

M02.03 – Executive summary

One of the target of Brescia mobility strategy is to increase the use of PT; and in this framework the e-ticketing can give high contribution to enhance intermodality and increase sustainable mobility. The integration of a new electronic cards compatible with NFC (Near Field Communication) standard could improve intermodality services; since up to now intermodality in Brescia urban area was limited only to suburban trips concerning the railways station and the main suburban bus station, located in the same place. Moreover a potential fare integration among public transport companies could be realized by the development of the AFC (Automatic Fare Collection) system, improving even more the accessibility to the whole PT services.

The upgrade of the existing e-ticketing system on Local Public Transport has been then considered fundamental to be implemented before the start up of the new metro line (2013).

The new e-ticketing allows to manage bike sharing, urban bus service and car parking using just one card (i.e. the Omnibus card). So the so-called Omnibus card contributes to give a new “smart “ image of PT in Brescia.

In this framework the measure aimed to prototype a technical solution, feasible from an economic view point, to manage smart cards, allowing users to take advantage of the same support to access the transportation services of the city (metro and buses, bike sharing, car sharing and park and ride), with a new intermodal approach. Thanks to this measure, the opportunity to develop NFC system has also been evaluated.

Research activities have been carried out to study the AFC platform, and, as a result, the new MIFARE contactless card seemed to allow the intermodal approach needed by Brescia.

The distribution of new cards to LPT (Local Public Transport) and bike sharing users allowed the city transport company (Brescia Mobilità) to start the implementation of an integrated e-ticketing system. Consequently, in April 2012 about 1250 cards have already been distributed.

The Measure evaluation has been selected in order to assess:

- possible technological problems related to the use of the new card;
- the magnitude of new card penetration;
- awareness and acceptance level on the integration of different kind of services in the city.

From a technological point of view, it's important to highlight the reliability of the new contactless cards: the number of registered broken cards was less than 2% of all the cards distributed.

To implement a similar measure, it is recommended to pay attention to the feasibility analysis: a strict collaboration with the provider is necessary to develop a suitable technology and make a reliable integrated system. Furthermore, the collaboration among stakeholders is considered fundamental for the measure success. Another key issue is the importance of an effective dissemination campaign (meetings and presentations), in order to spread information throughout the city.

A. Introduction

A1 Objectives

The measure objectives are:

(J) High level / longer term:

- To improve the PT accessibility and maximise the potential for local public transport through a fast and convenient service alternative to the private car which allows passengers to use different modes of public transport through the development and the promotion of ITS technologies.

(K) Strategic level:

- To build an optimised and user-friendly environment for high-quality public transport to the benefit of citizens by introducing an integrated ticketing system that can offer passengers a simpler and more seamless way of travelling multi-modally.

(L) Measure level:

- (1). To carry out the necessary research and demo activities in order to prototype and implement a new integrated smart card to be used for the e-ticketing system of the city;
- (2). To purchase and distribute at least 10.000 new MIFARE cards;
- (3). To integrate different transport services in view of the new metro line realization (start up foreseen in 2013), through the e-ticketing system and increase the use of smart cards among PT customers.

A2 Description

Today contactless technology is part of citizens' daily life. This equipment is a must when high throughput, high validation speed and secure systems are required. It can be used for financial applications, secure access control, secure ID credentials and documents, AFC⁵ systems and all RFID⁶ applications for supply chain, inventory and item tracking.

Contactless technology is based on an RF (Radio Frequency) communication process. RFID MIFARE 1K card is one of the most popular used for storing memories, while a simple security mechanism divides the memories into segments. Therefore, it is ideal for high volume transactions in all different applications, such as transport ticketing, time attendance solutions, car parking, road-tolling etc. It is mainly used in closed systems as fixed value tickets (e.g. weekly/monthly travel passes).

For these reasons the city of Brescia has decided to carry out research and demo activities in order to prototype and implement an e-ticketing system based on that technology. The ultimate aim by doing that is to strengthen intermodality among different PT modes and vectors, through integrated ticketing systems over wide areas, including different transport services.

⁵ Automatic Fare Collection.

⁶ Radio Frequency Identification.

The measure is therefore intended to identify technical solutions ,acceptable from an economic point of view, for managing smart cards avoiding users when travelling by different modes to buy a ticket at each leg of their journey, and so to give them access to different services such as Bike Sharing, Car Sharing and Park and Ride, also in view of the future metro service.

In this context, a new electronic smart card, in line with the ISO 14443 protocol, has been introduced in alternative to the one nowadays in use (GTML Card). Additionally, all the urban bus fleet (230 units) has been equipped with new ticketing machines able to read and validate the new smart card.

With this measure the city of Brescia is also accomplishing the Regional Plan for Intelligent Mobility Development⁷ regulation which aims to promote the use of ITS technologies for enhancing the infomobility services to citizens.

In the measure context the opportunity to develop a NFC⁸ system has also been considered. In particular, the possibility to apply NFC technology for purchasing tickets and providing infomobility services by using an AFC platform together with the new MIFARE cards has been considered very interesting.

⁷ D.g.r. 27/12/2007-8/6411

⁸ Near Field Communication.

B. Measure implementation

B1 Innovative aspects

- **Use of new technology/ITS** – This is the first time that a new multiservice smart card – based on ISO 14443 A and B MIFARE card technology – has been introduced in the city of Brescia in order to upgrade the existing e-ticketing system for public transport. The choice of that specific type of card has been made in order to extend the ticketing system also to other urban services such as parking and bike sharing.

This technology is very innovative in Italy, therefore, the definition of the technical features required particular attention from the software supplier.

The potential upgrade of the ticketing system towards NFC technologies represents an innovative opportunity for all PT users (i.e. bus users, Metrobus users besides Park&Ride and Bike Sharing users, adopting an intermodal approach). Additionally, this technology allows to store precious information about PT (Infomobility).

B2 Research and Technology Development

The research activity has been important to set the technical features of the SW/HW in view of the new e-ticketing system implementation. These activities aimed at improving the existing AFC system for a better customers usability. The SW needed substantial modifications in order to grant the communication between the ticket machines and the new MIFARE cards. It had to modernize the ticket sale devices with contactless interface and to assess the range of services managed by the new cards: Park&Ride, Bike Sharing and the future metro line.

The main research and technology development activities can be summarized as follows :

- Improvement of the contactless reader: specify a remote ticketing board intended to function autonomously, connected to a PC or by a serial link. It allows communication with type A (MIFARE 1) and type B (CD97 travel card, GTML) contactless cards.
- Technical features of the cards' charger devices (MGS-415): the card charger devices and their power supply have been installed in the outlets to upgrade the old type of contact card rechargers. It has been used a new kit (MGS 415) compatible with ISO 14443 A & B standards, and composed by contactless Reader Module CSC⁹, power supply module CSC and power connection RJ45/power. By changing the HW it has been possible to add contactless functionality to the devices to allow a contactless cards recharging since MIFARE technology hasn't got a contact interface.
- Definition of technical features and services to be accomplished by MIFARE contactless new mobility cards;
- Ticket machine software integration for MIFARE cards.

⁹ Content Security and Control.

The new software developed for the purpose has been tested to check the compatibility with the new ISO 14443A standard, maintaining also the previous technology ISO 14443B type. The new standards have also been extended to the electronic ticket machines and the self service machines for the tickets purchase.

The possibility to test an innovative scheme for the e-ticketing NFC applications was carried out through the participation to other projects (such as Stolpan) To reach the goal Consorzio Triveneto, partner of STOLPAN project, was contacted. Consorzio Triveneto had to verify the feasibility of replicating the MIFARE keys to enable communication between validator and cellular phone. A supplier called ACS proposed a bid for the experimentation of a platform able to test NFC technology. Unfortunately the available budget was not sufficient for implementing the experimental phase of the NFC within CIVITAS. Despite that, since the interest in this technology is very high, the basis for the application of NFC to the new ticketing service for the metro line has been investigated during the project lifetime.

B3 Situation before CIVITAS

Before the measure development , intermodality in the urban area of Brescia was possible only for suburban travels by bus and train. The fare integration between different companies was possible only for students travelling from the suburban area and having integrated subscriptions.

For this reason the introduction of a new smart-card able to better integrate the different transport systems from both the technological and the fares point of view resulted to be a key issue for the city. Indeed the existing e-ticketing system (which consisted in a contactless card usable only for Local Public Transport (LPT) services) didn't allow the integration of several services already available in the city,. Additionally, the start-up of the new metro line, foreseen at the beginning of 2013, was a strong driver for the introduction of a new e-ticketing system to allow a PT intermodality.

B4 Actual implementation of the measure

The measure was implemented in the following stages:

Stage 1: executive design of the AFC system upgrade (from October 2008 to September 2009) – This stage consisted on RTD activities carried out in order to design the technical features of the new e-ticketing system. The software developer and the new cards supplier were identified and the technical documents for the system upgrade were elaborated. The new designed system consisted of the following main elements:

- **Contactless new smart cards technical features** – The MIFARE cards are of two different kinds: the MIFARE 1K (MF1 IC S50) and MIFARE 4K. The difference between these two cards is the memory capacity. The two types are read by the system in the same way. Since both cards support up to 3 contracts, the decision to use the MIFARE 4K as a 1K card (i.e. a MIFARE 4K card isolating the part of 1K of memory, without using the remaining 3K) was due to the fact that the remaining card memory can be used in the future for other applications such as Car Sharing service.. The MIFARE 1Kmode (as the real MIFARE 1K) is composed of 16 sectors. Each sector consists of 4 blocks of 16KB. Only three sectors can be used, as the 4th block contains the cryptographic keys and access rights. The cards mapping , as defined by the supplier ACS, foresees data divided as follows: Environment, List contracts, 3 contracts, 3 Free Data and 4 events. The cards must be customized to be accepted for sale or validation (mandatory transaction in the system) and the customization should consider both the electronic and the graphic aspect (user's data and photo insertion, DEV – Data End

Validity definition, printing of the black magnetic line, etc...). Any kind of ticket and fare can be loaded into the card, and each title can be defined as rechargeable or not rechargeable.

