

2020  
**CiViTAS**  
Cleaner and better transport in cities

**DESTINATIONS**



## Measure Evaluation Results

### ELB7.3 – App for user real time information

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## Executive Summary

In tourist destinations, during the peak season, Municipalities often equip themselves with transport services complementary to the public transport service. Also, some Elba municipalities, during the summer season, put shuttle services into operation to allow tourists to move around without using a private car – which often creates problems due to narrow and steep streets and to a lack of parking.

With these shuttle services in operation, the municipalities have to face the problem of their performance monitoring and control, as these are often entrusted to small private firms with specific performance commitments. Furthermore, the means of transport are almost always not equipped with systems to provide the user with information of their arrival in real-time.

Thanks to the CIVITAS DESTINATIONS project, in Elba it was possible to test and equip the shuttles with an AVM (Automatic Vehicle Monitoring) system (CELSO), which was tested during the summer of 2018 and 2019 on the Marebus service. In addition, the solution was combined with an App for user information and a certification module for the performance of the service. The system has been successfully tested on auxiliary means of transport for tourist services put into operation in both Portoferraio and Rio.

The evaluation of the CELSO system was carried out successfully, and was based on surveys applied to the staff of the municipalities from Portoferraio and Rio to assess the operational benefits of the new system, and through surveys applied to citizens and tourists to evaluate their satisfaction with the supporting app. The two municipalities rated the system very positively, with 100% of staff from the municipalities from Portoferraio and Rio surveyed stating they were Satisfied with the CELSO solution. 94% of citizens and tourists surveyed also greatly appreciated the use of the specific APP which enabled them to see the arrival of the shuttles in real-time, allowing them to prepare to go to the stops without the inconvenience of arriving late or long waits.

## A Description

Elba Island is characterised by a strong touristic flow, especially during the summer period when the number of incoming tourists dramatically increases the number of people present on the island. Public Transport services on the island are very poorly used (14% of overall trips) when compared to private transport. The number of users increases during the tourist summer season, but the overall utilisation rate of public transport remains very low, considering the total number of tourists arriving on the island each year. Thanks to the CIVITAS DESTINATIONS project, specific measures have been implemented to improve the quality and attractiveness of public transport, in order to provide tourists and residents with services that are more responsive to their needs.



Figure 1: CELSO system

The CELSO system, provided by MemEx (a DESTINATIONS partner) was tested on the tourist shuttle transport services in Portoferraio and Rio, and is an innovative and cheap AVM (Automatic Vehicle Monitoring) which allowed municipalities to obtain precise certification (number of trips and respect for timetables) of the service performed, and enabled users to see the position of the bus in real-time through a specific App.

The CELSO system and related APP were positively tested during the 2018 and 2019 summer months on the Marebus service in Rio, on the Taxi Boat service in 2018 (Chicchero), and on several bus services during 2018-19 (Cosmopoli by night), connecting the parking area and the city centre of Portoferraio.

### A1 Objectives and outputs

#### City level objective

- Improve the PT service quality and efficiency for citizens and tourists
- Expand and enhance the quality of tourist offer, in order to reduce the use of private cars and related emissions

#### Specific objective

- Validation of the technical and operational viability of the adoption of a light AVM system (CELSO)
- Testing of an innovative "knowledge-based" service certification module for the validation of touristic bus service performance

- Testing efficiency and the provision of "real-time" info services which are very useful for users

### Output

- Demonstration that CELSO systems can certify service operation to the municipalities: including assessment of the performance achieved in terms of trip delays, missed bus stops, km travelled, trips partially completed as planned or not completed, etc.
- Demonstration that the related APP also allows users to see the bus position in real-time. This allows users to go to the stops at the right times
- Experimentation that, in its use for both planning routes and for finalising the system, data is very simple and easy to implement

### Supporting activities

MemEx (a CIVITAS DESTINATIONS partner) has supplied the CELSO system fully developed in its elements. They also trained both the technical staff of the two municipalities and the shuttle drivers on the use of the system and provided technical assistance in the field for unforeseen issues.

## A2 Inter-relationship with other measures

This measure is linked with other CIVITAS DESTINATIONS measures, as they cross-fertilise each other as they mutually seek to improve the quality of the PT service to tourists and residents, as follows:

- **ELB 2.1** – Sustainable Urban Mobility Plan (SUMP) in Elba island – The goal of the SUMP is to improve mobility on the island by also reducing the use of private cars in favour of public transport. The CELSO system goes in the direction of making auxiliary transport more preferable for tourists to use to get to points of interest compared to the private car. Furthermore, in the reorganisation of the public transport plan, the SUMP provided for main lines (equipped with the AVM system) to be fed by shuttles that must be equipped with CELSO or similar systems.
- **ELB 7.1** – Improved public transport services for tourists on Elba – The various auxiliary services put into action by the Municipalities of Portoferraio and Rio for the transport of tourists in the summer period, under the ELB 7.1 measure, made it possible to positively test the CELSO system on more than one occasion and in different environments and with different shuttle operators.

