Measure title: **Improved Traveller Information in Monza**

City: **Monza** *Project:* **ARCHIMEDES** *Measure number:* **79**

Executive summary

The research stage of the measure has focused on the analysis of the Urban Public Transport network in Monza, in order to identify the most suitable locations where to install electronic bus stops, as well as on the study of technical features of these devices aimed at better developing their functionalities.

The implementation stage has developed in two different steps: in December 2011 the totem and the first two electronic bus stops have been installed in Piazza Castello, just outside the interchange node of Porta Castello. The two bus stops have different energy supply modes: one is connected to energy power, whilst the other is fed by solar power. In the second step, after defining bureaucratic issues with energy supplier, the other 8 bus stops have been installed in May 2012.

Evaluation activities have been aimed at :

- collecting data about investments needed by Comune of Monza and NET as the principal PT operator in Monza to implement the measure, with an eye to the economic effort to be faced in order to extend the measure to the entire city's public transport network
- checking the level of knowledge of the measure implementation between users of public transport;
- checking if people appreciate principal features of the installed devices.

- **Key result 1-** An important investment is required to implement the measure in the whole city. More specifically, 10 electronic bus stops cost € 217.800 VAT included (€ 6.720 for each electronic bus stop, whilst the interactive touch screen totem cost € 24.600 VAT included plus € 9.205 VAT included to develop palimpsest.
- **Key result 2 –** A increase in use of Public Transport has been detected (+ 4,1%) after the implementation of the measure, which augurs well that the upscaling of these installations to the entire city can push citizens towards a modal shift in favour of PT.
- **Key result 3 –** In spite of the fact that devices may be physically seen, there are still some people who are not aware of the implementation of electronic bus stops: this is probably due to the fact that in Monza there are more than 500 bus stops, so it will be necessary to extend the measure to the whole city to be sure that citizens are completely aware of the new devices and of their features.

Such a measure is very important for citizens, so it is very important that all PT companies operating on the territory agree on developing it through the choice of a common AVL/AVM system or through an interface in case of different systems, so that every bus travelling on the territory can send real time information to the electronic devices. Such an improvement, even though in some cases can be seen as a means of control by the contract managers, will definitely implement the knowledge of PT performances and could possibly be a significant driver for people to shift to public transport.

Anyway, due to the important investment to be done, it is crucial, if such a system has to be implemented in all the city, to include in tender documents an obligation for those who will award the contract to complete the installation of such devices. For this reason, it is advisable that the contract has a duration allowing depreciation of such an important investment.

Measure title: **Improved Traveller Information in Monza**

City: **Monza** *Project:* **ARCHIMEDES** *Measure number:* **79**

A Introduction

A1 Objectives

The measure objectives are:

(A) High level / longer term:

- To render Public Transport more effective and appealing for day-by-day use

(B) Strategic level:

- To improve traveller information for Public Transport Fleet

(C) Measure level:

(1) To implement in important bus-stops Real Time Information system for urban public transport

A1.2 Target groups

- Users of public transport
- Owners of public fleets

The service has been initally activated in at 10 key stops and at "Porta Castello" Interchange node. Nevertheless the system is designed to monitor all the Public Transport buses lines along their entire route.

A2 Description

In the context of Sustainable Mobility, the use of Public Transport in the City of Monza needs to be increased. In order to achieve this objective, in the ARCHIMEDES framework a positive choice has been made, with the full support of the government of the Municipality, to implement technological measures to make Public Transport more attractive to citizens.

This measure aims at making operational a Real time passenger information provided by the Bus Management System at 10 key stops and at "Porta Castello" interchange node.

In September 2006, relying on an agreement involving the Municipality of Monza, Rete Ferroviaria Italiana (Owner of the Italian Rail Network) and Regione Lombardia Land, the Public Transport Interchange Node of Monza, named “Porta Castello” was set in operation. It is one of the most important interchange node in the entire Lombardia area. As far as train departures are concerned, the InfoMobility service is active, so people accessing the Railway Station find real-time information concerning train service.

What is so far missing is a similar information system concerning the service of the buses of the Public Transport: the expectation of the target group is to find an updated and reliable information concerning the arrival of the buses. This allows them to take some time if the arrival is expected in a few minutes or to take the bus of another line whose route can be a second choice but anyway convenient.

The same holds for other important bus stops where many people typically wait for the bus.

With measure MNZ 79 “(Improved Traveller Information in Monza”), an Advanced Traveller Information Service for Urban Public Transport has been set up providing real time information at the

most important bus stops in the city and at the Porta Castello interchange node through the installation of an interactive touch screen totem.

The implementation of the measure has been enabled by the activation of measure no. 78 (Bus Management System in Monza) which has allowed Bus Localisation and Monitoring, a fundamental prerequisite to define the kind of information to be provided to Public Transport users.

The measure covers 2 tasks:

Research Stage: Task 11.8.7 Bus Traveller Information Study

A study has been undertaken by Comune of Monza, with the technological support of PA and the operational support of NET to define the requirements of the kind of information to be provided to passengers at key interchanges and key bus stops in Monza.

Demonstration Stage: Task 8.14 Improved Traveller Information

Real time passenger information provided by the Bus Management System is provided by NET to passengers at 10 key stops and at the "PortaCastello" interchange node.

A3 Person in charge for evaluation of this measure

Name of person	Simonetta Vittoria
Name of organisation	Comune of Monza
Direct telephone	0039 039 2832839
e-mail	mobilita@comune.monza.it

B Measure implementation

B1 Innovative aspects

The innovative aspects of the measure are:

- **New conceptual approach** – The capability to exploit the information gathered by AVL/AVM generating end-user information is a new challenge for the city of Monza.
- **Use of new technology/ITS** – An Info-Bus system like this one is a classical ITS for real-time user information. As for other measures (MNZ 78, MNZ 80, MNZ 81 and MNZ 82), the adoption of this approach is a new issue for Monza, also on the technological point of view.
- **Targeting specific user groups** – This measure will primarily address the Public Trasport users which will receive updated information on bus arrivals. This user group is quite numerous so the results achieved have significant impact.

B2 Planning of Research and Technology Development Tasks

Task 11.8.7 Bus Traveller Information Study:

Within this research task, the work has focused on the study of the Public Transport service in Monza with the following activities:

1. analyse the current regulatory framework that is an important prerequisite to perform the measure;
2. analysis of the Urban Public Transport network in Monza, in order to identify the most suitable locations where to install Passengers Information Display Systems (PIDS). The attention has been primarily focused on most frequented lines, which cover the CIVITAS corridor for public transport.
3. Identification of the software and the technological framework to implement the measure, consisting of:
    a. the Electronic Display to be installed at the bus stops identified,
    b. an interactive totem to be installed at Porta Castello interchange node to provide complete information on the PT service to passengers (timetables, routes).

B3 Situation before CIVITAS

In September 2006, relying on an agreement involving the Municipality of Monza, Rete Ferroviaria Italiana (Owner of the Italian Rail Network) and Regione Lombardia Land, the Public Transport Interchange Node of Monza, named “Porta Castello” was set in operation. It is one of the most important interchange node in the entire Lombardia area. As far as train departures are concerned, the InfoMobility service is active, so people accessing the Railway Station find real-time information concerning train service.

What is so far missing is a similar information system concerning the service of the buses of the Public Transport. The only information available for PT users depends on maps of the public transport, leaflets with timetables and PT companies websites. Many information about PT and mobility in general is also given by Comune of Monza through its website, its Facbook page and SMS service, but it is never as reliable as real time information can be. The expectation of the target group is then to find an updated and reliable information concerning the arrival of the buses. This allows them to take some time if the arrival is expected in a few minutes or to take the bus of another line

whose route can be a second choice but anyway convenient. Every other information concerning mobility in Monza and in Milan, which is the most important mobility attractor near Monza, will be welcomed, and this is the reason for which the choice of an interactive totem in Porta Castello has been made.