- **Contactless reader improvements** – *A remote ticketing board has been set up to work autonomously. The device can be connected to a PC or can have a serial link. It allows communications with type A (MIFARE 1) and type B (CD97 travel card, GTML) contactless cards. In this way, even if simultaneous reading of different types of cards isn't possible, subscriptions can be charged on both types of cards.*
- **Cards' charger devices (MGS-415) technical futures** - *Card charger devices and their power supply have to be installed in the outlets to upgrade the old type of contact card recharger. With the new contactless charging mode it is possible to charge both the old card GTML and the new MIFARE one. The new kit MGS 415 is compatible with the ISO 14443 A & B standards, and it is composed by contactless Reader Module CSC, power supply module CSC and power connection RJ45/power. The purpose of the hardware changes is to add a contactless functionality to the devices, for contactless cards recharging.*
- **Ticket machine software integration for MIFARE cards** – *The software upgrade foresees an increase of the maximum number of tickets managed by the Automatic Fare Collection (AFC) system (greater than the old limit of 255 different fares), which is now set up in order to also accept other mobility services (bike sharing, park & ride, metro line tickets).*



Fig.1: Testing instruments for the new contactless cards recharge system. On the left: aerial for the contactless recharge; on the right: printer that simulates the sales check emission

Stage 2: Validation test for the software and analysis of SW integration with NFC technology (from September 2009 to May 2011) – *The software developed has been tested for the compatibility with the new ISO 14443A standard, maintaining also the previous technology compatible with the ISO 14443B type. The new standards have been extended also to the electronic ticket machines and the self service machines for tickets purchase.*



Fig.2: Updated the software running on the ticket machines for the contactless control of the validity of the cards



Fig.3: Updating of the software running on the ticket self service sales machines

During this stage the possibility to open the system to NFC technology was investigated, by searching potential partners for participating to other European projects (such as STOLPAN) or co-funding programmes to obtain the needed funds to develop such technology. Additionally, the ACS supplier has been contacted in order to make a feasibility study for an NFC trial, based on an emulation of the operations made with MIFARE cards on mobile devices like Nokia 6212.

with reference to the STOLPLAN project contacts with Consorzio Triveneto have been carried out for exploring the feasibility of replicating the MIFARE keys to enable communication between validators and cellular phone. In parallel, a search for co-funding negotiations have been held among BSM, bank and mobile phones operators. As the available budget is not sufficient for the actual

implementation of the NFC technology, just the basic research activities for the application of NFC to the new ticketing service for the metro line has been investigated.

Three different scenarios have been defined as possible ones because linked with Secure Element adopted, namely:

- SIM BASED Secure Element;
- External Secure Element (SDD CARD);
- Chip Embedded Secure Element.

The SIM BASED scenario was chosen because public transport is an example mass market and mobile phones that are based on a SIM technology (that would allow secure payments) could be easily adapt to do payments through their SIM.

The main problem isn't technological but is related to customers' privacy and to SIM secure protocol, therefore an agreement with phone providers should be carried out.

Concerning the intermediate running phase, the proposition of Secure Element on SDD has been considered interesting. This kind of solution can allow the independence among the external elements and simplify the reference Business Model, minimizing the number of involved operators. Nevertheless, this solution has been considered not strong enough to start the Mass Market.

As third option, it has been taken into account the Chip Embedded solution since it is available both in Android system and Samsung one. Anyway, the system access isn't available with Open modality. Hence, even if the solution has been considered interesting it sets some objective problems to make the system working. Therefore, this solution has been discarded because of the close examination impossibility.

In case of SE on SDD application, the model is shown in the following diagram (Figure 4):

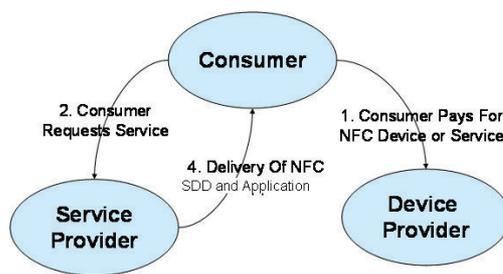


Fig. 4: High Level Commercial Model

In case of SE SIM BASED application, the model is more complex, as shown in the next diagram (Figure 5):

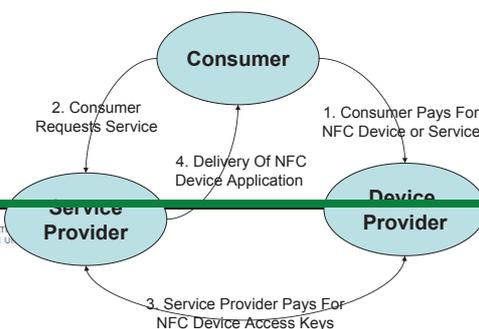


Fig. 5: High Level Commercial Model

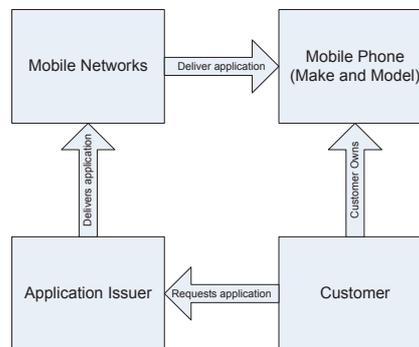


Fig. 6: Mobile NFC Operational Delivery Model

Therefore, the most important step came out to be the need of establishing an agreement with a mobile operator.

After an initial research phase, the option of using a phone with Secure Element Embedded has been dismissed: because not suitable to Market Model development.

As regards the SIM BASED solution, the alternative to implement a test phase with Telecom Italia phone operator has been analyzed. This choice was taken because this operator was already following an ambitious Road Map, including also the start-up of NFC service addressed to the Mass Market.

As regards the SDD Card solution, many marketed products have been analyzed and it has been chosen to collaborate with WatchData, already used in France for similar projects.

The testing phase has been carried out in order to demonstrate the compatibility between the ticketing system in place in Brescia and NFC technology. In this phase, the priority has been given to the interaction between the chosen depot/SIM and the systems in place in Brescia and .not to the “OTA” phase of NFC services. In order to carry out the testing phase, Secure Elements have been customized before the deployment on field. The USE CASES foreseen for the testing phase are explained below.

- Ticket purchase: the phone interacts with the existing system.
- Ticket validation: the ticket is used as in case of electronic equipment.
- Control: the phone is used as electronic ticket and it's controlled with the system in place.
- Visualization of ticket through phone User Interface: users, with USER INTERFACE, verify their ticket.

Nowadays, the more suitable technology for NFC system is the SIM based one.

this because it foresees that the chosen system Device + SIM emulates the MIFARE Classic card with the ticketing system.

During the design/planning phase the involved operators accomplished the following tasks:

- Brescia Mobilità provided:
 - o MIFARE keys in the ticket testing field;
 - o Layout of tickets on the card.

- *Consorzio / TELECOM provided:*
 - *Set up SIM;*
 - *Mobile phone useful for testing phase;*
 - *Specifications SW application;*
 - *SW application for Mobile system.*

During the testing phase the involved operators realized the following tasks:

- *Brescia Mobilità and TELECOM agreed on management process of production keys;*
- *Consorzio / TELECOM provided:*
 - *Production SIM;*
 - *Phones.*
- *Brescia Mobilità:*
 - *Identified target users;*
 - *Planned the testing phase.*

Stage 3: Experimental project / Prototyping test (from /June 2011 to October 2012) – *This stage started with the arrival of the new multi-service cards (May/June 2011). As the new cards have already been integrated with the Bike Sharing service, the priority has been to distribute the cards to the Bike Sharing users, in order to accelerate the activation of the new ticketing system (the new cards were sent to the subscribers by post). While the distribution of the cards to the LPT and Parking subscribers was more gradual and registered a massive increase in occasion of the season tickets renewal in September (school opening).*



Fig. 7: Promotion of the new cards on local news papers (Giornale di Brescia, 05/07/2011)



Fig. 8: Promotion of the new cards on local news papers (Bresciaoggi, 05/07/2011)

B5 Inter-relationships with other measures

The measure is clustered with other measures proposed in Brescia, using Civitas plus funding, to study the new public transport asset after metro realization, to introduce a smart PT image. Potential effects of the implementation of the measure should be foreseen though the evaluation of the result of the research carried out within the measure group.

In particular, the e-ticketing is related to the following measures:

- M.02.02 Intermodality with public transport;
- M.03.03 P&R facilities for underground and public transport system;
- M.08.05 Brescia Mobility Channel.