## A3 Target groups and/or affected part of the city or region

The target groups of this measure were:

- Residents and tourists demanding an innovative tool which was useful to gain real-time information about PT services

- Public administrations (Municipalities) providing additional PT services, needing an efficient tool to monitor and manage the services

## A4 Stakeholder involvement

Stakeholder name	Activities description
Municipality of Rio	Manages the summer public transport (Marebus)
Municipality of Portoferraio	Manages the summer public transport (little ferry and other road services)
PT operators (seasonal)	Additional seasonal public transport service providers in summer season
MemEx	Supply of the monitoring system (CELISO) and provide training and technical assistance

**Table 1:** Stakeholder involvement

## B Measure implementation

### B1 Situation before CIVITAS

The private bus used by Elba municipalities for taking people to the beaches during the summer season did not have any control over their service efficiency (number of effective trips /day, timetable respect, real-time bus position). Therefore, many possible users did not use the service due to the impossibility of knowing the arrival time at the various stops as the time was established only at the departure station.

### B2 Innovative aspects

The innovation element is the introduction of a "light" localisation system (AVL) (CELISO) as an alternative technical solution to replace the standard AVM system adopted for PT fleet monitoring and management. Moreover, the innovation of this measure is, in addition to the quality of the system's performance, its simple application both in the design of the route and stops and in the use by both the bus driver and remotely by the technician of the municipality in charge of the control and the final balance of the journeys made. This IT system is operating in an independent way from the SUMA implemented in the ELB 4.1-4.4 measures WP4 sharing platform.

### B3 Research and technology development

The relevant innovation of CELISO is to guarantee AVM functionalities with reduced investment (70%) and operational/maintenance costs (60%). CELISO improves the reliability/regularity of bus services, providing several benefits and outcomes for different actors involved in "sustainable mobility":

- To the bus fleet company/public transport operator: to reduce the staff resources involved in the processes of service management and monitoring
- To the public transport authority: to monitor the compliance of operated services with those scheduled, and eventually a prescript in-service contract
- To PT users and citizens: to have reliable scheduled transit times at bus stops, and to experiment with the improved quality of bus services, to receive information about vehicle positions

In contrast to standard AVM systems, CELSO requires vehicles to be equipped with a commercial tablet (Android based) as an on-board device – only a power supply and fixed or removable support are needed. In this way, CELSO can be implemented in any context in a short-time frame, and with lower costs than a full AVM system.

The service monitored by CELSO can be operated under different schemes: (i) conventional Local bus service, (ii) Demand Responsive Transport and ride sharing service, (iii) Shuttle bus service, (iv) School bus, and (v) transport service in rural areas. On the basis of the high flexibility of CELSO, there is also the possibility to implement and experiment with the system on several services with different characteristics.

The CELSO approach is based on two elements: (i) simple implementation, based on an APP (CELMO MOB), with an easy-to-use driver interface and light technologies (such as smartphones and tablets) to collect service data during bus operation, and the use of web-based server applications (CELMO CENTRE); and (ii) an innovative data mining tool to validate the operated PT services.

CELMO enables the generation of a high-quality validated set of PT service data which can be exploited by Operators and Authorities (the Organisation contracting the bus service) to improve PT services and the overall mobility context.

The CELMO architecture is very easy: operationally, the signal launched by the tablet or smartphone installed in the shuttle (CELMO MOB) reaches the server installed in the offices of the municipality (CELMO CENTER), where the management performance of the shuttle fleet is recorded. A signal is emitted from the centre to the users APP system (CELMO INFO) which allows users to know the position of the shuttle in real-time and therefore the expected arrival time.