The same holds for other important bus stops where many people typically wait for the bus.

On Monza territory, there are six urban lines which were previously managed by TPM, a company 100% controlled by the Municipality of Monza, and several other lines managed by other transportation companies which connect different cities of Brianza to Monza railway station or to the MM1 terminus in Sesto San Giovanni. The urban network is depicted in Figure 1 and the complete network with suburban lines, is depicted in Figure 2.

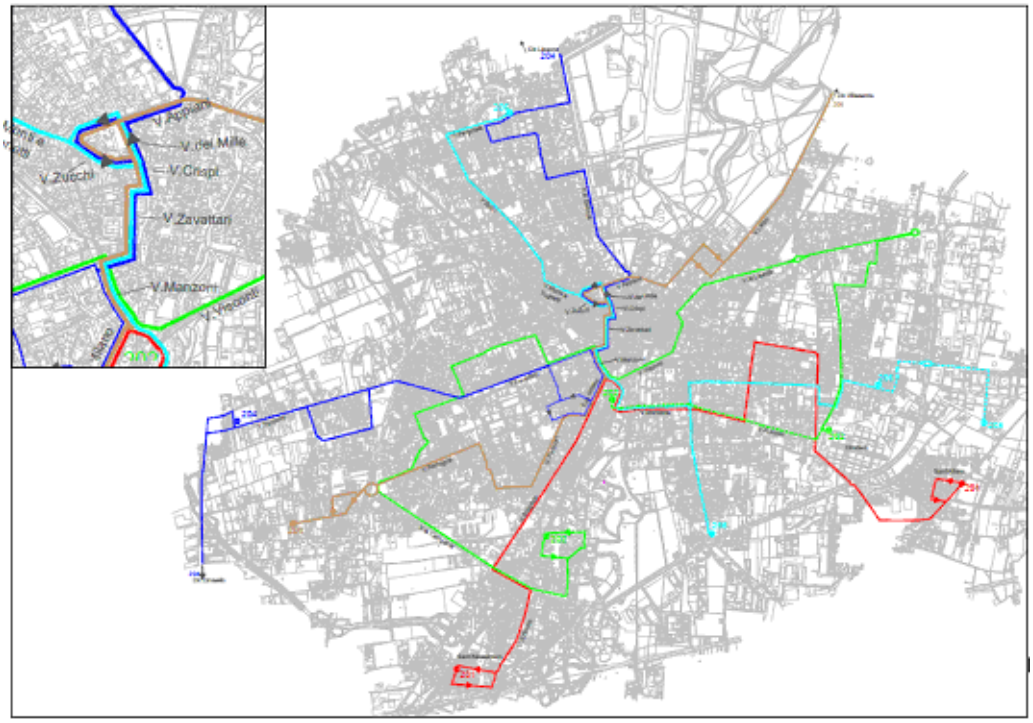


Figure 1 - Monza urban PT network

B4 Actual implementation of the measure

In September 2009, TPM merged with NET, a Public Transport (PT) company in which ATM (the company which runs the bus and the metro service in Milan) has a stake, so the urban lines are now managed by NET.

Before merging with NET, TPM had already installed an AVL/AVM system on its fleet, but that system needed significant upgrades to fulfil the ARCHIMEDES requirements in order to achieve good results for Measure no. 78 to be later exploited for measures 79 and 82 (Public Transport Priority in Monza).

The new management of the service, exploiting experience of ATM, decided to extend an existing AVL/AVM system, already active on the ATM fleet operating in Milan, to the fleet inherited by TPM; these required extensions have been successfully accomplished in a short time, due to the internal design of this new AVM/AVM system.

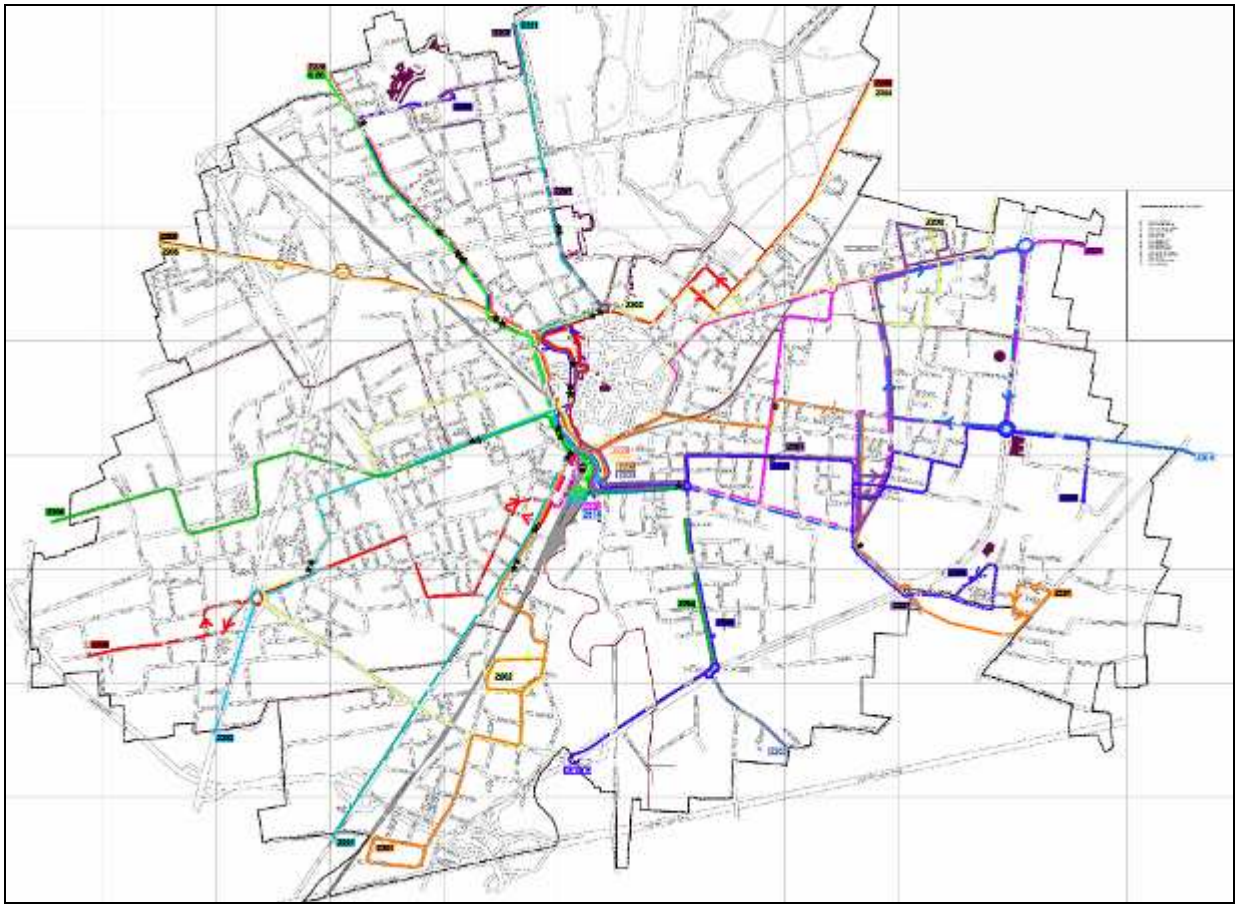


Figure 2 - Monza PT network (urban and suburban lines)

Since July 2010, every vehicle in the NET fleet has been equipped with an On-Board Unit (OBU) consisting of an Industrial PC with specific devices and sensors:

- a GPS device to determine the vehicle position, coded with Lat-Long coordinate system (WGS 84);
- a GPRS communication system to send the information to a Control Centre; to send the information to a Control Centre; this communication method has been chosen since it was already used before managing TPM fleet; ATM and NET fleets are monitored across a wide area and GPRS ensures the required coverage.

As the driver begins his shift, he identifies himself to the system, typing his personal code on a dedicated keyboard.