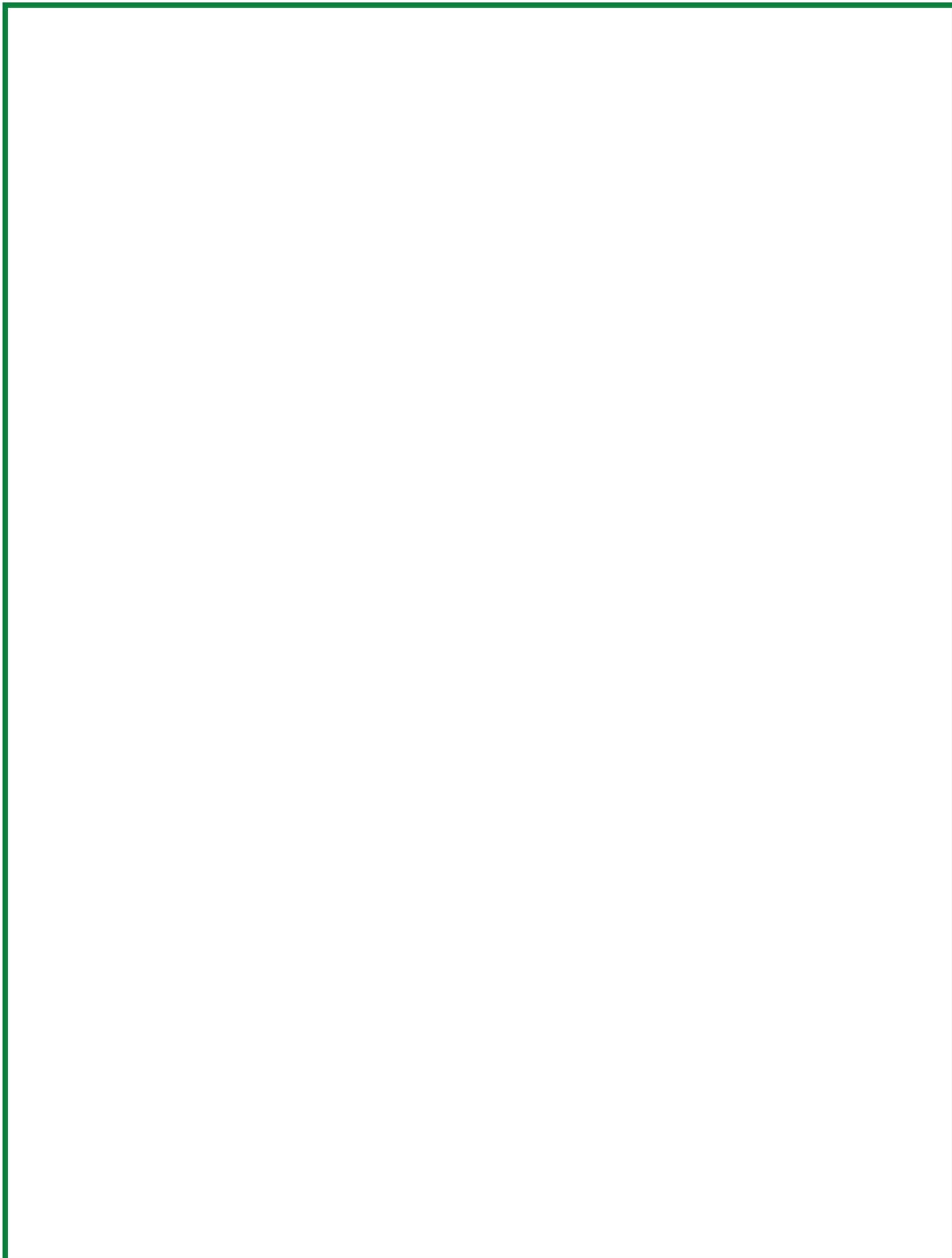
Measure title:

DEVELOPMENT AND UPGRADE OF THE E-TICKETING SYSTEM IN BRESCIA

City: **Brescia**

Project: **MODERN**

Measure number: **02.03**



C. Evaluation – methodology and results

From the evaluation point of view the main objective of the measure consists in prototyping and implementing the e-ticketing system in Brescia and monitoring its use.

C1 Measurement methodology

The indicators have been divided into two macro categories: main indicators and complementary indicators.

Main indicators are able to evaluate measure efficiency in terms of objectives achievement. Complementary indicators, instead, are introduced in order to assess specific issues. These indicators are relevant only at local level and are used to give additional information to better understand the measure performance.

For each measure, the two indicator categories have been specified together with the indicators that have been eventually deleted because no more significant in the light of the measure evolution.

In this measure all indicators are considered as main ones, because they are strictly linked to the achievement of the targets at measure level (see paragraph A1).

C1.1 Impacts and Indicators

Table C1.1: Indicators

No.	Impact	Indicator	Data used	Comments
1	Economy	Average cards validation per month	e-ticketing database	Main Indicator First data collection OCTOBER 2011
2	Economy	Number of new cards distributed in a given time period	e-ticketing database	Main Indicator Ex ante not scheduled First data collection OCTOBER 2011
3	Transport	Number of new cards validated/ Total number of new cards	e-ticketing database	Main Indicator Ex ante not scheduled First data collection OCTOBER 2011
4	Transport	Number/kind of fares/season tickets loaded on the new cards respect to the number of distributed new cards	e-ticketing database	Main Indicator Ex ante not scheduled First data collection OCTOBER 2011
5	Transport	Number of card breaks/new cards distributed	e-ticketing database	Main Indicator Ex ante not scheduled First data collection OCTOBER 2011
6	Society	Awareness level	Customer satisfaction survey	Main Indicator First data collection ...
7	Society	Acceptance level	Customer satisfaction survey	Main Indicator First data collection ...

Detailed description of the indicator methodologies:

- **Indicator 1 (AVERAGE CARDS VALIDATION PER MONTH)** – The existing ticketing system consists of two kinds of tickets: contact-less cards (for the season ticket holders) and the magnetic tickets (for occasional users). As the measure consists in distributing new contactless cards (MIFARE), this indicator is measured using data referred to the contactless cards validation. The indicator is collected monthly and it's calculated dividing the total number of c-less validations by the total number of valid season tickets. More details can be found in the specific section “Annex 2”.
- **Indicator 2 (NUMBER OF NEW CARDS DISTRIBUTED IN A GIVEN TIME PERIOD)** – This indicator is built considering the number of new MIFARE cards distributed for the local PT service in a given time period.
- **Indicator 3 (NUMBER OF NEW CARDS VALIDATED/ TOTAL NUMBER OF NEW CARDS)** - The methodology is similar to the indicator 1 “Average cards validation per month” (built dividing the number of validations by the number of active season tickets), data are referred to the new MIFARE cards distributed for the LPT service.
- **Indicator 4 (NUMBER/KIND OF FARES/SEASON TICKETS LOADED ON THE NEW CARDS COMPARED WITH THE NUMBER OF DISTRIBUTED NEW CARDS)** - In order to investigate the intermodality attitude of the LPT subscriber, this indicator is built extracting from the e-ticketing database the number of users that activated, besides the local PT season tickets, also the bike sharing service, which can be loaded on the same card.
- **Indicator 5 (NUMBER OF CARD BREAKS/NEW CARDS DISTRIBUTED)** - This indicator is useful to evaluate the new cards performance/reliability, as for many reasons cards can break and must be replaced. Data recorded are not lost but must be reactivated on a new card. E-ticketing database is able to monitor the number of cards that have been replaced and this information is compared with the total number of new cards distributed.
- **Indicator 6 (AWARENESS LEVEL)** - This indicator (and indicator n. 7 “Acceptance level”) is calculated through the BST Customer satisfaction inserting specific questions to the conventional survey, namely:
 - ✓ Do you know that a multi-service card (able to manage, beside local PT season tickets, many other services such as Bike Sharing, Parking and the future Metro) is going to be distributed soon?

The results of the survey can be found below, under the section “Annex 2”.

- **Indicator 7 (ACCEPTANCE LEVEL)** - This indicator (as indicator n. 6) is calculated through the BST Customer satisfaction inserting specific questions to the conventional survey, namely:
 - ✓ Would you be interested in a multi-service card (able to manage, beside LPT season tickets, many other services such as Bike Sharing, Parking and the future Metro)? Would you be favourably disposed towards the payment of a symbolic 5€ key money?

The results of the survey can be found below, under the section “Annex 2”.

C1.2 Establishing a Baseline

Since the beginning of the 21st century the city of Brescia has been characterized by an integrated management of the local public transport. Progressively, also the parking service and other complementary activities, such as the traffic lights management and the violations control (multaphot and multanova) have been added to the integrated management.

Brescia Mobilità SpA (metropolitan mobility company – BSM) was born on 28th December 2001, after the divestiture from the original Company ASM Brescia Spa.

Brescia Mobilità Company structure includes the following services and sectors:

- Public Transport (Brescia Trasporti SpA);
- Parking and parking meters (Sintesi);
- Traffic lights and innovative technologies;
- Driverless light metro (Metrobus).

The most important objective of the Brescia Mobilità Group is planning and managing different activities regarding mobility according to the Municipality's strategies and policies.

One of the activities carried on by BSM is the management of both single and seasonal tickets system (concerning the LPT, parking, etc.).

The situation to be taken as reference for the baseline consists in a local PT ticketing system based on 2 different kinds of tickets: the magnetic tickets (for the occasional users) and the contactless tickets (for the systematic users who subscribe a season ticket). Before Civitas, for the systematic users a ticketing system based on the contactless technology was already available in Brescia (since 2003). These c-less tickets were able to manage only the bus service season tickets.

The implementation of new mobility services (first of all the future metro line), offered the opportunity of upgrading the electronic ticketing. Before the start up of the metro line (December 2012); the new technology introduced by the measure represents a valid tool able to significantly test the new card potential towards the future intermodal mobility attitude of the city.

The design of the new cards ended at the beginning of 2011, as the necessary technology was developed by that period. The distribution of the new cards started in July 2011 among the bike sharing subscribers. The distribution of the cards to the LPT and parking users started later and was characterized by a gradual diffusion, as it depended also on the season tickets renewal.

The time reference for the establishing of the indicators baseline is July 2011, except for indicators n.6 (Awareness level) and n.7 (Acceptance level) which derive from the results of the customer satisfaction survey made in May 2011.

Indicator 1 (Average cards validation per month, intended as the total number of validations on bus divided by the LPT valid season tickets per month) has been selected to monitor the use of cards in the local PT network (i.e., for the baseline, the already existing contactless cards and then also the new MIFARE contactless cards after their introduction during Civitas). The baseline value (ex-ante) for this indicator, referred to July 2011, is equal to 29,39.

Since the new cards have been developed during the measure implementation, for the indicators n. 2 (Number of new cards validation in a given time period), n.3 (Number of new cards validated/ Total number of new cards), n.4 (Number/kind of fares/season tickets loaded on the new cards compared

with the number of distributed new cards) and n.5 (Number of card breaks/new cards distributed), about the new cards performances, the baseline value is equal to 0.

Even if also indicators n.6 and n.7 are referred to the new cards, they have a baseline value different from zero because they measure the level of information about the new cards distribution (i.e. the level of awareness and acceptance) among the citizens.