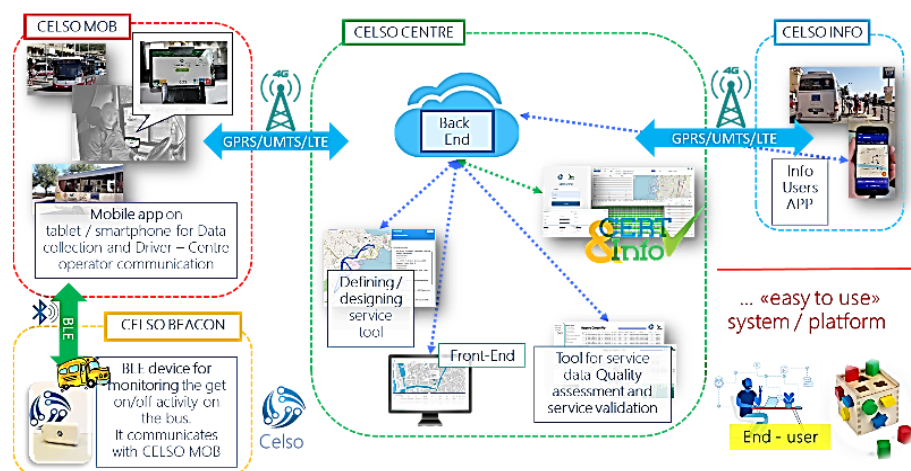


Figure 2: CELSO system architecture

## B4 Actual implementation of the measure

The CELSO system, tested in auxiliary transport services carried out in Portoferraio and Rio, is a bus fleet monitoring system which has been designed and developed for the needs of Small Transport Operators and for the requirements of different transport schemes (from conventional and flexible to school, shuttle, and ride sharing services).

The function and role of CELSO take into account the standard Automatic Vehicle Monitoring (AVM) that is an IT System for collecting data on bus operated services and thus reporting KPIs (Key Performances Indicators) and gives users, via pole or APP, the bus arrival time in real time.

During the tests carried out in 2018 and 2019, the CELSO system allowed Portoferraio and Rio municipalities to control fleet performance (bus service KPI) and via a dedicated APP, provided users with information on the arrival time of the shuttle.

Moreover, municipality managers of the bus service, through CELSO implementation, had the possibility to manage, monitor, and analyse the fleet operation in order to improve and increase the service quality.

In Rio, the CELSO system has been used during the summers of 2018 and 2019 on the Marebus service, bringing tourists and residents to the various beaches from the two Rio centres (Rio nell'Elba and Rio Marina).

In Portoferraio, CELSO has been used during the summer of 2018 on Taxi Boat services (Chicchero), and during 2019 and 2020 on Shopping Buses and on the night bus service (Cosmopoli by night).

This last service was active in the summer period from 20.00 to 00.30 every day including holidays, connecting the Limited Traffic Zone with the various urban car parks of Portoferraio, with a circular route.



**Figure 3:** CELSO application on Marebus and Chicchero services

Both in the auxiliary transport services of Rio and Portoferraio, the adoption of the CELSO system was very useful for passengers who were able to know in real time the arrival of the shuttle at the various stops.

## C Impact evaluation

### C 1 Evaluation approach

#### Expected impacts and indicators

Impact category	Impact indicator	Unit of measure
Society	1- PF and Rio municipalities satisfaction with CELSO system	%
Society	2-Citizens and tourists' satisfaction with CELSO system	%
Transport system	3-Improvement of passengers on auxiliary shuttle transport (1)	Nº/year

(1) Referred to auxiliary service Marebus

**Table 2:** Expected impacts and indicators

#### Method of measurement

Impact indicator	Method*	Frequency			Target Group	Domain (demonstration area/city)
		Bef.	Dur.	Aft.		
1- PF and Rio municipalities satisfaction with CELSO system	S	-	-	M37	Public transport providers	Rio Portoferraio
2-Citizens and tourists' satisfaction with CELSO system	S	-	-	M36	Public transport users	Rio Portoferraio
3- Improvement of passengers on auxiliary shuttle transport	S	M14	-	M25-36	Public transport users	Rio

\* Data collection (DC), Estimation (E), Survey (S)

**Table 3:** Method of measurement

#### Detailed description of the indicator methodologies:

**1- PF and Rio municipalities' satisfaction with CELSO system** - The interviews were carried out in September 2019 by the staff of the municipalities of Portoferraio and Rio towards the municipal managers of the contractual control of the service performance of the auxiliary services. It was asked whether the documents provided by the CELSO system had given a clear description of the compliance of the shuttle service with contractual commitments. The drivers of the vehicles were also interviewed to get their opinion on the operational management of the CELSO system.



In the finale, a summary question was asked: *are you satisfied with CELSO system?* The collected answers were evaluated on the following: Vs=Very satisfied, s=satisfied, n=not satisfied.

**2 - Citizens and tourists' satisfaction with CELSO system** - The interviews were carried out in August 2019 by the staff of the municipalities of Portoferraio and Rio. About 180 people (mostly tourists), who were waiting for the departure of the shuttle at the terminus, were asked if they used the CELSO APP and if they had encountered problems or errors in the real time location of the shuttle and *whether or not they were satisfied with the CELSO App* with a Yes or No answer.