Data concerning vehicle positions are produced at a given frequency (sampling interval is about 10 seconds) and sent to the Control Centre at another given frequency (transmission interval is about 1-2 minutes). Once records are received by the Control Centre they are processed by the GPCWIN FET module which analyses them and store them in a database table, for subsequent use. In the ARCHIMEDES context, the immediate use provides information which can be used for Measure 79 and for Measure 82. Such analyses allow to provision of accurate data, filtering possible outliers.In addition, data is available for every type of statistical analysis: typical applications of such analyses

are to assess if the planned service is coherent with the actual one in order to plan adjustments to timetables.

The technological framework needed to provide end-user information concerning the actual arrival time of buses is summarised in Figure 3.

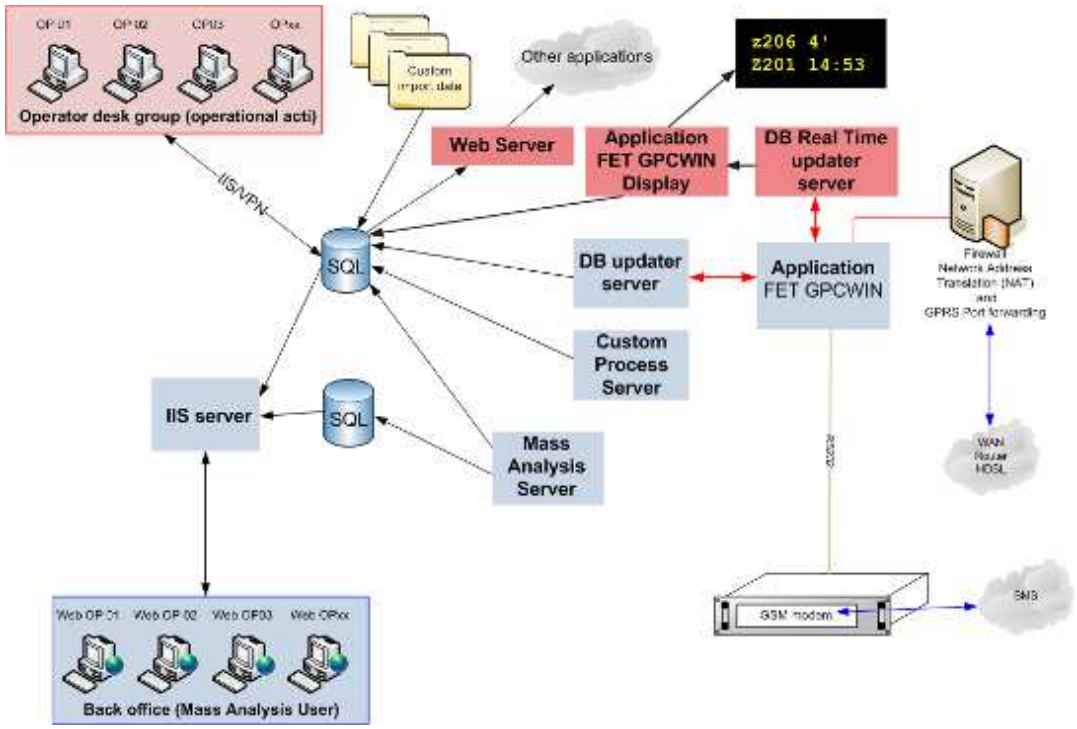


Figure 3 - Architecture of the system

This system provides real time positional data collected from the buses of the Public Transport Fleet, as it is received by the Central system, through the specific software module "DB Real Time Updater Server".

These data are then transferred to another software module running in the Central System ("Electronic Display Server") which is aimed at preparing data for every Electronic Display board installed across the city, depicted in Figure 3 by the black symbol with yellow characters.

Such Real Time data will also be available to other future applications, as depicted by the grey cloud in the upper right position of Figure 3.

After this preliminary activities, which have constituted the core of measure 78 and of the research stage of mesure 79, work has been focused on the implementation of measure 79, which has been developed in the following stages:

Stage 1: Identification of bus stops *(May 2011-September 2011)*

The most important bus stops of the PT network have been identified in order to define where to install bus stops with electronic displays.

The choice of the bus stops has been shared with NET and with the Province of Monza and Brianza with the aim of installing thirty electronic bus stops, ten of which will be located on one of the two CIVITAS corridors which were identified at the beginning of ARCHIMEDES project.More specifically this is the corridor mainly dedicated to Public Transport routes, which goes

fromPortaCastello interchange node, located at the bottom of the orange line in the following figure, close to the central Railway Station of Monza, to VialeCesareBattisti, where it joins the corridor dedicated to private traffic (depicted with the purple line).

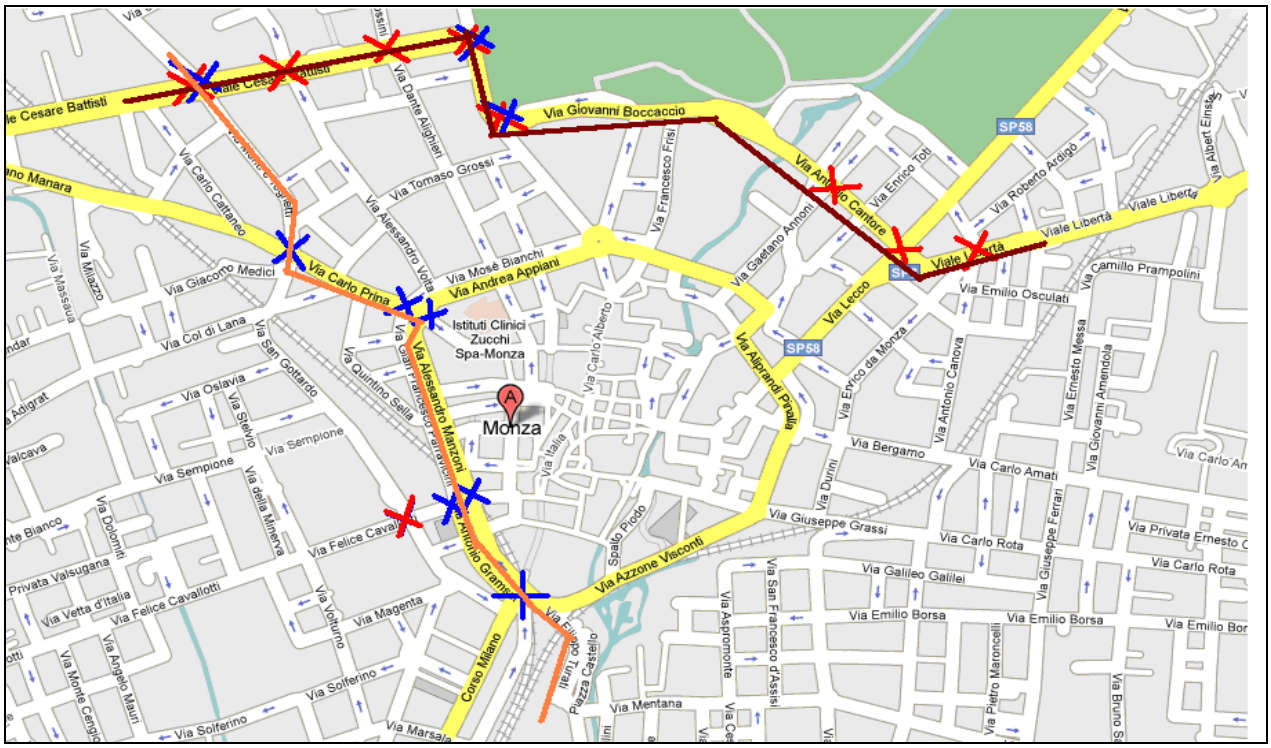


Figure 4 - Monza CIVITAS Corridors

In addition, it was decided to install electronic bus stops where the largest number of lines stop, so the information to PT users can be more complete and can also help with interchanges between different lines.

