalonia. In Figure 16 is shown the PT and PV differences on the same legend, which shows the faster accessibility from the PV for this peri-urban municipality Canet de Mar. In Figure 17 is presented the ratio PT/PV separating the areas if they are further than 2 hours travelling.

Table 2: Travel time using public transport and private vehicles; Background Source: (KEPLER, 2019)



Once the total demand for 2018 edition was identified, we analysed the potential mobility demand that was not satisfied and evaluated the convenience of adding new BusUp stops based on that unsatisfied demand. Data sources of unsatisfied demand include post code of last edition attendees (provided by the event organizer), route requests made by users to BusUp but not

satisfied (BusUp backend) and potential demand identified by Mosaic). An extract of the database generated can be identified hereafter.

Based on these analyses a draft list of potential stops was identified and shared with BusUp taking into account the desegregated inputs from the initial analysis carried out during the pre-feasibility phase. See Table below:

Table 3 – List of candidate municipalities for a stop.

Candidate municipalities for a stop
<p>Barcelona (2017,2018)</p> <p>Girona (2017, 2018)</p> <p>Olot (2018)</p> <p>Banyoles (2018)</p> <p>Sabadell (2017, 2018)</p> <p>Vilanova I la Geltrú (2018)</p> <p>Igualada (2017, 2018)</p> <p>Manresa (2017, 2018)</p> <p>Solsona (2017, 2018)</p> <p>Moià</p> <p>Vilafranca del Penedès (2018)</p> <p>Terrassa (2018)</p> <p>Figueres</p> <p>Vic (2017, 2018)</p> <p>Berga (2018)</p> <p>Mataró</p>

3.2.3 Phase 1 (December 2018 - July 2019)

December 2018 (6-7 months before the event):

Main BusUp's tasks of this stage included: the analysis and assessment of new proposed routes based on confirmed stops on the previous edition (2018) and Mosaics new proposed stops; the request of quotations for the 1st badge of routes to local bus operating companies; the pricing calculation of new proposed routes (provider cost + BusUp Fee), Design and set up the booking page specifically personalized for the event, canetrock.busup.com; and analysing and defining the communication and marketing strategy for the event.

Mosaic's main tasks during this period consisted in:

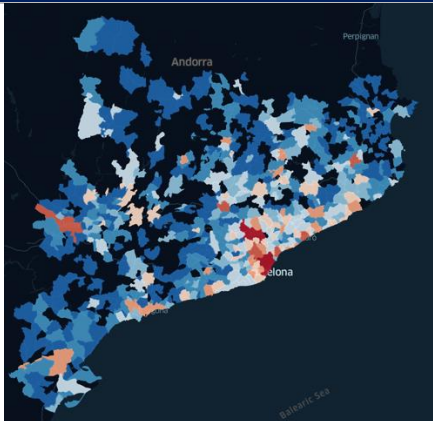
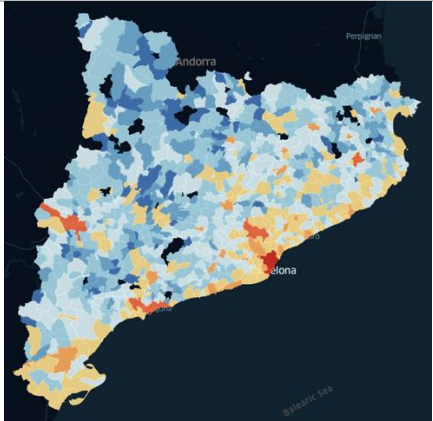
1) identifying the core festival accounts, which contain the main official festival accounts including organizers, partners and music artists; the Canet-influencer social network is constructed from the analysis of the Twitter followers up to second order relations from core accounts, meaning to take

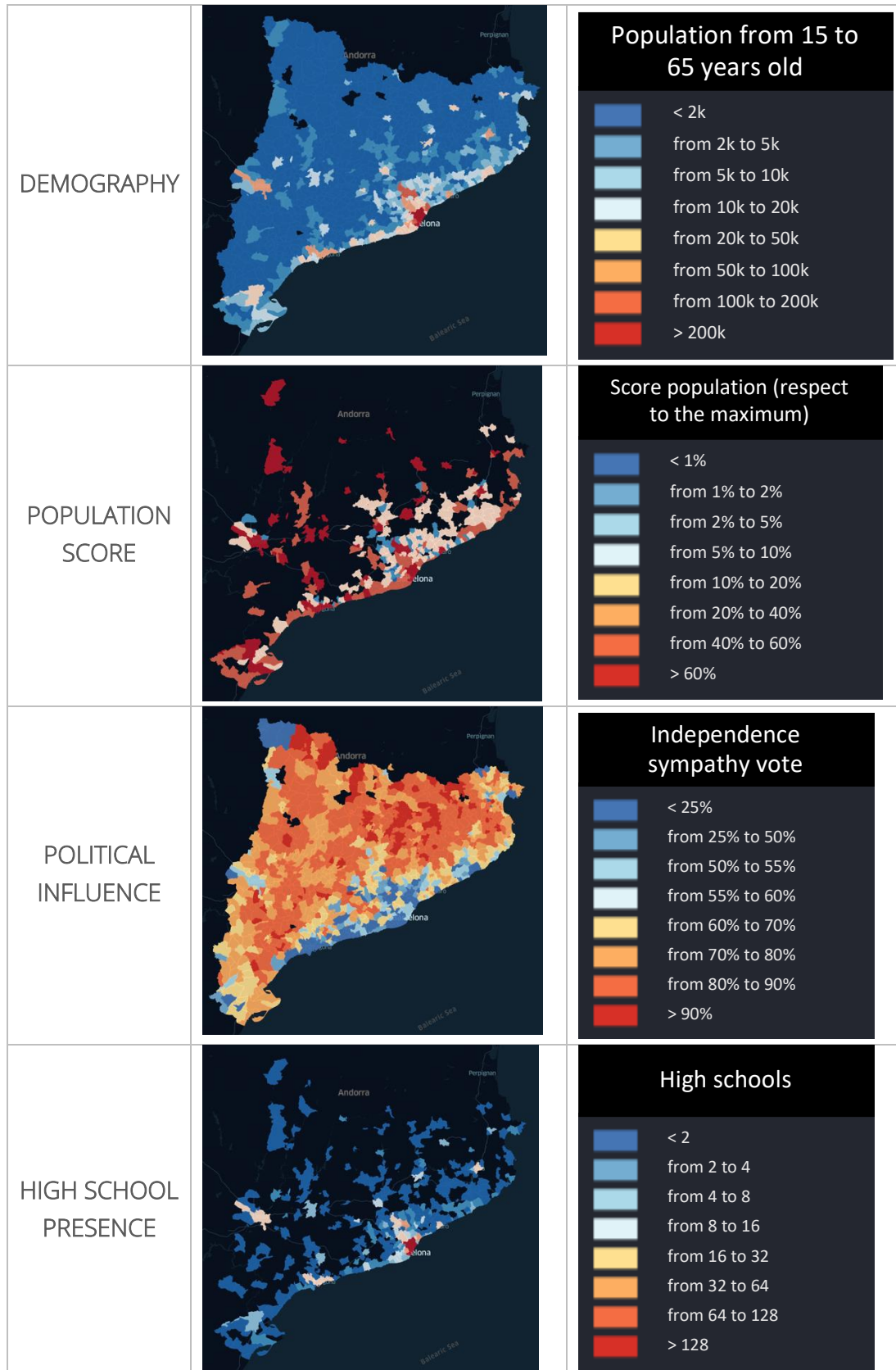
into account up to the followers that follow accounts that follow the core accounts; and the processing of this network that gives rise to an indicator for each municipality in terms of CanetRock influence.