**3 - Improvement of passengers on auxiliary shuttle transport** - The Municipality of Portoferraio has no data relating to the number of passengers transported in previous auxiliary services not equipped with the CELSO system. Instead, using the data relating to the auxiliary services equipped with the CELSO system:

- Chicchero: year 2018 passengers 2,329
- Cosmopoli by night: year 2019 passengers 624; year 2020 passengers 1,088
- Shopping bus: year 2019 passengers 130; year 2020 passengers 200

Therefore, for the Portoferraio auxiliary services, it is not possible to make a comparison of the number of passengers with and without CELSO System.

The comparison could be possible instead for the Marebus service of Rio where passenger numbers were registered in previous years:

- Marebus year 2017 (Baseline) passengers 5,326 (without CELSO)
- Marebus year 2018 passengers 3,145 (with CELSO)
- Marebus year 2019 passengers 3,056 (with CELSO)
- Marebus year 2020 passengers 1,793 (without CELSO)

Regarding this passenger data, it must be specified that in 2017, numerous daily trips were made (about plus 30% if compared to the trips of the following years) and a greater number of locations served. The comparable number with subsequent years is  $5,326 \times 0.7 = 3,700$ . In 2020, the service was implemented only in August.

### **The Business-as-Usual scenario**

Without experimenting with the CELSO system, the municipalities of Rio and Portoferraio would not have experimented with other bus control and localization systems as they are too expensive and complex. Failure to monitor and locate the summer services would continue. The BAU analysis is not possible as there was no data relating to any problems in the municipalities of Portoferraio and Rio due to the lack of control of the management of bus services.

## C 2 Measure results

Impact category	Impact indicator	Unit of measure	Baseline	Ex-Ante	Ex-Post
Society	1- PF and Rio municipalities satisfaction with CELSO system	%	N/A	80% Vs 10% s 10% n	100%Vs
Society	2- Citizens and tourists' satisfaction with CELSO system	%	N/A	80% yes 20% not	94%yes 6% not
Transport system	3- Improvement of passengers on auxiliary transport shuttle (1)	Nº/year	3,700 (2)	4,000	3,056

(1) This impact is referred only to Marebus service (2)  $5,326 \cdot 0.7$

**Table 4:** Measure results

### C2.1 Society

#### 1 - Portoferraio and Rio Municipalities satisfaction with CELSO system

The interviews carried out with the municipal managers of the performance control of the contracted auxiliary services showed complete satisfaction with the CELSO system, with 100% being very satisfied. The system had provided printouts for each day where the number of journeys made were clearly indicated, the times, and the deviation from the times scheduled at the individual stops. Full satisfaction was also expressed for the ease of planning a new route with time planning at the various stops.

Even the interviewed drivers declared that the system is very simple, easy to manage, and helps to manage the times of the journeys in order to respect the scheduled times at each stop.

#### 2 - Citizens and tourists' satisfaction with CELSO system

The interviews were mainly carried out with tourists waiting for the shuttle to depart at the Rio and Portoferraio terminus in August 2019. Many knew of the existence of the CELSO APP as it was well marked on the timetable at the terminus.

The interviewees were completely satisfied since knowing the position of the shuttle in real time allowed them to prepare in time to go to the stops without the inconvenience of arriving late or long waits. They had never found errors in reporting the position of the shuttle indicated on the APP. Some (just under 6%) suggested being able to equip the alarm APP to signal the transit of the shuttle at certain points of the route to be warned in time of its arrival.

## C2.1 Transport System

### 3 - Improvement of passengers on auxiliary transport shuttle

In Portoferraio, there were no data relating to the number of passengers in auxiliary transport services without the CELSO system. Therefore, it was not possible to evaluate the influence of the system on the number of passengers. However, this assessment is possible with regard to the Marebus service of Rio – the hoped increase of passengers as foreseen in Ex-Ante was not seen, but the registered number of 3,056 of passengers was satisfactory.

We must consider that the number of passengers using auxiliary services depends on many factors: bus capacity, runs for day, number and type of tourists in the area concerned, quality of the weather and the sea which greatly influences the movements of tourists, tourist events carried out by the municipalities, etc.

It should be noted that in 2020, the Marebus service without the CELSO system recorded a number of passengers equal to 1,793, but the service was not performed in July but only in August and September.