Starting from this approach, NET has proposed its list of thirty bus stops where new shelters are being installed, according to the following table and which are indicated in Figure 5.

Bus stop location	Bus stop denomination
Via Ferrari after Via Amati	Ferrari Amati
Via Borsa, before Via Ferrari	Borsa Ferrari
Via Manzoni – Via Osio, both directions	Manzoni Osio
Via Zavattari, both directions	Zavattari Trento e Trieste
Via Prina after Via Borghetto	Prina Borghetto
Via Prina after Via Villoresi	Prina Villoresi
Via Monti e Tognetti – Via Sirtori, both directions	Monti e Tognetti Sirtori
Via Boito – Via Pero	Boito Pero

Corso Milano -Largo Molinetto both directions	Milano Molinetto
Via Mentana before Via Buonarroti	Mentana Buonarroti
Piazza Citterio - Via Appiani both directions	Citterio Appiani
Via Cavallotti – Via A. da Brescia both directions	Cavallotti Da Brescia
Corso Milano railway Stazione both directions	Milano Stazione
Viale Regina Margherita - Viale Battisti both directions	Regina Margherita Battisti
Via Meda - Via Romagna both directions	Romagna Meda
Via Pergolesi Hospital entrance	Pergolesi Ospedale
Piazza Carducci	Carducci Municipio
Piazza Cimitero	Cimitero Salvadori
Via Borgazzi – Via Galvani both directions	Borgazzi Galvani

Of these 30 bus stops, 10 have been installed during ARCHIMEDES lifetime along CIVITAS Corridor dedicated to Public Transport, where also PT priority at traffic lights will be activated, and the remaining 20 will be installed within 2014, date of expiry of the PT contract.

Stage 2: Inspections on locations of the bus stops *(Setember 2011 – November 2011)*

After defining the location of bus stops, inspections have been made to define the precise positioning and the necessary electrical connections. At this stage, NET, who has supported Comune of Monza in carrying out practicalities for the installation of devices, has encountered some difficulties with the electricity supplier as far as the definition of costs estimates was concerned, but fortunately these problems were soon resolved: for many of the electronic bus stops, NET has been authorized to take power supply directly from energy points of the Municipality, in order to reduce energy consumption and to speed installation works.

The chosen device is Aesys series HG5M whose electronic display can be both connected to a power supply line and fed by solar power. In the city of Monza both of these options have been installed. The functions are the same: the only difference is that with a power supply connection the display can always by active; however, when the electronic display is fed by solar power the display only shows the contents for some seconds every minute, in order to reduce energy consumption.

Stage 3: Installation of first two electronic bus stops *(December 2011)*

The first two bus stops have been installed in Piazza Castello, just outside the railway station, where many important PT lines pass, and have been made immediately operational since the display receives information in real time about the bus location relying on the software system installed on all NET bus fleet used also for Measure no. 78 (Bus localization system).

The following figures show both types of electronic bus stops installed.

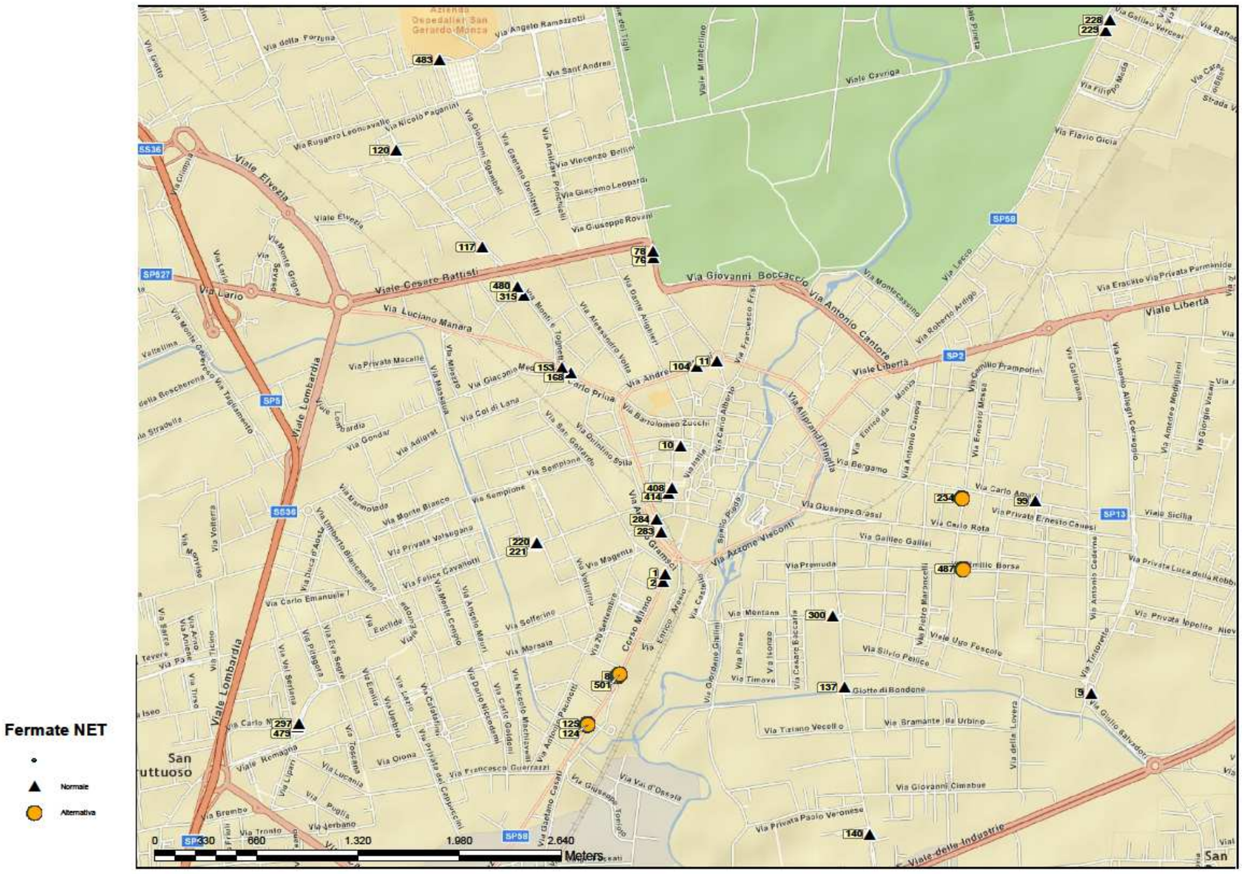


Figure 5 - Electronic bus stops location

Figures 6 and 7 - Front and side view of photovoltaic bus stop

Figure 7 - Electric bus stop

Figure 8 –Photovoltaic electronic bus stop showing arrival times

Figure 9 – Electric bus stop showing arrival time

Stage 4: Installation of the interactive totem *(November 2011)*

As far as the more complete communication system to be located at Porta Castello interchange node is concerned, a vertical interactive totem produced by Samsung has been installed; its functions allow a strong interaction with users, thanks to a touch screen function and built-in speakers.

More specifically, the chosen device is an outdoor solution LCD 46" all in one, described as an exclusive DID (Digital Information Display). It is equipped with a PC and network connectivity in order to be remotely controlled via LAN/WAN, and with a high brightness panel.

A conditioning system is included and the totem is provided with protective glass to resist vandalism. As an outdoor device, it has been designed to endure rain, snow, heat, dust and difficult environmental conditions in general.

Figure 10 - SAMSUNG Totem 460 DRn –A

Initially it was intended to locate the totem at the entrance to the subway leading to the railway station platform. However, it was difficult to reach agreement with Rete Ferroviaria Italiana(Owner of the Italian Rail Network), especially as far as electricity supply was concerned, so it has been decided to install the totem in Piazza Castello, just before the entrance to the railway station forecourt, in order to take the power directly from a building owned by the municipality.