2) Analyse the non-structured data aiming to detect Twitter activity related to the event in different geographic areas. To carry out this task MORIARTY software is used which collects unstructured data as tweets, selecting them through specific dictionaries and to store them in a database.

3) Detection potential (based on Twitter activity, demographic distribution, transport connectivity, historic information, etc.) to predict potential demand that want to attend to the festival.

Table 4: Some relevant indicators considered in the study at municipality level. Background Source: (KEPLER, 2019)

Indicator	Map	Map legend
ATTENDANCE		<p>Extrapolated attendees 2018</p> <ul style="list-style-type: none"> < 5 from 5 to 15 from 15 to 25 from 25 to 50 from 50 to 100 from 100 to 250 from 250 to 500 > 500
SOCIAL NETWORKS		<p>Twitter score (respect to the maximum)</p> <ul style="list-style-type: none"> < 1% from 1% to 5% from 5% to 10% from 10% to 20% from 20% to 40% from 40% to 60% from 60% to 80% > 80%



January 2019 (5-6 months before the event):

At this stage BusUp held a meeting with Canet rock board directors and Marketing department in order to align strategies in both festival and BusUp campaigns.

As regards the service, the main tasks of this phase consisted in the identification of the potential bus stops for CanetRock 2019 edition. The output of the model consisted into a list of municipalities which were linked to indicators related with the potential demand as attendance attraction factor or local relevance by the numbers of times appearing in each iteration performed by the model. This list of municipalities was ordered by their relevant indicators and were classified depending on its potential which were divided into 3 levels, high-, medium- and low-potential. The rest were discarded.

A map of the list is provided in the figure, hereafter:

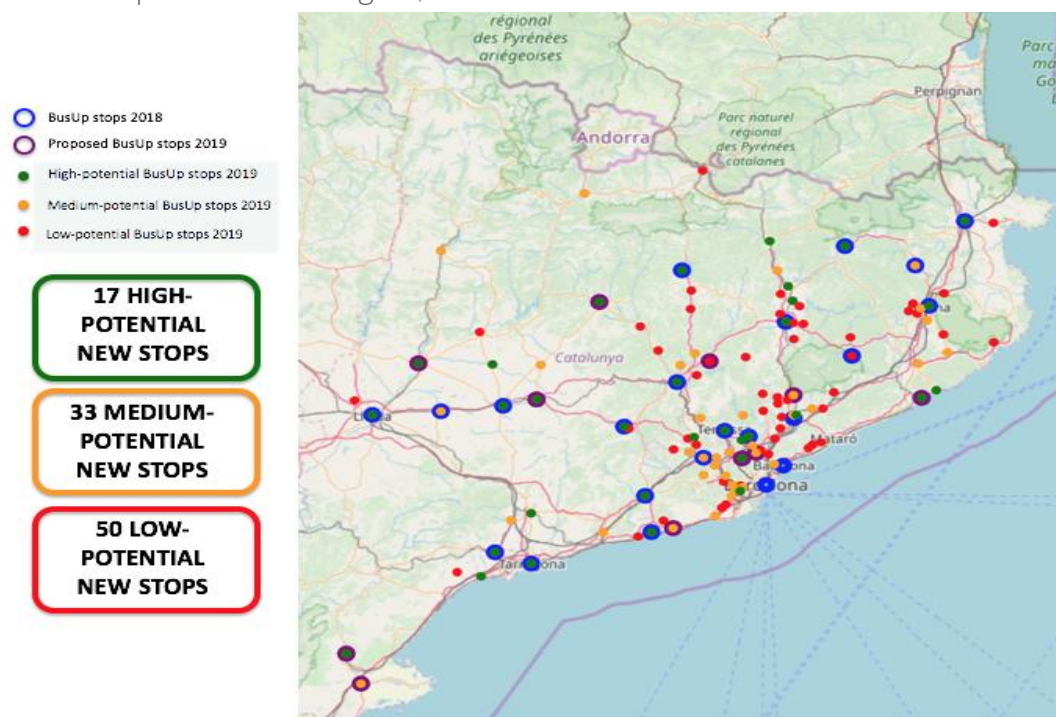


Figure 9 – Map containing the potential stops for Canet Rock 2019. Background

Source: (OpenStreetMap, 2019)

After the reaction of the potential list classified in 3 levels of interest, BusUp identified the routes and stops that had more potential in terms of demand aggregation. Once the selection was made, including 17 new stops proposed by Mosaic Factor, these new routes were quoted, priced and officially published on the booking platform.

The 17 new stops correspond to 'high potential' and some 'Medium potential' routes, as defined by Mosaic study, and are detailed hereafter: Vinaròs, Amposta, Tortosa, Cervera, Castelló de la

Plana, València, Balaguer, El Vendrell, La Garriga, Sitges, Vilanova i la Geltrú, Mataró, Blanes, Santa Susanna, Malgrat de Mar, Pineda de Mar, Calella.



Figure 10 – Official Sold Out post on the event's Instagram account

February-March 2019 (4-5 months before the event):

During this period BusUp publishes new routes based on Route Requests from users received through the booking platform and consistent with Mosaic's priority list. These routes include 3 new stops at Artés, Sant Cugat del Vallès and Cerdanyola del Vallès.

Considering that at this stage, the festival officially announces the full band list and the ticket sold-out, BusUp starts preparing the necessary marketing material to be used in marketing actions by BusUp (social media, paid social, google adds) and by the Festival (social media accounts).