Indicators	BASELINE (July 2011)
1. Average cards validation per month (total validations on bus/ LPT valid season tickets per month)	29,39
2. Number of new cards validation in a given time period	0 (no service)
3. Number of new cards validated/ Total number of new cards	0 (no service)
4. Number/kind of fares/season tickets loaded on the new cards compared with the number of distributed new cards	0 (no service)
5. Number of card breaks/new cards distributed	0 (no service)0
6. Awareness level (May 2011)	5,1 % of the interviewed people are aware of the imminent distribution of the new card in Brescia
7. Acceptance level (May 2011)	26 % of the interviewed people are interested in the new card; 22,1 % of the interviewed people are disposed to pay 5€ key money for the new card

C1.3 Building the Business-as-Usual scenario

To build the BaU scenario for selected indicators, different approaches have been adopted.

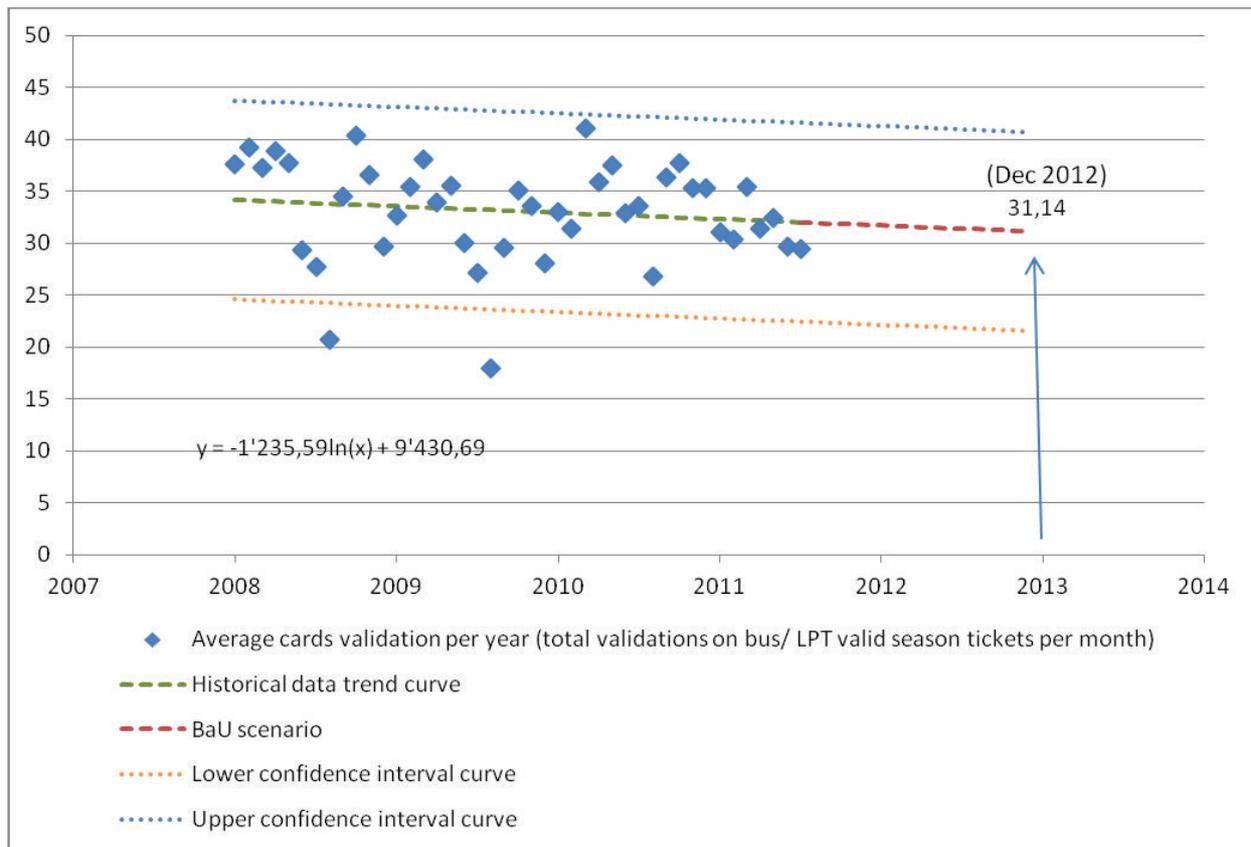
For the indicator n.1 “Average cards validation per month” (total validations on bus/ LPT valid season tickets per month) a consolidated monthly data series were available (since January 2008). Therefore, the BaU scenario for this indicator has been obtained projecting the historical data series (see the graph 1 BaU of Average cards validation per year).

The time horizon for the BaU scenario is December 2012, just before the start up of the metro service in Brescia.

The obtained BaU value for December 2012 (31,14) demonstrates an increasing trend with respect to the Baseline value. The introduction of the new e-ticketing system during Civitas should increase the value of this indicator, and the running of the metrobus, during 2013, will probably amplify this trend even more, also considering that the new card will be fully used for intermodality purposes.

Before the end of Civitas the integration among services will not be complete.

As a matter of fact, the metro service and the interchange parking will be working only after the beginning of 2013. Furthermore, it's important to highlight that the increase of the bike sharing stations is foreseen and these new ones will be installed near each metro station.



Graph 4 – BAU of Average cards validation per year

Indicators	BaU scenario (December 2012)
1. Average cards validation per month (total validations on bus/ LPT valid season tickets per month)	31,14

The assumptions concerning the BaU scenario for the indicators n.2 (Number of new cards validation in a given time period), n.3 (Number of new cards validated/ Total number of new cards), n.4 (Number/kind of fares/season tickets loaded on the new cards compared with the number of distributed new cards) and n.5 (Number of card breaks/new cards distributed), have been based on the new cards performances, taking also into consideration the ideas exposed in the interview with Brescia Mobilità SpA General Director, made by the Local Evaluation Group of Brescia in July 2011. The interviewee highlighted the crucial importance of the Civitas contribution in the realization of the new contactless cards. Indeed, without CIVITAS, this activity wouldn't have been implemented before the start up of the metrobus due lack of resources. For this reason the Business as Usual scenario has been set as equal to the Baseline value (0), since it corresponds to the alternative zero or the so-called “do nothing” option. As a consequence, notwithstanding the presence of a baseline value, also the BaU scenario for indicator n.6 (Awareness level) is equal to 0.

Concerning the indicator n.7 (Acceptance level) – being set in order to better understand the interest in the possible new card in relation with the start up of the metro – its value has been considered equal to the baseline (26% of the interviewed people are interested in the new card, 22,1% of the interviewed people are disposed to pay 5€ key money for the new card).

Indicators	BaU scenario (December 2012)
2. Number of new cards validation in a given time period	0 (no service)
3. Number of new cards validated/ Total number of new cards	0 (no service)
4. Number/kind of fares/season tickets loaded on the new cards compared with the number of distributed new cards	0 (no service)
5. Number of card breaks/new cards distributed	0 (no service)
6. Awareness level	0 (no service)
7. Acceptance level	<p>26 % of the interviewed people are interested in the new card;</p> <p>22,1 % of the interviewed people are disposed to pay 5€ key money for the new card</p>

C2 Measure results

The results are presented under sub headings corresponding to the areas used for indicators – economy, society and transport.

C2.1 Economy

Table C2.1.1: Results obtained for the Indicators corresponding to area “economy”

Indicator	Before	B-a-U	After	Difference: After –Before	Difference: After – B-a-U
1. Average number of validations per month	July 2011 = 29,39	October 2011 = 31,85	October 2011: 28,34	-1,05	-3,51
		April 2012 = 31,55	April 2012: 27,94	-1,45	-3,61
2. Number of new cards distributed in a given time period	Not scheduled	October 2011 = 0 (no service)	October 2011 = 690	Not Assessable	+690
		April 2012 = 0 (no service)	April 2012 = 1251	Not Assessable	+1251

As regards the average number of validations per month, collected by indicator 1, the "BaU" value is higher than the “After” one.

This reduction is due to:

- the increase of the LPT ticket fares during Civitas Project, which wasn't considered in the BaU fulfilment (as the fare influence on the “Average number of validations per month” is usually considered a transitory condition)
- the reduction of the LPT passengers in Brescia (from 42.692.823 passengers in 2008 to 42.553.535 passengers in 2010) that is related to the economical crisis, which caused the closing down of many activities in Brescia

This inflection cannot be considered related to the new implemented technology.

C2.4 Transport

Table C2.4.1: Measure results for the indicators of the category “Transport”

Indicator	Before	B-a-U	After	Difference: After –Before	Difference: After – B-a-U
3. Number of new cards validated/ Total number of new cards	Not scheduled	October 2011 = 0 (no service)	October 2011: 8,18	Not Assessable	+ 8,18
		April 2012 = 0 (no service)	April 2012: 16,12	Not Assessable	+ 16,12

Indicator	Before	B-a-U	After	Difference: After –Before	Difference: After – B-a-U
4. Number/kind of fares/season tickets loaded on the new cards compared with the number of distributed new cards	Not scheduled	October 2011 = 0 (no service)	October 2011: 20,14%	Not Assessable	+20,14%
		April 2012 = 0 (no service)	April 2012: 18,86%	Not Assessable	+18,86%
5. Number of card breaks/new cards distributed	Not scheduled	October 2011 = 0% (no service)	October 2011: 0/690 = 0%	Not Assessable	0%
		April 2012 = 0% (no service)	April 2012: 18/1251 = 1,44%	Not Assessable	+ 1,44%

As regards the ratio between the number of new cards validated and the total number of new cards, an increase of the collected values can be observed, in spite of the results of indicator 1 (Average number of validations per month). It can demonstrate that the new card is well accepted and it works.

As regards the use of the new card as integrated support, considered through indicator 4 (Number/kind of fares/season tickets loaded on the new cards respect to the number of distributed new cards), the collected values are considered almost constant.

It's important to remark two aspects:

1. up to 2013, mainly bike sharing and LPT can be considered as “chargeable services on the new card”, because these services at the moment represents the actual intermodal offer;
2. the parking subscriptions can be charged on the new card, but, until the start up of the metro by 2013, their use cannot be considered finalized to intermodality.

An increase of the value of the indicator 4 is expected in the near future, considering the start up of the metro by 2013.

Moreover, the new card durability, evaluated through indicator 5 (Number of card breaks/new cards distributed) is considered satisfactory: as a matter of fact, the number of broken cards is reasonably low in comparison with the total number of distributed cards. The new technology is considered reliable from the technical point of view.