The following figures show the initial siting, in which the totem is located in front of the Urban Center of Monza (figure on the left), and the actual installation below in the bus shelter (on the right), in order to better protect the totem, on the one hand, and to make it more accessible to people waiting for buses even in bad weather conditions, on the other, as well as allowing for wi-fi connection through the Municipality net serving the Urban Center.

Figure 11 - Initial setting and definitive location of totem

The following information has been made available on the totem:

- Monza Public Transport network
- Monza – Milan – Monza trains' timetable
- Around me (indicating location of public offices, events, retailers of PT tickets, churches, offices etc.)
- Real time situation of flights at Malpensa and Linate airports
- Real time Milan Metro situation
- Events at Milan – Rho Fair
- News concerning mobility, events and Municipality of Monza (through RSS feed)Meteo.

The following figures depict the appearance of the totem, which was previewed during the Monza Consortium Meeting.

Figure 12 - Screenshots of the totem

Stage 5: Completion of installation of electronic bus stops. In May 2012, after solving some problems due to energy supply because of long bureaucracy of the supplier, the remaining 8 electronic bus stops have been installed on CIVITAS Corridor dedicated to public transport.

B5 Inter-relationships with other measures

The measure is not related to any other measure.

C Impact Evaluation Findings

C1 Measurement methodology

C1.1 Impacts and indicators

C1.1.0 Scope of the impact

The indicators chosen in the table below were selected as directly related to the introduction of the measure.

The indicators relate to:

Economy – costs incurred at setting up the InfoBus system are considered; no operational costs have been considered, since for many electronic bus stops NET has taken power supply directly from Municipality points of energy in order to optimize costs and reduce energy consumption. Benefits are not considered, since no direct operational revenues are expected;

Energy – no indicators of this group are considered:

Environment – no indicators of this group are considered;

Society – Awareness and acceptance will be assessed through surveys described in the core of the Local Evaluation plan, directed to cover the several issues concerning Public Transport (reduced travel time – this measure, better information – see measure 82)

Transport – impacts concerning the perception of an improvement of quality of service has been addressed in a survey which will cover several issues concerning PT. No modal split has been considered.

C1.1.1 Selection of indicators

NO.	EVALUATION CATEGORY	EVALUATION SUB-CATEGORY	IMPACT	INDICATOR	DESCRIPTION	DATA /UNITS
	ECONOMY					
2A		**Costs**	**Capital Costs**	Capital costs	Costs per every info-point	Euros/info-point**;** the cost of the control centre is spread over the info-points centralised
	SOCIETY					
13		**Acceptance**	Awareness	Awareness level	Awareness of the policies/measures	Index (%), qualitative, collected, survey
	TRANSPORT					
19		**Quality of Service**	Quality of service	Quality of service	Perception of quality of service	Index, qualitative, collected, survey

C1.1.2 Methods for evaluation of indicators

No.	INDICATOR	TARGET VALUE	Source of data and methods	Frequency of Data Collection
2b	Capital Costs	The minimum allowed	Amount of money spent by the Municipality and by NET to implement the system	Once, at intervention completed
13-14	Awareness	High degree of awareness	Surveys will be conducted to measure awareness level of users of Public Transport Service in order to measure whether people actually change their behaviour or their attitude because of Info-bus system. Surveys have been organized at bus stops with interviewers who will question people about their perception of the implementation of the measure. The survey will cover also qualitative aspects of other measures connected to public transport, like measure 7 (Hybrid Bus) and measure 82 (PT priority) The sample considered has been of 240 people, chosen between normal users of PT service. The face to face method should	Data will be collected twice: once before the installation of the devices (May 2011) and once after the installation (June 2012)

No.	INDICATOR	TARGET VALUE	Source of data and methods	Frequency of Data Collection
			reduce percentage of mistakes in the survey.	
19	Quality of service	The maximum allowed	The survey conducted for indicators 13 and 14 will address also the Quality of Service of the users of Public Transport fleet.	Data will be collected twice: once before the installation of the devices (May 2011) and once after the installation (June 2012

C1.1.3 Planning of before and after data collection

EVALUATION TASK	INDICATORS INVOLVED	COMPLETED BY (DATE)	RESPONSIBLE ORGANISATION AND PERSON
Measuring Capital Costs	2b	Month 40 (only after data)	Comune di Monza – S. Vittoria
Measuring awareness level of target group of users of Public Transport	14	Month 32(before data) Month 45(after data)	Comune di Monza – S. Vittoria
Measuring Quality Of Service	19	Month 32(before data) Month 45(only after data)	Comune di Monza – S. Vittoria
D12.2 Baseline and first results from data collection	All indicators	Month 34	Comune di Monza – S. Vittoria
D12.3 Draft results template available	All indicators	Month 49	Comune di Monza – S. Vittoria
D12.4 Final version of results template available	All indicators	Month 50	Comune di Monza – S. Vittoria

Measure title: **Improved Traveller Information in Monza**

City: **Monza** *Project:* **ARCHIMEDES** *Measure number:* **79**

C1.2 Establishing a Baseline

PT in Monza has been managed by the Company "Trasporti Pubblici Monzesi – TPM" (100% owned by Comune of Monza) until September 2009, after the City Council decided to merge the branch of TPM concerning Public Transport with the Company "Nord-Est Trasporti –NET", a PT company already operating in Monza, almost totally owned by the Company "Azienda Trasporti Milanesi – ATM" Milan, the largest public PT Operator of the area of Milan.

Before ARCHIMEDES, no real time information about mobility and PT had been activated in the city of Monza: the only real time available information was in the railway station concerning train service.

What is so far missing is a similar information system concerning the service of the buses of the Public Transport. The only information available for PT users depends on maps of the public transport, leaflets with timetables and PT companies websites. Many information about PT and mobility in general is also given by Comune of Monza through its website, its Facbook page and SMS service, but it is never as reliable as real time information can be.

C1.3 Building the Business-as-Usual scenario

The running contract for urban and suburban PT service in Monza, which will last till November 2014, provides, among other clauses, the obligation of the PT operator to install electronic bus stops by the deadline, but the rising cost of public transport has seen operators more concentrated on optimization of the service by reviewing exercise programs than on installation of devices which can improve the perception of the quality of service.

In a future perspective, it can be assumed that the installation of such devices will become necessary for all PT companies, in order to offer users a more modern service, especially now that technology, with a relatively small investment, allows to convey information in real time.

As far as the totem is concerned, it can be assumed that without ARCHIMEDES, no such device would have been installed, whilst now that the totem is working, its performances could be appreciated by citizens and, in a future perspective, other devices could be purchased and installed in other strategic locations of the city (Hospital, city centre, Park).

C2 Measure results

C2.1 Economy

Table C2.1.1: Costs

As regards costs for the implementation of the measure, it has been considered how much Comune of Monza and NET have invested for the installation of the electronic bus stops (including street works and power supply connection) and of the interactive totem.

Indicator	Before (date)	B-a-U (date)	After (December 2011)	Difference: After – Before	Difference: After – B-a-U
No. 2A: Capital Costs	Not applicable	Not applicable	• € 217.800 VAT included (€ 6.720 for each electronic bus stop) by NET • € 24.600 VAT included for the totem by Comune of Monza	Not applicable	Not applicable

			• € 9205,48 VAT included to develop palimpsest of the totem by Comune of Monza		

If we consider that in Monza there is a total of 463 bus stops managed by NET and about 100 bus stops managed by other PT companies passing through Monza, it can be assumed that the equipment of all bus stops with electronic devices would cost about 3.581.760 € (already deducted what has been paid for the 30 devices installed by NET).

If other interactive totems are installed, the cost of one device will have to be multiplied for the number of totems. For this period, no maintaining costs have been calculated, since the device is still under guarantee. After the guarantee expires, it will be necessary to issue a contract which, besides covering costs for ordinary and extraordinary maintenance, includes also costs to be afforded for the implementation of the palimpsest with further contents than those currently included.