April 2019 (3 months before the event):

From April onwards, starts the official communication campaign for BusUp. Canet Rock Festival starts posting, in their own social Media Accounts, the marketing material prepared by BusUp. The goal is to provide detailed and compelling information about BusUp services. Some examples of the material published by the event organizer during this period are provided hereafter:



Figure 11 – Campaign launched on the 20th of April: “Propose your route, from home to Canetrock”

source: (Instagram & Facebook)



Figure 12 – Campaign launched on the 25th of April: “Contest. Win a merchandising pack”

(Source: Instagram & Facebook)

May 2019 (2 months before the event):

A this stage, BusUp publishes **15 new stops** based on Route requests received through the booking platform and consistent with Mosaic's priority list: Caldes de Montbui, Moià, Mollet del Vallès, Sant Quirze del Vallès, Castellar del Vallès, Molins de Rei, Sant Joan Despí, Esplugues de Llobregat, Cornellà de Llobregat, Sort, La Pobla de Segur Tremp, Ripoll, Torelló, Manlleu, Agramunt and Valls.

Furthermore, in this period we also see an increase in the Marketing actions, mainly focused in Social Media (Festival & BusUp)



Figure 13 – Campaign launched on the 10th of May: “New routes”

source: (Instagram and Facebook Stories) .



Figure 14 – Campaign launched on the 20th of May: “New routes”

Source: (Instagram and Facebook Stories)

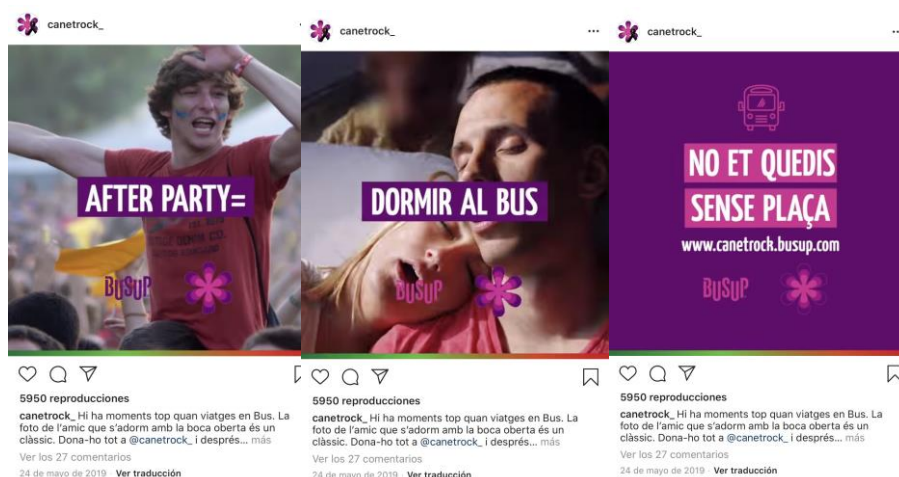


Figure 15 – Campaign launched on the 24th of May: “After Party = Sleep on the bus. Don't be left out”

Source: (Instagram and Facebook Stories)

BusUp also starts a paid campaign on social media and Google Ads. Snapshots of Google, Facebook and Instagram Ads are provided hereafter:

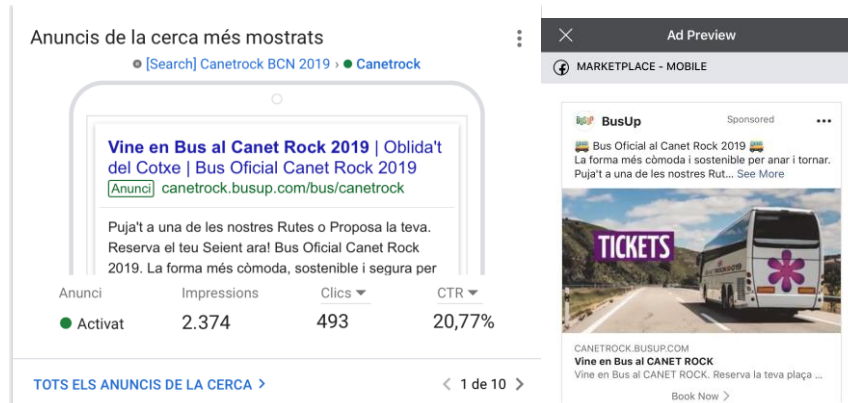


Figure 16 – Google and Facebook adds.

Thanks to the intense marketing activities, first routes started to be confirmed and sold-out. Some examples provided hereafter (snapshots from the booking platform):



Figure 17 – Tickets sold out on the dedicated BusUp platform for the event.

BusUp's operations team starts coordination activities with Police Station in Canet de Mar to start preparing all the security measures and parking spaces for buses.

June 2019 (1 month before the event):

Due to the proximity of the day of the event and the increasing activity in social networks, an update of Twitter activity status is carried out, so as to detect any variation. The new information is used to run the model again with a non-significative outcome variation from the previous list.

Fifteen days prior to the event, routes not reaching minimum capacity are cancelled and money is transferred back to users. Cancelled routes include the following stops: Caldes de Montbui, Moià, Mollet del Vallès, Sant Quirze del Vallès, Castellar del Vallès, Molins de Rei, Sant Joan Despí, Esplugues de Llobregat, Cornellà de Llobregat, Sort, La Pobla de Segur Tremp, Agramunt, Artés, Sant Cugat del Vallès and Cerdanyola del Vallès, Vinaròs, Amposta, Tortosa, Cervera, Castelló de la Plana, València, El Vendrell, Mataró, Blanes, Santa Susanna, Malgrat de Mar, Pineda de Mar and Calella. These cancellations are communicated via email. See example below:

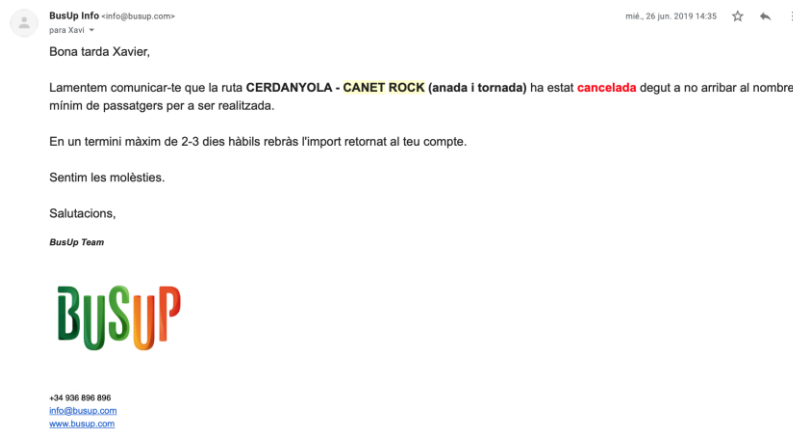


Figure 18 – Email of cancelation of Canet Rock 2020.