C2.5 Society

Table C2.5.1: Measure results for the indicators of the category “Society”

Indicator	Before	B-a-U	After	Difference: After –Before	Difference: After – B-a-U
6. Awareness level	May 2011: 5,1 %	November 2011 = 0 (no service)	November 2011: 44,3 %	+ 39,2%	+ 44,3 %
7. Acceptance level	May 2011 (interest in the new card) = 26 %	November 2011 (interest in the new card) = 26 %	November 2011 (interest in the new card) = 22,6 %	- 3,4%	- 3,4%

Indicator	Before	B-a-U	After	Difference: After –Before	Difference: After – B-a-U
	May 2011 (willing to pay 5€ key money for the new card) = 22,1 %	November 2011 (willing to pay 5€ key money for the new card) = 22,1 %	November 2011 (willing to pay 5€ key money for the new card) = 88,9 %	+ 66,8%	+ 66,8%

In order to evaluate the awareness and the acceptance of citizens about the new integrated card, some specific questions have been added to the standard customer satisfaction survey.

Before the distribution of the new e-ticketing card, the specific questions for indicator 6 and 7 were:

"Do you know that a multi-service card (able to manage, beside local PT season tickets, many other services such as Bike Sharing, Parking and the future Metro) is going to be distributed soon?"

"Would you be interested in a multi-service card (able to manage, beside LPT season tickets, many other services such as Bike Sharing, Parking and the future Metro)? Would you be favourably disposed towards the payment of a symbolic 5€ key money?"

These questions have been updated after the card distribution: the first question changed in "...have been distributed?", while the second one hasn't been changed.

The comparison between "Before" and "After" situations shows a significant increase of the awareness level towards the new cards, but at the same time a very slight decrease of the acceptance.

It's important to highlight that in the customer satisfaction survey the sample size of the interviewed people was the same, but the involved people were different and no specific information campaign was carried out just before the interviews.

Therefore, the growth of citizens' awareness and acceptance seem to be related to satisfied users - that spread out the information through "word-of-mouth" - and to dissemination campaigns carried out during mobility events in Brescia, such as the European Mobility Week.

C3 Achievement of quantifiable targets and objectives

No.	Target	Rating
1	To carry out the necessary research and demo activities in order to prototype and implement a new integrated smart card supporting the e-ticketing system in Brescia The objective is considered exceeded.	**
2	To purchase and distribute at least 10.000 new MIFARE cards. The objective is considered substantially achieved.. <i>The achievement can be evaluate considering both the purchase and the distribution of new cards.. The distribution activity is expressed by indicator 2 (Number of new cards distributed in a given time period). In April 2012 the distributed cards were equal to 1.251, as part of the 7.333 cards available. The number includes also the new distributed cards for other interoperable services, such as Trenocittà, ioviaggio Lombardia and SIA bus network. As regards the purchased cards, their number exceeded the 10.000 cards (actually, more than 6.000 cards have been distributed among bike sharing users, more than 1200 among PT users and 5.000 have been given to the suburban transport societies to distribute among interested users</i>	*
3	To integrate different transport services in view of the new metro line realization	**

	<p>(start up foreseen in 2013), through the e-ticketing system and increase the use of smart cards among PT customers . The objective is considered achieved in full.</p> <p><i>The achievement can be evaluate considering that on the new MIFARE card the subscription of bicimia, LPT service and parking service can be charged. The metro service will start up with the new technology and subscription will be immediately chargeable.</i></p>	
<p>NA = Not Assessed O = Not Achieved * = Substantially achieved (at least 50%) ** = Achieved in full *** = Exceeded</p>		

C4 Up-scaling of results

The measure implementation regarded all the urban and suburban territory not only for LPT service (considering that the service coverage of the territory regards the city of Brescia and 14 suburbs around Brescia), but also for bike sharing and parking (all the small columns in these service have been equipped with the new validation support, updated for the new card). Therefore it isn't possible to make an up scaling of the results of the measure, as all the potential and the existing users and areas have been already involved in Civitas Project activities.

C5 Appraisal of evaluation approach

The evaluation approach firstly considered project's objectives as expressed explicitly in the original evaluation plan. The data collection methodology and the data quality have been defined as adequate for the technical evaluation of the measure.

The indicators were selected at the beginning of Civitas project and the chosen ones belong to the following categories: Economy, Transport and Society. Indicators were able to monitor the attitude to the use of LPT service in Brescia and the effective distribution of the new integrated card, developed during Civitas. The indicator 2 ("Number of new cards distributed in a given time period") were useful to evaluate research and demo activities at measure level

The indicators included in the category "Transport" were useful to evaluate the use of the new integrated card on LPT service (through both indicator 3 "Number of new cards validated/ Total number of new cards" and indicator 4 "Number/kind of fares/season tickets loaded on the new cards respect to the number of distributed new cards") and the durability of the card (through the indicator 5 "Number of card breaks/new cards distributed"). This indicator was considered important in order to monitor the reliability of the new contact less card and, as a consequence, of the intermodality in Brescia. At the beginning of Civitas project, these indicators were chosen in order to monitor technological problems and to give an order of magnitude of the measure implementation.

The indicators within the category "Society", were used to monitor Awareness and Acceptance of the new card. It was considered significant to insert specific questions in BST Customer Satisfaction conventional survey. This choice was carried out because of the novelty of the new integrated card.

The ex ante and ex post data collections have been carried out as defined in the original plan.

This measure is part of "Metro package", with measures M02.02 "Intermodality with public transport", M03.03 "P&R facilities for underground and public transport systems in Brescia" and M08.05 "Brescia Mobile Channel". In order to carry out a complete evaluation, it's important to consider these measures in the context of the city of Brescia, which is deeply changing with the metro start up by 2013. In this view, the evaluation approach was affected by the need to obtain an overall perception of the Metro Package implementation.

C6 Summary of evaluation results

The key results are as follows:

- **Key result 1** – It's considered significant that in a medium sized city, as Brescia, it has been decided to improve the existing e-ticketing system with a new integrated contactless card,

technologically advanced. This choice, also linked with the start up of the metro line in the city, was important for the city image, in terms of “city smartness”.

- **Key result 2** – The realization of a new prototype of an integrated contactless ticketing system in Brescia has been an important goal from a technological point of view, because the validation of only one card allows to use different transport systems (LPT, metro, Bike sharing, car parking and Park & Ride). The system is the development of the existing one, which was not integrated (there is one card for each service). This choice will be more esteemed after the start up of the metro (2013).
- **Key result 3** – The new cards distributed for LPT were almost 1250 in April 2012. These were in addition to the 6000 cards distributed to bike sharing users. The new system implementation has increased the awareness level about the new card and the opportunity of integrated mobility (from ex ante data 5,1% of interviewed people to ex post data 44,3%) and the acceptance level (from ex ante data 22,1% to ex post data 88,9% referred to interviewed people who have been willing to pay a caution for the new integrated card).
- **Key result 4** – From a technological point of view, it's important to underline the reliability of the new contactless card: actually, the number of registered broken card have been less than 2% of all the distributed cards.
- **Key result 5** – During Civitas project, a substantial decrease of the number of all LPT card validations has been registered. Otherwise, the number of the contactless card validations have increased during the operational phase. Therefore, the new e-ticketing cards have been accepted and they have been daily used.

C7 Future activities relating to the measure

Among the possible future activities related to the measure, which can be carried out after the end of Civitas, the control and the monitoring of the information security on the new integrated card are the most important ones from a technological point of view. Furthermore, the monitoring of the number of new cards breaks and the number of new cards validations will also be important to control both if the dissemination campaign carried out till now is sufficient and if the new cards don't have any technological problem (paying particular attention to the new cards obsolescence).

Other future activities will consist in a promotional campaign, in view of the metro start up in order to spread out information about the new integrated card. Furthermore, it will be important to inform citizens about the opportunity of charging the new card with the metro subscription, to increase awareness and acceptance level in Brescia about available integrated mobility systems. Furthermore, a massive distribution of the new integrated cards is likely possible, in order to promote the new integrated transport service in Brescia.

As regards the NFC technology experimentation, it's foreseen to draw up the necessary security protocols for the SIM cards and also to activate an agreement with Triveneto consortium.

D. Process Evaluation Findings

D.0 Focused measure

This measure is not a focused one.

D1 Deviations from the original plan

- **NFC technology deviation** – as regards the initial project, an important deviation, which has to be pointed out, is linked with the test phase on NFC technology. As a matter of fact, as it has been described in section B4, the activities carried out are related to a test phase in Autumn 2012. The delay of this phase is due to the difficulty to make agreements with phone partners, in order to test the new technology that is SIM based.

The technological development was also more difficult than expected because the fares plan, foreseen to make them flexible.

D2 Barriers and drivers

D2.1 Barriers

In the sequel main barriers, which have been picked out during the measure implementation, are pointed out:

Preparation phase

- **Planning barrier** – there were some difficulties in the project technical management to determine requirements of measure implementation for NFC technology experimentation (times to make technical and economic arrangements with different partners have been undervalued)

Implementation phase

- **Organizational barrier** – during the first phase of the measure implementation, it has been pointed out a problem related to the monopoly of card validation system, which has contrasted with the measure implementation (development of a new integrated card).
- **Technological barrier** – there were some problems related to the availability of Smartphone with NFC enabling. As a matter of fact, this system would allow to pay fares with a Smartphone.

Operational phase

- **Organizational barrier** – the collaboration between Brescia Mobilità and Brescia Trasporti in order to distribute the card was insufficient. This is considered a company barrier, that didn't compromise the defined objectives achievement of the measure. In fact, the delivery of 10000 cards was fulfil: cards were delivered to bike sharing users, to parking users and to public transports users, who expressly required the new card (Omnibus). Brescia Trasporti chose to use the old cards only for public transport users and new cards (Omnibus) for multiservice users.