## C 3 Quantifiable targets

No	Target	Rating
1	Improvement of the PT services quality fostering the use of PT by residents and tourists	**
2	*Portoferraio and Rio Municipalities are satisfied at least 80% of the Celso system performance certifications	**
3	*At least 80% of citizens and tourists have declared themselves satisfied of the CELSO system APP	**
4	*Passengers on auxiliary buses increased by 10%	*
<b>NA = Not Assessed O = Not Achieved * = Substantially achieved (at least 50%)</b> <b>** = Achieved in full *** = Exceeded</b>		

\*New target, not in GA

**Table 4:** Measure results

Target 1 was planned in the Grant Agreement, but Targets 2 to 4 were new targets adapted to the scope of the measure. In the evaluation phase, after having implemented the measure, it was also considered appropriate to know the satisfaction towards the CELSO system both by users and by the authorities that manage the auxiliary public transport services.

Target 1 was Achieved in Full. Despite this target not being possible to be quantified, the local partners consider that with the implementation of the CELSO system, an improvement of PT auxiliary service quality was achieved.

Target 2 was Achieved in Full. Portoferraio and Rio Municipalities declared their total satisfaction regarding Celso system performance. The system allowed for simple and functional control of auxiliary service performance and is easy to program.

Target 3 was Achieved in Full. Citizens and tourists were completely satisfied with CELSO as the system allowed them to know the position of the shuttle in real time, enabling them to prepare in time to go to the bus stops.

Target 4 was Substantially Achieved. With reference to the Marebus auxiliary service in 2019 with the CELSO system, the number of passengers transported during the summer period was a little lower than the Ex Ante forecast. As previously clarified, the number of passengers is influenced by numerous factors that are often independent of the quality of the service.

## **C4 Up-scaling of results**

The CELSO received the Seal of Excellence by the European Commission after the evaluation of an SME Instrument Phase 2 proposal.

After the very positive field test with the ELB 7.3 measure, CELSO will be able to be used by the various European municipalities in auxiliary transport services for fleet control and for user information.

## **D Process Evaluation Findings**

The Celso system, which besides certifying to the municipalities the number and punctuality of the summer transport services, allows users (through a dedicated APP) to know the position of each bus/vehicle in real time. The system has been tested on both land (Marebus and Cosmopoli by night) and sea (Chicchero) summer transport services with excellent results and user satisfaction.

The municipalities of Rio and PF are very satisfied with the results of experimentation with the CELSO system. The users also interviewed in 2019 appreciated the information received via the APP and were satisfied with the timeliness of the shuttle.

## D1 Drivers

The interest of the municipalities to have inexpensive systems to monitor and certify the performance of auxiliary transport services contracted out (e.g., summer services, school bus, transport of elderly people, etc.) was a relevant enabler for the measure implementation. In addition, the interest of citizens and tourists who use the auxiliary transport services to know the arrival times of the buses at the stop.

## D2 Barriers

The license to use the CELSO system has a cost that, although very limited and not comparable to the well-known AVM (Automatic Vehicle Monitoring) system, often does not fall within the budgets of the municipalities who consider the system an improvement in the service that they can save.

## D3 Lessons learned

The experimentation, through the DESTINATIONS project, confirmed that the CELSO system is a valid tool for controlling and certifying the performance of an auxiliary transport service. Its management is very simple and even its initial programming (memorising the route and times at the various stops) requires a limited commitment.

# E Evaluation Conclusion

The positive evaluation obtained from the testing of the CELSO system on the auxiliary services confirms the full reliability of the CELSO system which improves the quality of the services.

The CELSO system has positive impacts on the efficiency of the temporary public transport services: the service provider can check the progress of the service, the municipality has the daily certification of the service performed, and the user can easily calculate the arrival time at the stop knowing the position of the bus or the small ferry in real time.

Considering the number of passengers registered on the Marebus service, it is possible to conclude that the CELSO system and its APP is of great importance for those (Municipalities) who must check that the service complies with the contractual rules. However, although highly appreciated by users, it has had a limited influence on the growth of passenger numbers.

## **F Additional information**

### **F1 Appraisal of evaluation approach**

The positive evaluation of the municipalities of Portoferraio and Rio is not only regarding the efficiency of the CELSO system and its low installation cost, but also for the extreme simplicity of its application to a specific path.

The interviews were carried out only on Marebus passengers in Rio as they were more numerous. However, even by interviewing the passengers of other auxiliary services, for example those implemented by Rio, the assessment is unlikely to have changed.

### **F2 Future activities relating to the measure**

After the DESTINATIONS project, the municipalities of Portoferraio and Rio are very likely to continue to use the CELSO system for additional public transport services. Most likely, the same system will also be adopted by other municipalities in Elba for similar summer public transport services.