During this period, BusUp team defines the Survey content and sets up a distribution strategy to maximize answers. BusUp users will be handed out the survey on the Bus that will be handed out to BusUp on field coordinators at destination. Non BusUp users will be interviewed on field, at the entrance of the event.

July 2019 (1 week before the event):

Local digital newspapers report on the forthcoming event, highlighting the different options on how to get there, thus driving up last minute sales:

<https://www.vilaweb.cat/noticies/canet-rock-2019-guia-amb-el-cartell-i-els-horaris-del-festival/>

<https://www.naciodigital.cat/noticia/183445/10/coses/has/saber/si/vas/al/canet/rock>



Figure 19 – Practical information released in the local media

Right before the event, last minute logistics are defined, including coordination with Coach operators in order to use correctly BusUp Technology, and distribute them the surveys, and with local police and event organisers.

Last minute sales take place reaching a final number of 2037 tickets sold, 22 routes and 30 stops, with an occupation rate of 89%. Summary tables can be found hereafter:

Table 5 –Summary of routes and tickets sold by BusUp for the Canet Rock 2019.

CANET ROCK 2019					
TICKETS					
	OUTBOUND		INBOUND		
BARCELONA PROVINCE				BARCELONA PROVINCE	
BARCELONA - CR (AVANT)	92		174	CR - BARCELONA	
TERRASSA - CR (BARDET)	22		52	CR - TERRASSA	
SABADELL - CR (BARDET)	37		58	CR - SABADELL	
IGUALADA - MARTORELL - CR (BARDET)	46		50	CR - MARTORELL - IGUALADA	
VILANOVA I LA G. - SITGES - CR (AVANT)	30		52	CR - SITGES - VILANOVA I LA G.	
MANRESA - CR (SAGALÉS)	59		59	CR - MANRESA	
VIC - CR (SAGALÉS)	60		59	CR - VIC	
ARBÚCIES - CR (SAGALÉS)	42		42	CR - ARBÚCIES	
RIPOLL - TORELLÓ - MANLLEU - CR (SAGALÉS)	45		54	CR - MANLLEU - TORELLÓ - RIPOLL	
LA GARRIGA - GRANOLLERS - CR (SAGALÉS)	22		44	CR - GRANOLLERS - LA GARRIGA	
GIRONA PROVINCE				GIRONA PROVINCE	
FIGUERES - GIRONA - CR	52		83	CR - GIRONA - FIGUERES	
OLOT - BANYOLES - CR	44		58	CR - BANYOLES - OLOT	
LLEIDA PROVINCE				LLEIDA PROVINCE	
LLEIDA - CR	60		60	CR - LLEIDA	
TÀRREGA - CR	55		55	CR - TÀRREGA	
BALAGUER - MOLLERUSSA - CR	55		52	CR - MOLLERUSSA - BALAGUER	
SOLSONA - BERGA - CR	35		38	CR - BERGA - SOLSONA	
TARRAGONA PROVINCE				TARRAGONA PROVINCE	
TARRAGONA - CR	54		54	CR - TARRAGONA	
REUS - VALLS - CR	54		55	CR - VALLS - REUS	
EL VENDRELL - VILAFRANCA P - CR	29		45	CR - VILAFRANCA P - EL VENDRELL	
TOTAL		893	1144		
TOTAL (OUTBOUND + INBOUND)		2037			

Table 6 – Canet Rock Comparison 2018-2019 by tickets, stops, routes and occupation rate.

CANET ROCK COMPARISON 2018-2019											
TICKETS SOLD			STOPS			ROUTES			OCCUPATION RATE		
2018	2019	DIFF %	2018	2019	DIFF %	2018	2019	DIFF %	2018	2019	DIFF %
1572	2037	+22,82%	23	30	+23%	15	22	+31,81%	96%	89%	-7

The day of the event, surveys are distributed on the bus and completed surveys are collected upon arrival. Non BusUp users are interviewed at the entrance of the event.

3.2.4 Phase 2 (August 2019 - July 2020)

August-September 2019:

During this period, takes place the compilation and analysis of the survey results. BusUp successfully collected 209 responses to the survey from BusUp users (collected on the Bus) and 60 responses collected from non BusUp users (collected on the queue entrance to the event). Main results from the survey, as regards to targeted KPIs, can be found hereafter:

Table 7 - Summary of Quantified targets.