D2.2 Drivers

In the sequel main drivers, which have been picked out during the measure implementation, are pointed out:

Preparation phase

- **Political and organizational driver** – a constructive partnership was arranged in order to develop a new mobility card for the citizens among Brescia Mobilità, Sintesi (parking management) and Brescia Municipality.
- **Strategic barrier** – considering the necessity to realize a new ticketing system, in the view of the start up of the metro (2013), and the possibility to improve the existing intermodal attitude of citizens, Civitas project has been considered an important occasion to implement both the new e-ticketing system and the interchange among transports offered by the city of Brescia, through not only new infrastructure (as new parking for P&R), but also through a new contactless card with several integrated services.

Implementation phase

- **Financial driver** – the availability of Civitas funding was fundamental for developing the electronic ticketing system upgrade, also in the view of the start up of the metro, foreseen in 2013.

Operational phase

- **Political/strategic driver** - Considering that this measure is linked with the start-up of the metro, a Target Group has been created (see Annex 3), , in order to make more sharable the objectives of each measure related to the so-called ‘metro package’ (M02.02 “Intermodality with public transport”, M03.03 “P&R facilities for underground and public transport systems in Brescia”, M08.05 “Brescia Mobile Channel”). MLs had taken part in the target group in order to discuss and to concert the activities, which had to be carried out. In particular, the meeting was important at measure level, because it was possible to discuss the typology of analysis which was needed to carry out the use of the new card and the different services to be used. Furthermore, it was possible to consider the activities for the card distribution, in order to optimize the spread of information and of the card itself.

D2.2 Activities

Preparation phase

- **Planning activity** - As regard the NFC technology, some activities have been carried out in order to start the test phase before the end of Civitas, according to several involved stakeholders, and a proposal of an agreement has been arranged between ML and the phone partner. Both partners agreed in carrying out research in order to shift from the test phase to the implementation one in short time.

Implementation phase

- **Organizational activity** - during the measure implementation, it has been arranged an agreement between Brescia Mobilità card validation system society in order to update the validation system, which was considered inadmissible for the Brescia Mobilità new needs. It has been possible only thanks to a strict collaboration between the societies.

Operational phase

- **Political/strategic activity** - in order to get over the political/strategic barrier, a constructive partnership was arranged in order to develop a collaboration to the objective achievement, through a strict collaboration with MLs. Furthermore, it has been arranged an important partnership between BST and BSM, in order to solve problems related to the new card distribution.

D3 Participation

D.3.1 Measure partners

- **Brescia Trasporti S.p.a.** – this society manages the urban local public transport in Brescia; as the measure objective regards the realization of a new e-ticketing system for transports available in Brescia, it had an important role in the research and development activities and during the operational phase, through the distribution of the new cards.
- **Sintesi S.p.a. – Parking sector** - this society manages the urban parking in Brescia; as the measure objective regards the realization of a new integrated e-ticketing system for transports available in Brescia, it had an important role in the research and development activities and also the operational phase, through the distribution of the new cards.
- **Sintesi S.p.a. – Bike-sharing sector**- this is the part of Sintesi s.p.a. which manages the bike sharing service implemented in Brescia; in particular, this is one of the service integrated in the new contactless card. During the operational phase, it helped the distribution of the new cards, involving about 6000 users and new potential ones.
- **Brescia Municipality** – the partnership with Brescia Municipality has been considered fundamental, because it integrated the information spread, for example through activities and events promoted during the European Mobility Week.

D.3.2 Stakeholders

- **Brescia citizens** - Inhabitants of the city of Brescia. were direct involved through administering them a four-monthly customer satisfaction survey, interviewing 1200 actual and potential users. Citizens have been also involved in a promotional event, on 4th of July 2011, when the new integrated card has been officially presented.
- **Bike sharing, LPT and parking users (existing and potential ones)** - these ones have been directly involved during the operational phase, as the new contactless card have been distributed (since July 2011).
- **New contactless card and validation system providers** - these ones have been involved during the implementation phase, from a technological point of view; as a matter of fact, they participated to the SW and hw update of the e-ticketing system in Brescia.
- **Phone partners and banks** - These ones have been relevant stakeholders, as they have been involved in NFC research phase of this new technology.

D4 Recommendations

D.4.1 Recommendations: measure replication

- **Find out potentially stakeholders involved** – a feasibility analysis is necessary in order to evaluate the willingness and the interests of who is potentially involved in the measure implementation.
- **Strict collaboration with new technology providers** - a strict collaboration with the new technology provider (as the new integrated card) is necessary, in order to solve quickly the technological issues and to make reliable and safe the renewed e-ticketing system.

D.4.2 Recommendations: process

- **Collaboration among partners** – the collaboration among different partners has been fundamental from the start of the measure, as it has been possible among Brescia Mobilità, Brescia Trasporti, Brescia Municipality, Sintesi Bicimia and all involved providers.
- **Dissemination improvement** – the direct stakeholders involvement, not only through newspaper, but also with a dissemination campaign with meetings and presentation, which should be widespread throughout the country of Brescia. This campaign is fundamental, in order to increase the awareness of the available services and the use of LPT and intermodality in the city.

Annex 1: Historical data series for the BaU calculation

- **Indicator 1** (Average cards validation per year) –

2008	Validations c-less cards on SIA busses	Validations c-less cards on BST busses	Valid season tickets	Monthly average value (total validations/valid season tickets)
January	108416	699164	21490	37,58
February	107025	722146	21149	39,21
March	116075	685911	21529	37,25
April	118927	715614	21471	38,87
May	110020	680782	20980	37,69
June	77862	523115	20457	29,38
July	66075	465009	19172	27,70
August	40118	316289	17241	20,67
September	104161	641600	21618	34,50
October	131205	787393	22738	40,40
November	117004	696291	22255	36,54
December	92519	564744	22178	29,64
TOTALS	1189407	7498058	252278	34,44

Tab.A1.1: Ex ante situation indicator 1, year 2008

2009	Validations c-less cards on SIA busses	Validations c-less cards on BST busses	Valid season tickets	Monthly average value (total validations/valid season tickets)
January	100285	602832	21515	32,68
February	106736	641097	21081	35,47
March	116801	702115	21529	38,04
April	102526	615830	21195	33,89
May	103998	618228	20346	35,50
June	80870	508006	19606	30,04
July	66571	421364	17987	27,13
August	30061	275964	17101	17,90
September	97398	555398	22070	29,58
October	121940	679375	22857	35,06
November	103540	638051	22099	33,56
December	81470	521074	21477	28,06
TOTALS	1112196	6779334	248863	31,71

Tab.A1.2: Ex ante situation indicator 1, year 2009

2010	Validations c-less cards on SIA busses	Validations c-less cards on BST busses	Valid season tickets	Monthly average value (total validations/valid season tickets)
January	85432	544175	19088	32,98
February	90155	563549	20838	31,37
March	105379	668151	18865	41,00
April	87739	582592	18701	35,84
May	88897	582435	17896	37,51
June	70022	430122	15207	32,89
July	56558	387462	13211	33,61
August	38447	280453	11893	26,81
September	81421	542683	17181	36,33
October	99480	618833	19049	37,71
November	93452	590048	19341	35,34
December	77105	500398	16381	35,25
TOTALS	974087	6290901	207651	34,99

Tab.A1.3: Ex ante situation indicator 1, year 2010

2011	Validations c-less cards on BST + SIA busses	Valid season tickets	Monthly average value (total validations/valid season tickets)
January	568953	18319	31,06
February	600143	19754	30,38
March	660908	18670	35,40
April	583143	18595	31,36
May	609938	18776	32,48
June	496708	16758	29,64
July	406670	13838	29,39

Tab.A1.4: Ex ante situation indicator 1, year 2011, up to July 2011

Annex 2: Ex ante and Ex Post data collection

- Indicator 1** (*Average cards validation per month*) – The existing ticketing system consists of two kind of tickets: contact-less cards (for the season ticket holders) and the magnetic tickets (for occasional users). As the measure consists in distributing new contactless cards (MIFARE), this indicator is measured using data referred to the contactless cards validation. The indicator is collected monthly and it's calculated dividing the total number of c-less validations by the total number of valid season tickets. As specified in Stage n. 3, the New MIFARE cards arrived in May/June 2011, but the actual massive distribution of the cards has been carried out in September 2011. Therefore, the beginning of the on going data collection has been set in October 2011, once the new ticketing system can be considered actually thriving. As a consequence, the ex ante period has been lengthened up to July 2011. Here the average value for each year is given, calculated using the cards validation data sorted by month.

EX ANTE SITUATION:

2011	Validations c-less cards on BST + SIA busses	Valid season tickets	Monthly average value (total validations/valid season tickets)
July	406670	13838	29,39

Tab.A2.1: Ex ante situation indicator 1

AFTER SITUATION:

2011	Validations c-less cards on BST + SIA busses	Valid season tickets	Monthly average value (total validations/valid season tickets)
October	655215	23120	28,34

Tab.A2.2: After situation indicator 1

AFTER SITUATION: (first data collection October 2011 and second data collection April 2012)

2011	Validations c-less cards on BST + SIA busses	Valid season tickets	Monthly average value (total validations/valid season tickets)
November	637854	24225	26,33
December	539792	23528	22,94
January	558897	22927	24,38
February	583540	23731	24,59
March	678364	24275	27,94

Tab.A2.3: After situation indicator 1

- Indicator 2** – (*Number of new cards distributed in a given time period*)

EX ANTE SITUATION: not scheduled.

AFTER SITUATION: (October 2011 - linked to the new ticketing system actual thriving).

This indicator is built considering the number of new MIFARE cards distributed for the LPT service in a given time period.

First data collection (October 2011)

690 new cards have been distributed for the LPT season tickets. The total number of new cards distributed is actually 6010, but this value includes also the new cards that have been distributed for other interoperable services, such as trenocittà, ioviaggio Lombardia and SIA bus network.

Indicator n.2 (October 2011) = 690

Second data collection (April 2012)

561 new cards have been distributed for the LPT season tickets from November 2011 to march 2012. The total number of new cards distributed is actually 7333 (1323 of which have been distributed from November 2011 to march 2012), but this value includes also the new cards that have been distributed for other interoperable services, such as trenocittà, ioviaggio Lombardia, SIA bus network and LPT in the city of Desenzano del Garda (BS).