C2.4 Transport

In order to evaluate core indicators concerning transport and society, and to assess mobility habits of surveyed people, two qualitative surveys were conducted before (May 2011) and after (June 2012) the start of the implementation stage of the measure.

The first survey, which was conducted on the 4 most frequented PT urban lines and in some nevralgic locations of the city, has interested 240 people in order to analyze their knowledge and their opinion about public transport improvements in progress in Monza thanks to ARCHIMEDES project, as well as detecting potential interest and perception about measures' development and which of the on going measures are considered mostly impacting on respondents mobility habits on going projects (even if they are not known)

A questionnaire of 23 questions was elaborated by statistic technicians according to Municipality of Monza's requirements and concerned not only measure no. 7, but also measures no. 19, no. 79 and no. 82.

In June 2012 the second survey was realized on 236 people using public transport at Monza, on lines 206, 266, 202, 201 and at two main bus stop (Piazza Castello e Via Manzoni). The interview had the scope to assess awareness of the implementation of the measure as well as eventual changing of habits in using public transport and in quality of service. The opinions of the respondents were acquired through a questionnaire designed ad hoc.

The sample size guarantees the statistic reliability of the survey, according to the following parameters:

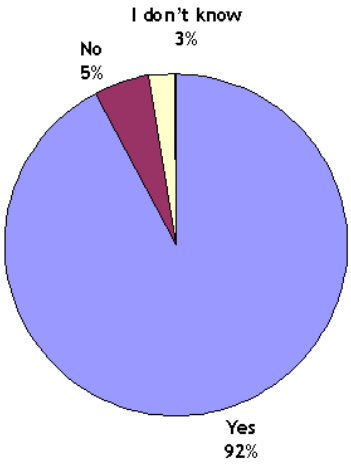
- Significance level: 95%
- Error margin – 5% .

As described in Section C1.1.0, as for transport no modal split has been assessed, even though a survey has been held to assess if the implementation of the measure has improved quality of service. Nevertheless, some questions about mobility habits have been asked which are shortly summarized in the following table.

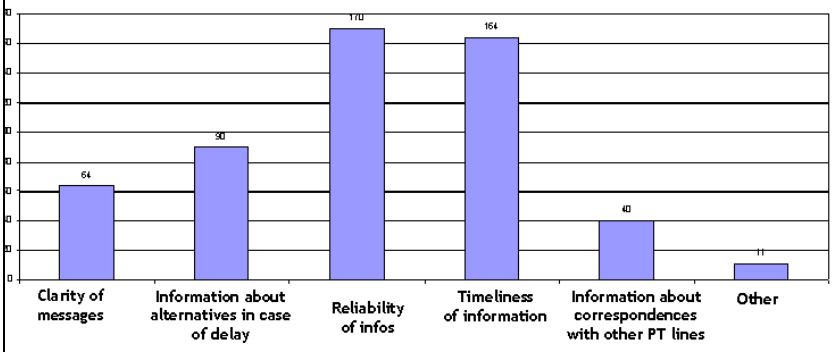
In this section results of the two surveys will be summarized, whilst all findings from the interviews will be shown in the annex to the present document.

Indicator	Before (May 2011)	B-a-U	After (June 2012)	Difference: After –Before	Difference: After – B-a-U
USE OF PT	**44,2%** use PT more than 10 times a month **22,9%** use PT less than 10 times a month Most used lines are 206 and 266, both running on CIVITAS Corridor for which measure no. 82 (PT priority) is being implemented	Percentage of PT users would have remained the same	**51,7%** use PT more than 10 times a month **19,5%** use PT less than 10 times a month Most used lines are 206 and 266, both running on CIVITAS Corridor for which measure no. 82 (PT priority) is being implemented	**+ 4,1**% in total use PT	+ 4,1%
No. 19 – **Quality of service**	**92%** of surveyed people think the implementation of the measure **may be** useful to improve quality of service People expect that information is reliable (**170** out of **240**), timely (**164** out of **240**) and that gives alternatives in case of problems/delay (**90** out of **240**)		**91,9%** of surveyed people think the implementation of the measure **is** useful to improve quality of service People think that information on devices is clear to read (**85** out of **236**), liable (**30** out of **236**), and that it is quickly updated (**26** out of **236**) Unfortunately many people are not able to answer about devices' features	As a result of the after survey people is now convinced that Infomobility is useful to improve quality of service has remained the same	

Below graphs explaining findings of the surveys are reported.

Do you think that real time information devices can improve quality of service? **INDICATOR NO. 19 (Quality of service)**	

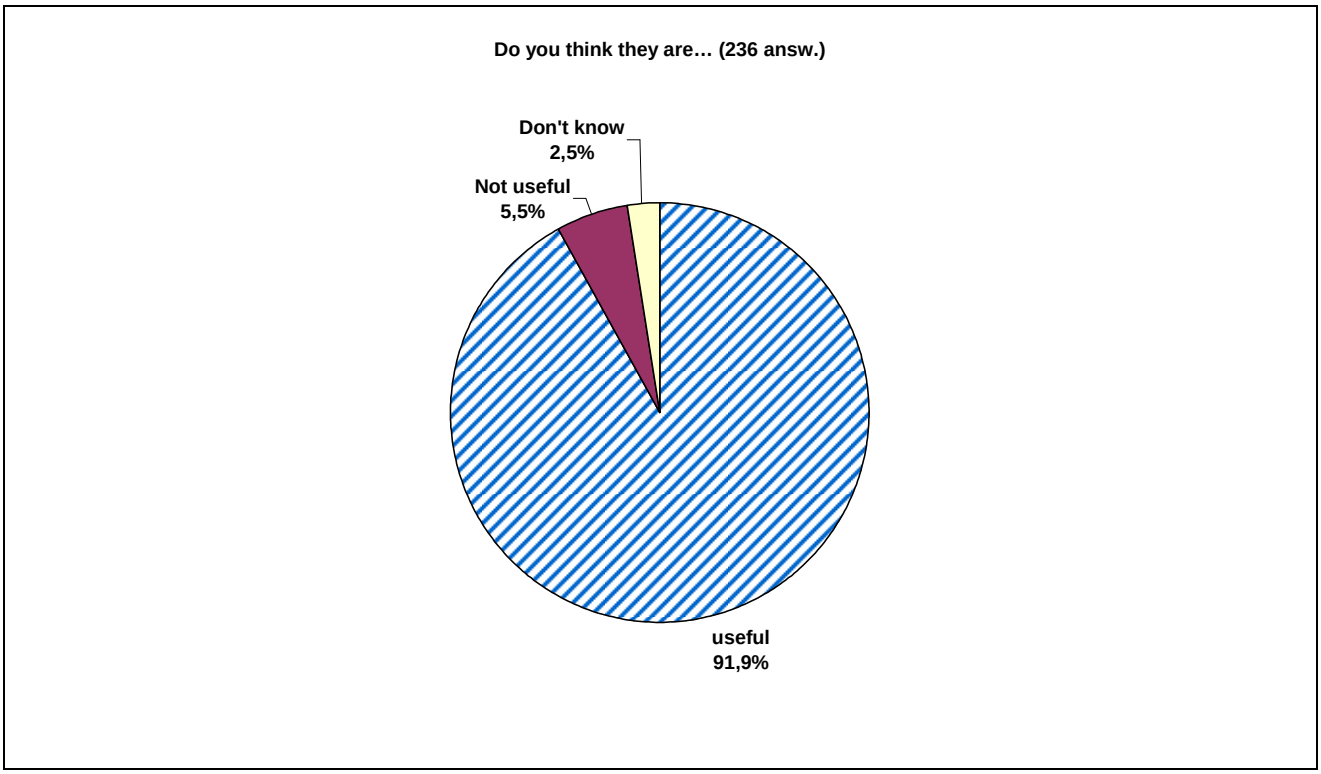
Graph 1 – Opinion on quality of service improvement – May 2011 survey