Indicators	Quantified Targets	Source of the data; e.g. provide a reference or link to the data source identifying how the data was collected and the date(s) it was collected (and time of day if relevant). If the indicator data is collected through a survey question provide the survey reference and the question number.	Data Values; please enter the value for the indicator in column 'C' before the measure becomes active. Please ensure that the units of measurement (e.g. trips per month) are clearly described.
NEW DEMAND: Identify BusUp users attending the festival for the 1st time (difficulties to attend before/new demand)	Identify which % wouldn't have attended if they had no BusUp service	Survey to BusUp Users attending CanetRock19	17,05% of BusUp users attending for the 1st time wouldn't have attended if they had no BusUp service
	Identify which % would have used the car if they had no BusUp service	Survey to BusUp Users attending CanetRock19	30,23% of BusUp users attending for the 1st time would have used the car if they had no BusUp service
	Identify which % of them are women	Survey to BusUp Users attending CanetRock19	85,27% of BusUp users attending for the 1st time are women
	Identify which proportion of people attending the festival as first time are under 24	Survey to BusUp Users attending CanetRock19	82,17% of BusUp users attending for the 1st time are under 24
	Identify which proportion of people attending the festival as first time are under 18	Survey to BusUp Users attending CanetRock19	46,51% of BusUp users attending for the 1st time are under 18
NEW DEMAND: Identify BusUp users attending the festival for the 2nd time (or more) that used other transport mode to attend in previous editions and are changing their behaviour	Identify which % wouldn't have attended if they had no BusUp service.	Survey to BusUp Users attending CanetRock19	8,75% of BusUp users attending for the 2nd time or more wouldn't have attended if they had no BusUp service
	Identify which % would have used the car if they had no BusUp service.	Survey to BusUp Users attending CanetRock19	42,5% of BusUp users attending for the 2nd time or more would have used the car if they had no BusUp service
	15% of BusUp users have changed their mode of transport.	Survey to BusUp Users attending CanetRock19	97,5% of BusUp users attending for the 2nd time or more have changed their mode of transport
	Identify which % of them are women	Survey to BusUp Users attending CanetRock19	81,25% of BusUp users attending for the 2nd time or more are women
	Identify which proportion of them are under 24	Survey to BusUp Users attending CanetRock19	70% of BusUp users attending for the 2nd time or more are under 24
SERVICE QUALITY: Identify satisfaction level of BusUp users	Identify which proportion of them are under 18	Survey to BusUp Users attending CanetRock19	33,75% of BusUp users attending for the 2nd time or more are under 18
	70% of BusUp users are 'satisfied' or 'very much satisfied' with their mode of transport to the event	Survey to BusUp Users attending CanetRock19	97,61% of BusUp users are 'satisfied' or 'very much satisfied' with their mode of transport to the event
	Identify which % of the people 'satisfied' or 'very much satisfied' are women	Survey to BusUp Users attending CanetRock19	84,31% Identify which % of the people 'satisfied' or 'very much satisfied' are women
	Identify which % of the people 'satisfied' or 'very much satisfied' are under 24	Survey to BusUp Users attending CanetRock19	77,94% Identify which % of the people 'satisfied' or 'very much satisfied' are under 24
	Identify which % of the people 'satisfied' or 'very much satisfied' are under 18	Survey to BusUp Users attending CanetRock19	41,67% Identify which % of the people 'satisfied' or 'very much satisfied' are under 18
SERVICE QUALITY: Identify satisfaction for non-BusUp users, using other transport modes.	Identify the satisfaction levels of non-BusUp users, using another mode of transport to attend the event	Survey to Non-BusUp Users attending CanetRock19	93,44% Identify the satisfaction levels of non-BusUp users, using another mode of transport to attend the event are satisfied or very satisfied
	Identify which % of the people 'satisfied' or 'very much satisfied' are women	Survey to Non-BusUp Users attending CanetRock19	47,36% Identify which % of the people 'satisfied' or 'very much satisfied' are women
	Identify which % of the people 'satisfied' or 'very much satisfied' are under 24	Survey to Non-BusUp Users attending CanetRock19	64,91% Identify which % of the people 'satisfied' or 'very much satisfied' are under 24
	Identify which % of the people 'satisfied' or 'very much satisfied' are under 18	Survey to Non-BusUp Users attending CanetRock19	10,53% Identify which % of the people 'satisfied' or 'very much satisfied' are under 18
	70% of BusUp users in area indicate 'Safe' or 'very much Safe' with their mode of transport to the event	Survey to BusUp Users attending CanetRock19	99,52% of BusUp users in area indicate 'Safe' or 'very much Safe' with their mode of transport to the event
SAFETY PERCEPTION: of BusUp users	Identify which % of the people 'safe' or 'very much safe' are women	Survey to BusUp Users attending CanetRock19	84,13% Identify which % of the people 'safe' or 'very much safe' are women
	Identify which % of the people 'safe' or 'very much safe' are under 24	Survey to BusUp Users attending CanetRock19	77,88% Identify which % of the people 'safe' or 'very much safe' are under 24
	Identify which % of the people 'safe' or 'very much safe' are under 18	Survey to BusUp Users attending CanetRock19	41,83% Identify which % of the people 'safe' or 'very much safe' are under 18
	Identify the safety perception levels of for non-BusUp users, using different mode of transport to attend the event.	Survey to Non-BusUp Users attending CanetRock19	100% Identify the safety perception levels of for non-BusUp users, using different mode of transport to attend the event
	Identify which % of the people 'safe' or 'very much safe' are women	Survey to Non-BusUp Users attending CanetRock19	49,18% Identify which % of the people 'safe' or 'very much safe' are women
SAFETY PERCEPTION of people that have used other mobility services (no BusUp)	Identify which % of the people 'safe' or 'very much safe' are under 24	Survey to Non-BusUp Users attending CanetRock19	67,21% Identify which % of the people 'safe' or 'very much safe' are under 24
	Identify which % of the people 'safe' or 'very much safe' are under 18	Survey to Non-BusUp Users attending CanetRock19	9,84% Identify which % of the people 'safe' or 'very much safe' are under 18

After the event, Mosaic also performs an analysis of the finally confirmed routes. Out of the 16 high potential stops proposed by the model, 10 out of 16 were new routes and were published and made available to receive bookings. Out of the 33 stops identified by the model as having medium potential, 11 were published as new stops and made available to receive bookings. Finally, out of the 50 high potential stops output by the model only 4 were published as new stops and made available to receive bookings. In addition to this, there were a total of 20 'old' stops (i.e. those established in previous years) which were published and made available to receive bookings. The reduction in new stops between those output from the model and those chosen to be published for booking is the result of filtering out stop locations where there is already some form of reasonable public transport access to the event location. Most of these fell in the more urban areas of Barcelona and large towns such as Girona.

Tables below summarizes the performance of all stops published, including new and old stops, classified by level of priority.

Table 8 – Summary of potential stops proposed, published and operated.

Demand Level Stops	Proposed	Published	Pub/ Prop %	Operated	Op/ Prop %	Op/ Pub %
New stops (added for 2019)	99	25	26.00	8	8.08	32.00
High – new	16	10	62.50	5	35.29	50.00
Mid – new	33	11	33.33	3	9.09	27.27
Low – new	50	4	8.00	0	0.00	0.00
Existing stops (repeated from 2018)	20	20	100.00	19	95.0	95.00
High – old	16	16	100.00	16	100.00	100.00
Mid – old	3	3	100.00	2	66.67	66.67
Low – old	1	1	100.00	1	100.00	100.00
Total	119	45	37.82	27	22.69	60.00
High	32	26	81.25	21	65.63	80.77
Mid	36	14	38.89	5	13.89	35.71
Low	51	5	9.80	1	1.96	20.00

Figure below shows the confirmed bus stop locations where BusUp services operated overlaid on population density. Blue circles denote old stops, green and orange denote high and medium demand for new stops. Purple circle marks the location of the Canet Rock festival.