Indicator n.2 (October 2011) = 561

- **Indicator 3** (*Number of new cards validated/ Total number of new cards*)

EX ANTE SITUATION: not scheduled.

AFTER SITUATION: The methodology is similar to the indicator 1 (built dividing the number of validations by the number of active season tickets), but data are referred to the new MIFARE cards distributed for the LPT service.

First data collection (October 2011)

(this value can correspond to the active season tickets loaded on the new cards).

Total number of validations (only LPT) = 5646

Total number of new cards distributed for the LPT service = 690

Indicator n.3 (October 2011) = $5646/690 = 8,18$

Second data collection (April 2012) (this value can correspond to the active season tickets loaded on the new cards)

Total number of validations (only LPT) = 20172

Total number of new cards distributed for the LPT service (till march 2012)= 1251

indicator n.3 (April 2012) = $20172/1251 = 16,12$

- **Indicator 4** (*Number/kind of fares/season tickets loaded on the new cards compared with the number of distributed new cards*)

EX ANTE SITUATION: not scheduled.

AFTER SITUATION: In order to investigate the intermodality attitude of the LPT subscriber, this indicator is built extracting from the e-ticketing database the number of users that activated, besides the LPT season tickets, also the bike sharing service, which can be loaded on the same card.

First data collection (October 2011)

In October 2011 the number of LPT subscribers who loaded also the bike sharing season tickets on the new MIFARE cards are 139 on a total of 690 new MIFARE cards distributed for the LPT service.

$$\text{Ind. 4} = 139/690 = 20,14\%$$

Second data collection (April 2012)

In April 2012 the number of LPT subscribers who loaded also the bike sharing season tickets on the new MIFARE cards are 236 on a total of 1251 new MIFARE cards distributed for the LPT service.

$$\text{Ind. 4} = 236/1251 = 18,86\%$$

- **Indicator 5** (*Number of card breaks/new cards distributed*)

EX ANTE SITUATION: not scheduled.

AFTER SITUATION. First data collection: October 2011. This indicator can be useful to evaluate the new cards performance/reliability, as for many reasons cards can break and must be replaced. Data recorded are not lost but must be reactivated on a new card. E-ticketing database is able to monitor the number of cards that have been replaced and this information is compared with the total number of new cards distributed.

First data collection (October 2011)

690 new cards distributed for the LPT

Number of cards breaks = 0

$$\text{ind. 5} = 0/690 = 0\%$$

Second data collection (April 2012)

1251 new cards distributed for the LPT

Number of cards breaks = 18

$$\text{ind. 5} = 18/1251 = 1,44\%$$

- **Indicator 6** (*Awareness level*) - This indicator (and indicator n. 7) is calculated through the BST Customer satisfaction inserting specific questions to the conventional survey. During the

conventional survey, interviews are 1200, repeated 3 times a year (April, July and November) and are carried out to Brescia Trasporti customers: 700 face to face and 500 by phone. The sample is drawn in two different ways: for face to face interview at the bus stops the place are identified on the basis of the lines, the end of the line or specific parts of lines; for the interview by phone there is a random sample from Omnibus Card database (subscribers) on the basis of ticket used.

EX ANTE SITUATION is referred to the period previous to the cards distribution, therefore, during the May 2011 survey, a specific question for the collection of this indicator has been inserted, namely:

- ✓ Do you know that a multi-service card (able to manage, beside LPT season tickets, many other services such as Bike Sharing, Parking and the future Metro) is going to be distributed soon in Brescia?

Tavola 23 **Il grado di conoscenza dell'effettivo lancio sul mercato della carta multiservizi**

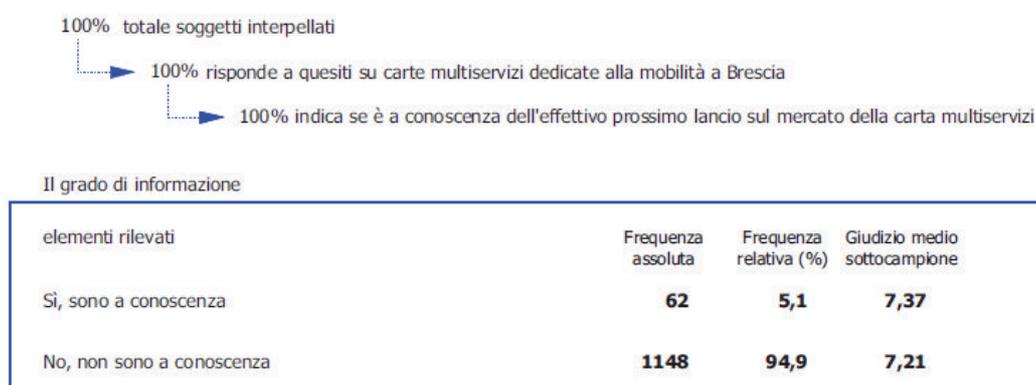


Fig.A2.1: Specific question results for indicator 6

Indicator 6 = 5,1 % of the interviewed people is aware of the imminent distribution of the new cards in Brescia.

EX POST SITUATION is referred to November 2011 survey, a specific question for the collection of this indicator has been inserted, namely:

- ✓ Do you know that a multi-service card (able to manage, beside LPT season tickets, many other services such as Bike Sharing, Parking and the future Metro) is available in Brescia?

Tavola 29 **Grado di informazione sull'esistenza della Card, per i non possessori**

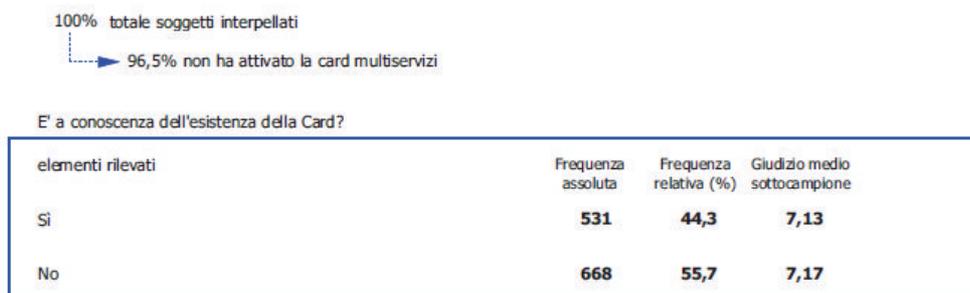


Fig.A2.2: Specific question results for indicator 6

Indicator 6 = 44,3 % of the interviewed people is aware of the distribution of the new cards in Brescia.

- **Indicator 7 (Acceptance level)** - This indicator (like indicator n. 6) is calculated through the BST Customer satisfaction inserting specific questions to the conventional survey. During the conventional survey interviews are 1200, repeated 3 times a year (April, July and November) and are carried out to Brescia Trasporti customers: 700 face to face and 500 by phone. The sample is drowned in two different ways: for face to face interview at the bus stops the place are identified on the basis of the lines, the end of the line or specific parts of lines; for the interview by phone there is a random sample from Omnibus Card database (subscribers) on the basis of ticket used.

EX ANTE SITUATION is referred to the period previous to the cards distribution, therefore, during the May 2011 survey, a specific question for the collection of this indicator has been inserted, namely:

- ✓ Would you be interested in a multi-service card (able to manage, beside LPT season tickets, many other services such as Bike Sharing, Parking and the future Metro) is going to be distributed soon?
- ✓ Would you be favourably disposed towards the payment of a symbolic 5€ key money?

Tavola 22 **Interesse verso la creazione di una carta multiservizi dedicata alla mobilità in Brescia**

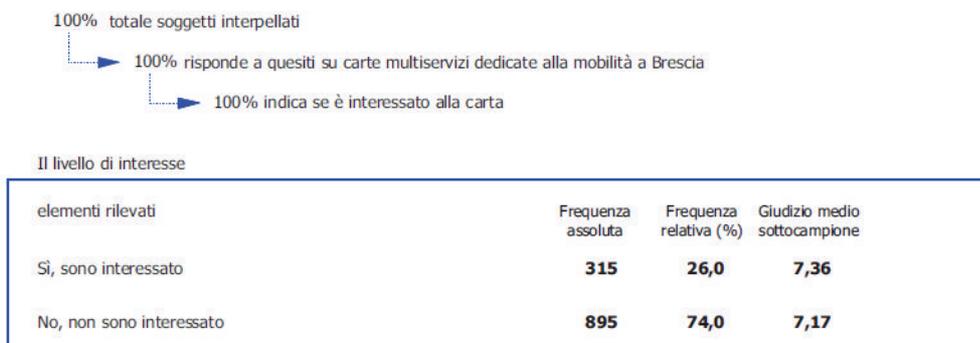


Tavola 24 **La propensione a diventare titolare della carta multiservizi**

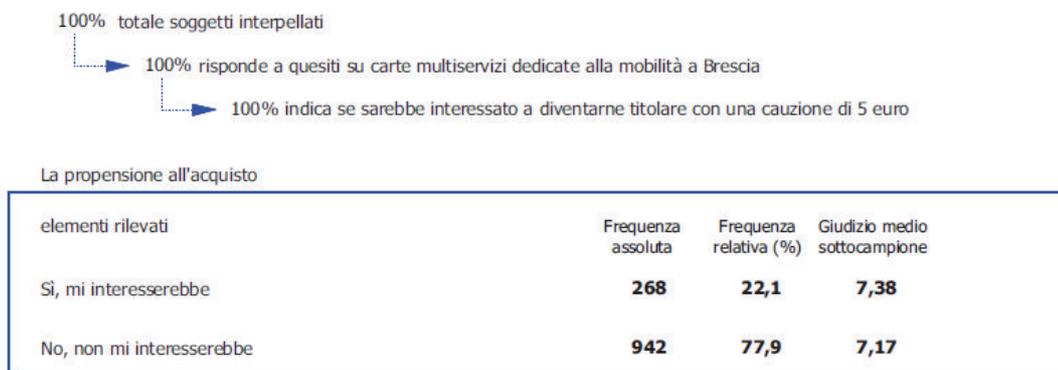


Fig.A2.3: Specific question results for indicator 7

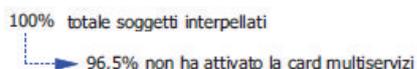
Indicator 7 = 26 % is interested in the new card

22,1 % is disposed to pay 5€ key money for the new card

EX POST SITUATION is referred to the period November 2011 survey, a specific question for the collection of this indicator has been inserted, namely:

- ✓ Would you be interested in a multi-service card (able to manage, beside LPT season tickets, many other services such as Bike Sharing, Parking and the future Metro) is going to be distributed soon?
- ✓ Would you be favourably disposed towards the payment of a symbolic 5€ key money?