What are your expectations about the real time information service? **INDICATOR NO. 19 (Quality of service)**	

Graph 2 - Expectations about real time information service – May 2011 survey

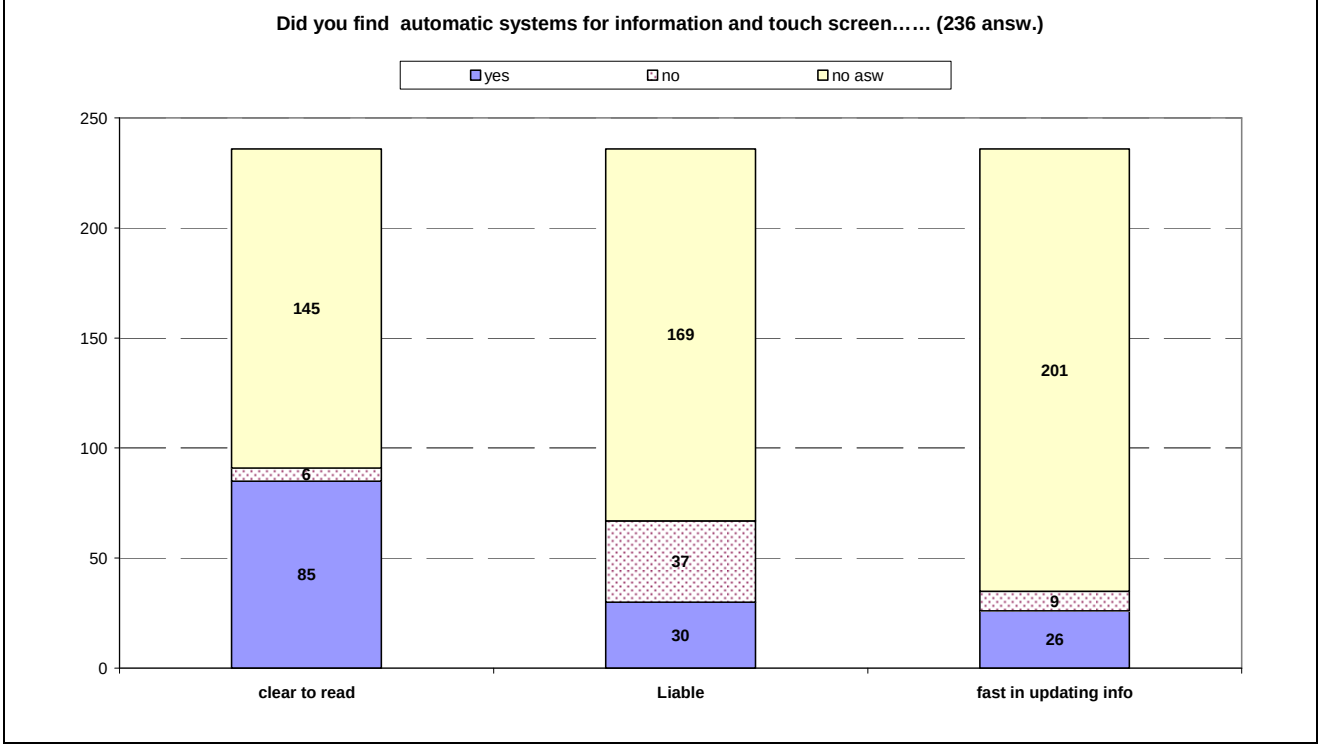
.

INDICATOR NO. 19 (Quality of service)



Graph 3 - Opinion on quality of service improvement – June 2012 survey

INDICATOR NO. 19 (Quality of service)



Graph 4 - Opinions about real time information service – June 2012 survey

C2.5 Society

In the same surveys realized to better understand mobility habits of citizens and to verify if quality of the service improved thanks to traveller information, also awareness of the implementation of the measure has been assessed.

In the second survey some questions have been necessarily different from the ones asked during the before survey (especially as far as awareness indicator was concerned), since the implementation of the measure was noticed after the press and web information campaign and because installed devices were actually visible on the street. For this reason, also some questions about people's opinion on the installed devices were asked.

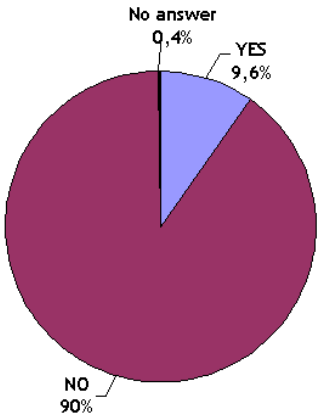
Results have been summarized in the following table, and are better described in the graphs below.

Table C2.5.1:

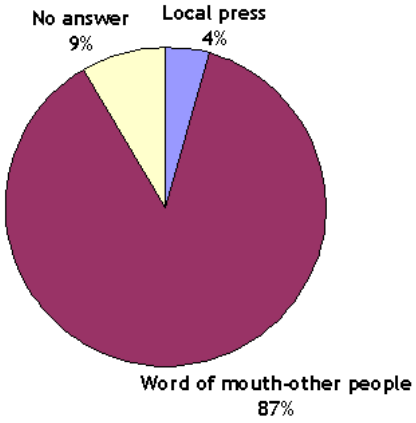
Indicator	Before (May 2011)	B-a-U (date)	After (June 2012)	Difference: After –Before	Difference: After – B-a-U
No 14 - Awareness	**90%** is not aware of the implementation of the measure (only **9,6%** is informed) **87%** of informed people knew of the measure by word of mouth/other people	NOT APPLICABLE	**54,2%** is aware of the implementation of the measure (**45,8%** is not) **48,7%** did not notice installed devices **22,9%** noticed both electronic displays and interactive totem (**123** people out of **236** noticed directly on the road)	Awareness has increased of **44,6%** (possibly because the implementation is visible on the road)	NOT APPLICABLE

Results show that, although awareness of the implementation of the measure has substantially increased (+44.6%), in spite of the fact that devices may be physically seen, there are still some people who are not aware of the implementation of electronic bus stops: this is probably due to the fact that in Monza there are more than 500 bus stops, so it will be necessary to extend the measure to the whole city to be sure that citizens are completely aware of the new devices and of their features.

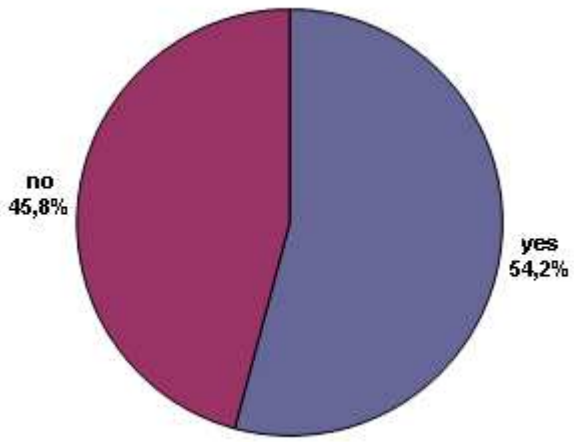
Below graphs explaining findings of the surveys are reported.