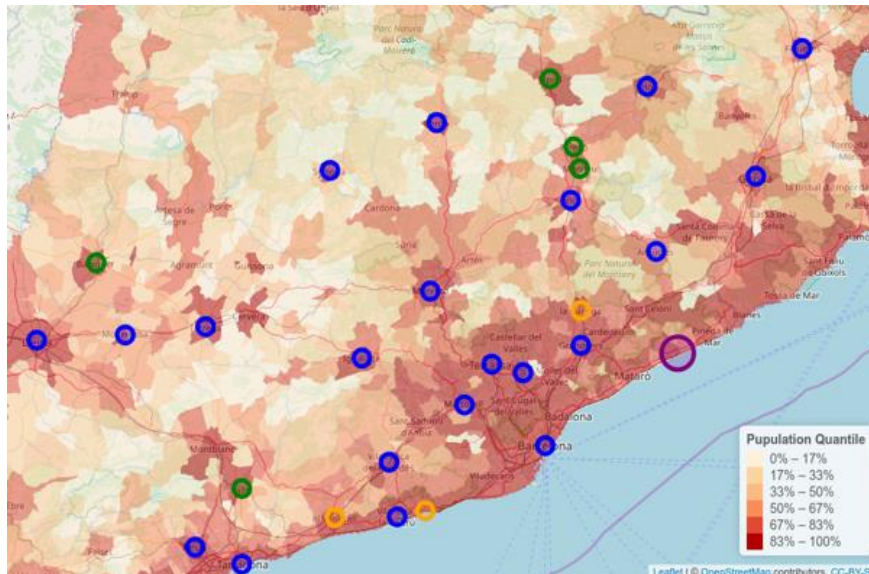


Figure 20 – Confirmed bus stop locations where BusUp services operated and population density.
Background Source:

Source: (OpenStreetMap, 2019)

In the image above, blue circles denote old stops, green and orange denote high and medium demand for new stops. Purple circle marks the location of the Canet Rock festival. Overall, there was 23% increase from last year on the number of bus stops served (see Table 9), with the majority of these operating as direct routes between the new stop and the event. This suggests the model successfully identified, from the outset, stop locations with sufficient demand to fill buses without the need to divert or stop en-route. The number of tickets sold increased by 23%.

The majority of the existing BusUp routes (developed through traditional demand estimation based on population and previous attendance) are serving more densely populated urban areas or are intermediate stops on a route serving a densely populated urban area. It is notable that the majority of new stops (illustrated by the green and yellow circles in Figure 30), suggested by incorporating the Twitter influence score into the stop selection, resulted in commercially viable direct routes from less densely populated areas. This confirms that deriving estimated demand from social media data can form the basis to establish commercially viable bus routes to large scale events from peri-urban and more rural areas.

4 Deviations from planning and corrective actions

MEASURE 1: Using social media to identify unmet needs/demands of people that want to attend Canet Rock 2019

During the process of data analytics some new data policies changed since the INCLUSION proposal preparation. At the beginning, this social-networks analysis was planned to be focused on Instagram and Facebook data. However, due to the [Cambridge Analytica](#) scandal, these two social networks were no longer available and this study was re-designed to be focused on Twitter data. To complement this study, some other data analysis such as transport connectivity, demographic distribution, etc. were merged with the social networks' analysis.

Table 9 – Deviation from planning summary.

Measure affected (ref. previous slides)	Description of deviations	Impact on the development of the measure(s)
Non-structured data analysis aiming to detect Twitter activity related to the event in different geographic areas.	Data collection issues: Firstly, the idea was to analyse data from Facebook and Instagram, but at the moment we started developing the model, the data policies for these social networks changed and the data we expected to collect was not available.	Therefore we focused on Twitter data and we merged it with other data sources.

MEASURE 2: Introduce new on-demand services to meet identified mobility needs of people wishing to attend Canet Rock 2019 (BUSUP)

This Pilot was limited by the date of the event (7th of July 2019), so adjustments were necessary as regards the timeline of the pilot. For this reason, preparations started earlier than expected and first results obtained much earlier than other pilot sites (September 2019).

The second adjustment made was regarding the time of Survey distribution and collection. BusUp was only able to connect with potential survey respondents at the time of the event, which meant that surveys were not possible to be distributed in advance to service provision but on the bus (for BusUp users) and on the entry line to the event for non BusUp's users.

None of these deviations on the time-frame of the activity have had any negative impact on the overall results and performance of the pilot, however we foresee that with lower limitations the results could have been even better.

5 Institutional, regulatory and financial issues

The pilot has not encountered any major institutional, regulatory or financial issues. However other small barriers have been encountered:

Data Sources: as explained in previous sections new Facebook and Instagram restrictions forced Mosaic to find alternative data sources that could complement twitter. This strategy has proven to be a very successful contingency plan, as it has not only proven to provide excellent results, but it has also made the technology more transferable to other service applications where maybe social media has not as high impact as music events (commuting) or targeted audiences who have lower level of usage of social media (elders).

Infrastructure: According to Spanish regulations, BusUp is not allowed to use regular bus stops. BusUp has overcome this restriction by using Bus Terminals and Bus parking's nearby the event, made available by local authorities.

6 Main results of the pilot

6.1 Evaluation activities and target indicators

A vast majority of the targeted goals / indicators of the pilot have been successfully achieved both as regards the mobility service offered (Table 10: Mobility service offered Indicators) and the ITS tools used in the pilot (Table 11: ITS model KPIs). A summary of these KPIs has been provided in the tables below.

From the mobility service offered by BusUp (Table 10) the most relevant KPIs are related to the quality, safety and improvement of the service as well as the impact in new attendance demand generated by the service.

From the ITS model developed by Mosaic Factor (Table 11) the most relevant KPIs are related with the service quality in terms of time travelling reduction, the potential interest to CanetRock identification, the relevant stops identification and the parameters-relation explanation of the model.

Table 10: Mobility service offered Indicators

Indicator	Target	Data collection methods	Data values	Comments
Service improvement	10% increase in the overall indicators: services, direct services stops, tickets and occupation rate	Operational	31,82% increase in BusUp services, 200% increase in direct services, 36% increase in BusUp's stops, 39% increase in tickets and the 8,2% decrease in occupation per route	Slight decrease in occupation levels, that were already extremely high (above 90%), was a direct consequence high increase in bus services, bus stops and direct services
Transport demand characteristics	Identify New Demand from BusUp users attending the festival for the first time and BusUp users attending the event for the 2nd time or more.	Surveys	BusUp users attending for the first time: 17,05% wouldn't have attended the event if they had no BusUp service and 30,23% of those would have used the car. BusUp users attending for the second time or more: 8,75% wouldn't have attended the event if they had no BusUp service and 42,5% of those would have used the car. 97,5% of users have changed their mode of transport in 2019 edition.	
Service quality	Identify the level of satisfaction regarding the service quality among	Surveys	97,61% of BusUp users are very satisfied or satisfied with the service quality. 93,44% of non	

	BusUp users and non BusUp users		BusUp users are also very satisfied or just satisfied.	
Safety perception	Identify the safety perception levels for BusUp users and non-BusUp users using different mode of transport to attend the event	Surveys	<p>99,52% of BusUp users in area indicate 'Safe' or 'very much Safe' with their mode of transport.</p> <p>100% of non-BusUp users in the area indicate 'Safe' or 'very much Safe' with their mode of transport.</p>	