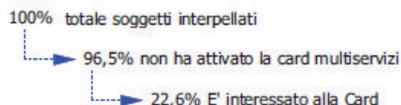
Tavola 30 Grado di interesse per la Card, per i non possessori



Sarebbe interessata alla Card?

elementi rilevati	Frequenza assoluta	Frequenza relativa (%)	Giudizio medio sottocampione	Tavole di approfondimento
Si	271	22,6	7,15	↳ Tav. 31
No	928	77,4	7,15	

Tavola 31 Conferma dell'interesse di fronte all'ipotesi di una cauzione di 5 euro per l'attivazione



Conferma dell'interesse dopo l'indicazione dell'ammontare della cauzione

elementi rilevati	Frequenza assoluta	Frequenza relativa (%)	Giudizio medio sottocampione
Si	241	88,9	7,16
No	30	11,1	7,08

Fig.A2.4: Specific question results for indicator 7

Indicator 7 = 22,6 % is interested in the new card

88,9 % is disposed to pay 5€ key money for the new card

Customer satisfaction questionnaire where specific questions for the calculation of the indicators 6 and 7 have been inserted (may 2011 survey):

Brescia Trasporti S.p.A.
Rilevazione della soddisfazione della clientela - Indagine 2011

Le informazioni che fornirà sono assolutamente anonime e tutelate dalla normativa sulla privacy (legge 675 del 1996 e successivi aggiornamenti).

Dati personali

Sesso	Studente Medie o Superiori Studente universitario	Luoghi di partenza e di arrivo dei viaggi con i mezzi di Brescia Trasporti	Luoghi in Brescia città Centro storico Stazione Altro luogo in Brescia	Borgosatollo Botticino Bovezzo Caino Castelmella Cellatica Collebeato	Concesio Flero Gussago Nave Poncarale Rezzato Roncadelle
Età	Lavoratore dipendente Lavoratore autonomo Pensionato				
Occupazione	Casalunga Senza occupazione				

Modalità di utilizzo dei servizi di Brescia Trasporti S.p.A.

Freq. di utilizzo (n° corse/settimana)		Carnet 10 corse Abb. Settimanale	Supporto utilizzato per il titolo di viaggio	Cartaceo Omnibus Card
Motivi di utilizzo del mezzo pubblico (indicare con "P" il motivo principale, con "S" quelli secondari)	Studio Lavoro Shopping Commissioni Relazioni personali Motivi di salute Casi eccezionali	Titolo di viaggio utilizzato Zona 1 Zona 2 Zone 1+2	Corsa semplice Biglietto 24 ore Abb. Mensile Abb. Mensile integrato Abb. Annuale Abb. Annuale integrato Tessera libera circ. Carnet 12 corse	Linee utilizzate Tratte consecutive Altri mezzi integrati nello stesso viaggio
Tempo mediamente impiegato per lo spostamento: minuti			Da quanto tempo è titolare di Omnibus Card?.....	
Quali dei seguenti strumenti di comunicazione utilizza?	Mappa della rete Libretto orari Call center Dialogo con l'autista Informazioni alle fermate Internet		Ha a disposizione un mezzo alternativo all'autobus? Quale?	
		In caso vengano indicate le informazioni alle fermate, specificare se:	informazioni fornite dalle paline elettroniche	informazioni riportate nelle tabelle orari

E' interessata ad una card multiservizi che consenta di utilizzare, oltre al trasporto pubblico, servizi come Bicimia, parcheggi in struttura e futura metropolitana? Sì No

E' a conoscenza che fra breve verrà messo sul mercato un nuovo tipo di card multiservizi con cui potersi abbonare a TPL, Bicimia, parcheggi in struttura e futura metropolitana? Sì No

Se la card comportasse una cauzione di 5 euro, Le interesserebbe? Sì No

Fig.A2.5: Customer satisfaction questionnaire

Annex 3: Focus Group Activities

	Brescia University	FOCUS GROUP ACTIVITIES	CIVITAS MODERN
Title	Impostazione dei Focus Group		
Metro Package measures	M02.02 Intermodality with public transport M02.03 Development and upgrade of the e-ticketing system M03.03 P&R facilities for underground and public transport system M08.05 Brescia Mobile Channel		
Other stakeholders	- Brescia Municipality - Sutera - Verità		
STEP 1	Accoglienza e riscaldamento (circa 10 minuti)		
	1) Presentazione degli invitati al gruppo di discussione.		
	2) Presentazione dei ricercatori.		
STEP 2	Introduzione al tema della discussione (circa 10 minuti)		
	3) Motivazione e condizioni (fasi e tempi) dell'incontro di gruppo in data _____		
	- Metro Package (MP); - lighthouse measures; - indicatori.		
	4) Gli obiettivi dell'incontro sono:		
	- condivisione metodologia per lo svolgimento del Focus Group; - attuazione del Focus Group.		
STEP 3	Fasi della ricerca: descrittiva, riflessiva e propositiva		
	TEMA	MISURA	METROPACKAGE
	Azzeramento della conoscenza e condivisione degli input (ipotesi scenari)		
	Potere decisionale in relazione al tipo di scelta da attuare		
	Percezione di rischi/problematiche oltre Civitas (ad esempio, entrata in esercizio della metro)		
	Ruolo di ciascun intervento per il funzionamento del MP: - bike sharing; - parcheggi; - BMC; - intermodalità; - e-ticketing; - politiche di tariffazione; - gestione della mobilità.		
STEP 4	Verifica di fattibilità e scelta finale		
STEP 5	Assegnazione dei ruoli		
STEP 6	Sintesi dei risultati:		
	- per singola misura; - per Metro Package		

Fig. A3.1 General structure of the Focus Group activities

		Brescia University	FOCUS GROUP ACTIVITIES	CIVITAS MODERN
Title		Impostazione dei Focus Group		
Metro Package measures		M02.02 Intermodality with public transport M02.03 Development and upgrade of the e-ticketing system M03.03 P&R facilities for underground and public transport system M08.05 Brescia Mobile Channel		
Other stakeholders		- Brescia Municipality - Sutera - Verità		
MEETINGS		Partner	PRESENCE	
Date: 15 november 2011		Brescia University	Bulferetti, Cadei, Ferrari	
		BSM	Sbardella, Gussago, Ragnoli, Pace	
		BST	Sutera	
		CBS	Bresciani	
		BICIMIA	Verità	
Main topics	1) Scambio ERT tra i vari Partner per condividere le attività previste nelle diverse misure; 2) Rivedere i contenuti insieme, in modo da avere COERENZA nella descrizione delle misure; 3) Prevedere un rimando corretto e concordato in tutte le misure collegate (es. 02.02 e 02.03); 4) Coinvolgimento Bicimia (geom. Verità) per testare l'efficacia della distribuzione delle tessere OMNIBUS e il loro funzionamento per gestione P&R (verificare tracciabilità dei dati) e scegliere un Parcheggio + BICIMIA (x es. in centro), dove si hanno dati e uso della OMNIBUS 5) considerare solo timbrature e uso delle OMNIBUS (no altre carte!!!) 6) necessità di ricevere (dal CBS???) una tavola con la localizzazione dei Parcheggi per la Metropolitana e il numero degli stalli (deve essere base condivisa!!!) 7) usare modello di BSM come previsto nella M02.02 8) concentrarsi anche solo su uno scenario, Parcheggio e analizzarlo benissimo!! 9) portare dati e info al prossimo incontro (15 dicembre) 10) rendicontare questa attività nel Process Evaluation Form (Focus, coordinamento e condivisione) 11) vedere indicatori delle misure, in particolare quelli legati alla simulazione metropolitana e collaborare per la raccolta (usare modello della M02.02)			
	Prossimo incontro fissato per il 19 Dicembre 2011 a Brescia Mobilità			

Fig. A3.1 Focus Group activities – Convocation of the 1th meeting (15 November 2011)

	Brescia University	FOCUS GROUP ACTIVITIES	CIVITAS MODERN
Title	Impostazione dei Focus Group		
Metro Package measures	M02.02 Intermodality with public transport M02.03 Development and upgrade of the e-ticketing system M03.03 P&R facilities for underground and public transport system M08.05 Brescia Mobile Channel		
Other stakeholders	- Brescia Municipality - Sutura - Verità		
MEETINGS	Partner	PRESENCE	
Date: 19 dicembre 2011	Brescia University	Bulferetti, Cadei, Ferrari	
	BSM	Sbardella, Gussago, Ragnoli, Pace	
	CBS	Bresciani	
Main topics	1) Verifica dello scambio dei dati di input per la coerenza degli scenari per i parcheggi; 2) inquadramento delle misure M02.03 e M08.05 (in qualità di possibili lighthouse measures) all'interno del Metro Package; 3) cronogramma della M02.03; 4) soluzioni trovate per la registrazione dell'utilizzo del servizio P&R per gli utenti occasionali (sistemi, fornitura, test); 5) determinazione e consapevolezza della capacità decisionale che il ML ha come responsabile della misura; 6) analisi della percezione di rischi/problematiche oltre Civitas; 7) definizione del ruolo del Mobility Manager all'interno del Focus Group 8) proposta dell'organizzazione di un Focus Group aperto al pubblico (individuando persone da coinvolgere) per avere opinioni e aspettative da parte dell'utenza in merito a bike sharing, parcheggi, BMC, ecc., da considerarsi come azione di dissemination		
	Prossimo incontro possibile: prima della riunione tecnica di febbraio		

Fig. A3.1 Focus Group activities – Convocation of the 2nd meeting (19 December 2011)