Table 11: ITS model KPIs

Indicator	Target	Data collection methods	Data values	Comments
Service quality	Time reduction to attend the event from different regions	Transport connectivity data	In the Barcelona region: 52% time reduction.	
			In the Girona region 54% time reduction	
			In Lleida region (from 50-100km: 47% time reduction), (up to 50 km: 32% time reduction)	
			In the Tarragona region 35% time reduction	
Potential interest	Comparison between	Twitter data, Demographic	80% of the top-100 and 90% of the top-50	

identification	potential interest and real interest	data, event historical data, transport connectivity data	municipalities have been identified	
Stops identification	Comparison between predicted and confirmed stops	Twitter data, Demographic data, event historical data, transport connectivity data	66% of the high potential stops published had success	
Model explanation	Correlation between three key parameters: attraction factor, real attendees and BusUp sold tickets	Twitter data, Demographic data, event historical data, transport connectivity data	0.86 of correlation between the attendees vs Twitter score, population and attraction factor	Without considering the Attraction factor, the coefficient is reduced at 4.7%. Taking out the Twitter score, the determination coefficient is reduced a 2.6%. Removing population only reduces it a 1%. Thus, the attraction factor is the most relevant parameter.

6.2 Pilot Lab vs INCLUSIVITY goals

Different INCLUSION principles have been tackled and guaranteed in this Pilot Lab. The development of this forecasting tool to identify unmet needs/demands of people that want to attend to Canet Rock provide BusUp the opportunity to identify unsatisfied demand, optimize the costs by replacing inefficient bus stops with low passenger numbers with services that better meet user demands, especially vulnerable users' needs (e.g. door to door) and increase the number of quality of collective transportation services in areas where there is limited PT. By adopting this new business model, **Convenience** it is one of the INCLUSIVE principles that has been achieved as this innovative service is far more convenient and reliable than PT; also, more bus stops and more direct routes were added for BusUp. Main KPIS related to this principle are the following: 31,82% increase in BusUp routes and 36% increase in BusUp's stops. **Empowerment** has been also tackled as many young people would have not been able to attend the events with a car, and more bus stops afforded them more transportation options and thus the freedom to choose); Main KPIS related to this principle are the following: 82,17% of first time BusUp users are under 24 year old, 17,05% of BusUp users attending for the first time wouldn't have attended the event if they had no BusUp service and 30,23% of those would have used the car. This new service has more **Efficient** routes than PT, BusUp's are far more direct and therefore time used to travel was significantly reduced. Main KPIS related to this principle are the following: 200% increase in direct services. As a vast majority of BusUp users are young women, a user group that shows lower rates of car ownership and more vulnerable using PT at odd hours, Busup's on-demand service is **Gender equitable**; main KPIS related to this principle are the following: 85,27% of first time BusUp's users are women. Finally, BusUp's **safety** is unparalleled against car, especially after a music event where alcohol is served. But it also is safer than PT as limits the walking time to stops at odd hours, especially for women. Main KPIS related to this principle are the following: 99,52% of BusUp users feel Safe or Very Safe with this mode of transport.

6.3 Lessons learnt

Several aspects of the model used to mine twitter data could be further developed in future replications to improve the quality of data that is mined, as well as to increase the quantity and variability of the different datasets regarding tickets, demographic data, transport connectivity, etc. The dictionaries designed following a modular architecture to be used for data scraping in Twitter, would greatly benefit from A.I. assistance in further implementations. A key improvement to be done in this part of the study would be having A.I assistance for evaluating the impact of the key words of each module.

Another key issue of the twitter data is the limited amount of geolocation related data, this risk must be reduced by merging social media data with other data sources trying to increase the

accuracy of the study. In this case, the social media data has been complemented and enriched by socio-economic, transport connectivity, politics, and other relevant datasets.

There is a variable amount of uncertainty regarding the transparency, accessibility, and availability of personal data from social media platforms. In general, more localised festivals and events generate less activity online than international ones. This is a risk that not enough data can be mined from too few tweets. Additionally, the topic of data privacy continues to be explored and debated. Already there is a slowly growing trend to deny social media apps geolocation trackability.

One of the main lessons learned as regards the business model is that if it is an events with early sold out, as Canet Rock, some difficulties may arise such as: 1) Transportation cannot be used as an incentive to attend the event, and that the choices in mode of transport will highly depend on availability, convenience and safety. In this sense, the Canet Rock Pilot has proven that more availability and more convenience have resulted in higher bus use. 2) It is essential to channel market communications through the event organiser. For next editions of the event, this aspect will continue to be key as early sold out has been the norm.

7 Assessment

7.1 Benefits of the actions developed

Benefits for the event attendees:

Thanks to the Pilot, BusUp succeeded in offering for young adults, especially for young women, a convenient, efficient and safe alternative to attend a major music event.

Survey's respondents show that up to 17% of first time BusUp's users would not have been able to attend the event if it were not for BusUp and almost 97% stated that they switched transportation modes compared to last year, which proves that the new service offering of BusUp is much more convenient than the existing ones.

Convenience is a concept that encompasses several advantages, including time, costs, safety, and quality. In this sense, we can conclude that the new BusUp service offering has excelled in convenience for their passengers in the sense that it has been able to provide 1) 200% increase in direct bus routes that has led to time savings of 45,7%, compared to PT use; 2) 67,58% of costs reduction compared to car use; 3) 31,82% increase in BusUp routes and 36% increase in BusUp's stops; 3) Almost 97% of the respondents have shown their satisfaction with the service provided; and last but not least, 4) 99,52% have defined the service as Safe or Very safe.

Benefits for BusUp and event organizers:

The benefits of the action on the users has also shown a direct translation in the economic benefits for both the Event organizer and BusUp: The increase in number of stops by 36% (and the quality of those stops) has allowed BusUp to increase the amount of Bus Routes by almost 32% and the amount of direct routes by 200% which has led to an increase in tickets sold of almost 23% increase of the tickets sold, thus doubling expectations (10% goal). Furthermore, considering that BusUp services have saved a minimum of 727 cars attending the event (considering a 1,4 average occupation), this means that the event organizer has been able to save 727 parking spaces (av. 13.000sqm) that would have to be rented to the City Council.

Benefits for overall society:

BusUp works with local bus operators who are subcontracted to provide bus services departing from their local areas. The pilot has directly contributed in contributing to economic growth and job creation in the transportation sector.

Furthermore, by taking up to 727 cars out of the road, BusUp has enabled congestion savings of up to 4km of traffic jam, and savings in CO₂ emissions of up to 19Tn, which represents an 83% in savings in CO₂ emissions compared to car use. Furthermore,

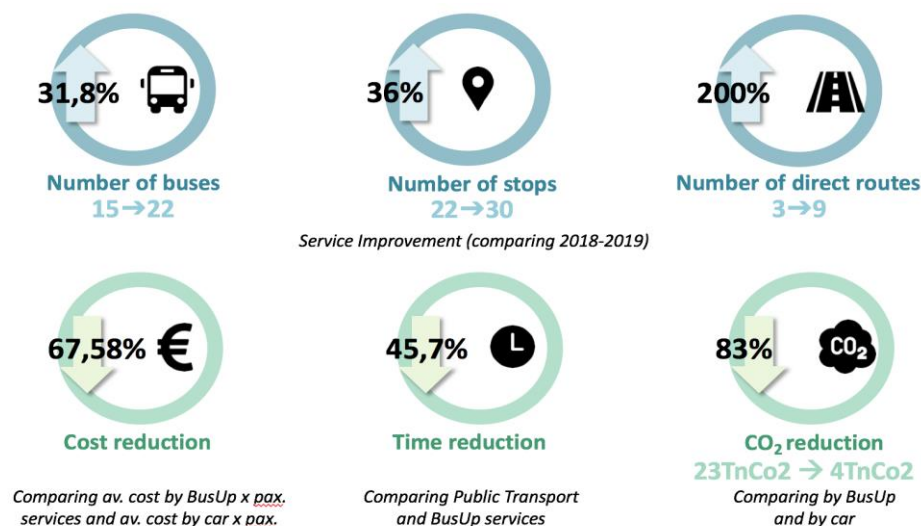


Figure 21 – Summary of main key parameters.

7.2 Key transferability issues

After developing this pilot lab, different potential opportunities for transferring this solution to other use cases have been identified:

1) Events with high level of presence in Social Media:

ITS is developed in a general approach inside the geographic demand analysis and estimation schema, being able to incorporate multi source structured or unstructured data of any type. In this manner the model is constructed on simple and robust grounds easily scalable and replicable to other sorts of multidisciplinary events such as other music festivals, politics meetings or sportive events, where event attendees show high usage level of social media networks.

These grounds are conformed by data mining of social networks plus other data sources compatible with the topic to enrich and make a robust base. Assuring that the possible data acquisition setback, obstacles or barriers can be overcome in an appropriate manner

Social networks are analysed through accurate dictionaries, i.e. Twitter dictionaries, constructed in a modular manner (differentiating between TRANSPORT, MUSIC, LOCATION) which permits updating them in a dynamic and simple way.

The use of different datasets with diverse natures make this solution easier to transfer to other use cases such as sport, cultural or political events. The knowledge gained by analysing more transversal pillars such as socio-economic aspects, may be strongly useful to be applied in different use cases, where similar approaches can be followed.

Overall, this pilot has evidenced that the innovation of information mining from Social Networks can provide a better comprehension of the demand and can radically improve the capacity of bus ride-sharing services, such as BusUp, to offer more tailored services and to better aggregate and serve the demand to large events (>10.000 attendees). Practitioners should be aware that the transferability of this approach to other scenarios needs to be considered carefully. Three characteristics of this example were important factors in contributing to its successful application:

- Gaps in knowledge of demand: one-off or irregular large-scale travel demand generators such as events where attendees are changing/not known in advance.
- Social Media active target groups.
- Shortage of suitable existing transport options for the target groups.

2) Events with low presence in Social Media or other transport needs beyond events:

Moreover, target users with no social networks' interaction will not be necessarily excluded and can be target vulnerable users for this demand identification ITS solution.

In this sense, the successful results obtained from the work done in extracting information from alternative data sources such as historical data, transport availability, demographics, politics, etc. shows that there is also a high transferability potential to either events where the attendees do not typically interact with social networks (elders), or even for daily trips such as commuter trips or essential trips in rural areas.

3) COVID impacts

Main negative impact is the temporary restrictions or cancellations of major large socio-cultural events, which radically decreases the demand for this type of services, while the restrictions are implemented.

Users may be less willing to share vehicles with other people, thus an increase in the use of private car to go to cultural/social events may be possible (however, it has to be noticed that some cultural destinations such as theatres are not accessible (or hardly accessible) by private car, thus the increase in the use of private car may be softened).)

If a reduced vehicle capacity becomes temporarily mandatory, it may also compromise the business model, for the duration of the restrictions, as the passengers would not be willing to support the additional costs, rendering the service unviable.

A positive impact is that the number of active users on social media has been increased. This fact lets experts' think that more insights of current and future patterns will be easier to understand through real and historic social media analysis.

Another positive impact is that public perception has shown that private buses, with limited capacity (coaches) pre-booking and stricter disinfection protocols, are perceived as safe as single car use and much safer than PT or carpooling, thus it has become a sound alternative to single car use, during the pandemic.

8 Conclusion



Figure 22 – Attendees from BusUp service Canet Rock 2019.

Source: BusUp

Despite initial limitations of data collection, the pilot has outperformed its initial expectations not only in results, doubling almost all targeted KPIs, but also in contributing to all the project INCLUSIVITY GOALS as well as exceeding the expectations as regards transferability, as the diversification of data sources exponentially grows the transferability potential of the resulting solution.

The attendees to the annual Canet Rock music festival were predominantly under 24 of age, female, and the majority were social media active. In addition, there was a reliance on lifts from parents due to a lack of public transport options from peri-urban and more rural areas. These characteristics were important factors in the appropriateness and success of the approach described.

The BusUp services were rated as safer, more convenient and empowering for young people and women to attend the Canet Rock music festival.

The innovation of information mining from Social Networks can provide a better comprehension of the demand and can radically improve the capacity of bus ride-sharing services, such as BusUp, to offer more tailored services and to better aggregate and serve the demand to large events.

The implemented stochastic model is based on the mining data from the social networks and complemented by other external data sources such as the transport connectivity and the available interconnection between all the municipalities. This innovative approach is able to be transferred to other types of transport services covering different needs (e.g. other cultural or leisure events, commuting, on-demand transport planning for rural areas, etc.) .

The demand estimation from Twitter data resulted in publication of 25 potential new stops for 2019 which the demand analysis suggested could be viable, mainly from less densely populated areas. Ultimately 8 of the stops modelled from Twitter data analysis attracted enough bookings to make the services commercially viable, providing improved access to around 450 new users (a 37% increase on the previous year).

While this confirms that deriving estimated demand from social media data can form the basis to establish commercially viable bus routes to large scale events from peri-urban and more rural areas, it also highlights that there is scope to further improve the number of bookings from the stops on routes which were ultimately cancelled.

9 References

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