Do you know Comune of Monza will implement a real time information system for PT users? **INDICATOR NO. 14 (Awareness)**	

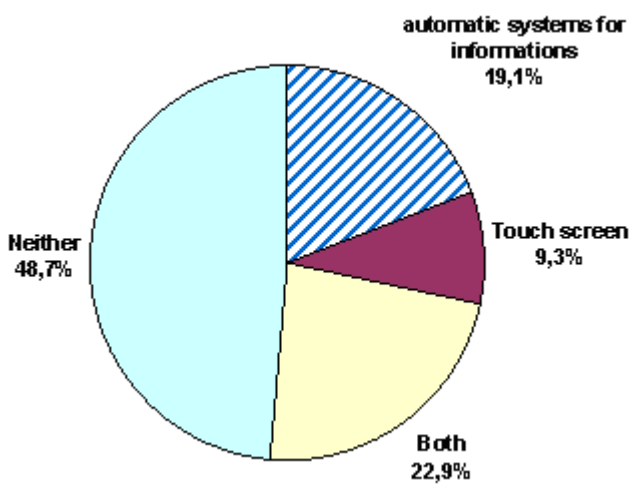
Graph 5 – Awareness of the measure – May 2011 survey

If you are informed about the real time information system, how did you know? **INDICATOR NO. 14 (Awareness)** SAMPLE SIZE FOR THIS QUESTION IS OF 23 RESPONDANTS	

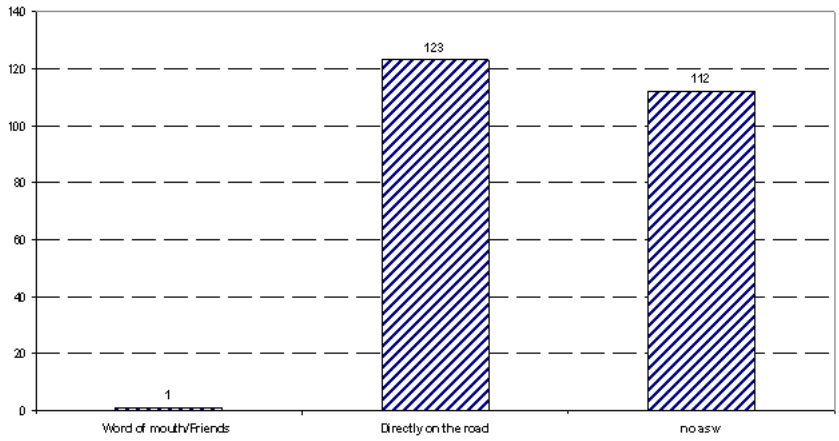
Graph 6 - Means of knowledge – May 2011 survey

Do you know Comune of Monza has installed automatic systems for information and a touch screen for PT users? **INDICATOR NO. 14 (Awareness)**	

Graph 7 – Awareness of the measure - June 2012 survey

What devices you noticed in town? **INDICATOR NO. 14 (Awareness)**	

Graph 8 – Devices noticed in town – June 2012 survey

How did you know about the installation of the devices? **INDICATOR NO. 14 (Awareness)**	

Graph 9 - Means of knowledge – June 2012 survey

C3 Achievement of quantifiable targets and objectives

No.	Target	Rating
2B	Measuring Capital Costs	**
14	Measuring awareness level of target group of users of Public Transport	**
19	Improving general perception of overall quality of PT service	**
NA = Not Assessed O = Not Achieved * = Substantially achieved (at least 50%) ** = Achieved in full * = Exceeded**		

The collection of before data showed that, since the survey has been made before the installation of the devices, there has not been a relevant perception of awareness of the measure between citizens,

even though all surveyed people were strongly convinced that the implementation of the measure can improve the quality of PT service.

With the collection of after data, during the survey held in June 2012, once that the installation of devices was completed, awareness of the measure has significantly improved, even though there is still a wide range of people who are not aware of the implementation of the measure (45,8%), obviously because the installed devices may be phisically seen on the road by citizens. The largest part of surveyed people think these devices are very useful to improve the quality of service, but many people cannot say which of the functionalities is more useful.

C4 Up-scaling of results

The installation of such devices will become necessary for all PT companies, in order to offer users a more modern service, especially now that technology, with a relatively small investment, allows to convey information in real time.

Obviously, the purchase of a number of electronic bus stops which can cover all the locations of the city will entail a considerable financial investment (about 3.581.760 € for all bus stops in Monza), and it can be assumed that this will need to issue a tender by the PT companies.

Such an approach, even though the implementation can be rather expensive at the beginning, could be included as part of next PT service tender, which will be held by Comune of Monza in 2014 now that it is head of the new Province. In this way, costs can be more easily depreciated with a long term contract (the current contract runs for seven years).

As far as the totem is concerned, other devices could be purchased and installed in other strategic locations of the city (Hospital, city centre, Park).

Request for information concerning mobility is always increasing, since nowadays mobility concerns almost everyone, especially in a city like Monza where traffic is strongly influenced by its proximity with Milan, which, besides being the capital city of the Region, is also one of the most important towns of the entire nation, as far as economic activities are concerned. For this reason, it will be very important to verify what kind of information is really needed by citizens to improve performances of both devices and to offer a real time information which is limited not only to PT but to other aspects of daily life.

C5 Appraisal of evaluation approach

Evaluation activities have been aimed at :

- collecting data about investments needed by Comune of Monza and NET as the principal PT operator in Monza to implement the measure, with an eye to the economic effort to be faced in order to extend the measure to the entire city's public transport network
- checking the level of knowledge of the measure implementation between users of public transport;
- checking if people appreciate principal features of the installed devices.

Some questions about mobility habits have been asked in order to see if the implementation of the measure, may lead to a modal shift in favour of public transport.

Considering that with the implementation of this measure Comune of Monza has achieved an important technological evolution in improving information for PT users, it can be assessed that evaluation approach worked well. Even though it was not difficult to assess awareness of the measure

by citizens, all the same only 54,2% of people was really aware of the implementation, possibly because only 10 electronic bus stops and one interactive totem were installed. Actually, in spite of the fact that devices may be physically seen, there is still a wide range of citizens who are not aware of the implementation of electronic bus stops: this is probably due to the fact that in Monza there are more than 500 bus stops, so it will be necessary to extend the measure to the whole city to be sure that citizens are completely aware of the new devices and of their features.

The upscaling of the measure, with the extension of the installation of these devices to the whole city, will surely lead to an increase in consciousness of people about usefulness of the electronic bus stops and the totem for a better information about PT and mobility in general..

C6 Summary of evaluation results

From the qualitative survey aimed at collecting opinions of citizens about the implementation of a real time information about PT, the following results can be considered interesting:

- there has not been a relevant perception of awareness of the measure between citizens, which have mostly been informed by word of mouth or local press;
- in spite of this, people expect a considerable improvement in quality of service by the implementation of this measure, which is considered the most important, between the ones concerning PT, to change the approach of people in favour of sustainable mobility;
- people who do not think that the implementation of the measure will change their approach towards PT justify their answer with the fact that already use it routinely.

More useful information about results gained by the implementation of the measure will be added after the survey which is going to be held in April 2012, after the installation of all devices.

As far as impact indicators are concerned, it can be said that important investments need to be afforded by PT companies if the entire city network has to be equipped with electronic bus stops: if we consider that central Government funding for the PT service is being further reduced due to the economic crisis, the opportunity that PT companies are available to face such a huge investment must be necessarily accompanied by a long term contract, which could allow them to prolong depreciation terms.

C7 Future activities relating to the measure

The other electronic bus stops will be installed as soon as streetworks and electricity supply connections are complete, in order to realisethe full implementation of the improved traveler information system.

The implemented technological framework has been designedto also host other functionalities that could be implemented in the future, such as:

- software applications to provide information through SMS service;

- software applications to provide information through a Web site;

- installation on buses of screens to provide passengers with in-trip information.

Another important possible extension, which this system is capable of providing, is the management of data related to other Public Transport fleets in the city of Monza where other PT operators are active. For these purposes, the DB Realtime Updater server would be fed by data originated by such fleets through specific software interfaces (e.g. Webservices). Other PT companies have already been

approached in order to ask them to develop such interfaces in order to have all PT information available on the bus stops.

As far as the totem is concerned, surveys will be made to ask users about their degree of satisfaction, so as to evaluate the opportunity to install more devices in the city, in other strategic locations like the City Centre, the Hospital and the Park.

The installation of such devices can be considered the starting point for future use of these technologies as far as improving information for PT travellers is concerned. In future all bus stops in the city will have to be equipped with electronic bus stops, so to provide information to all citizens and not only to those using buses on CIVITAS Corridor. This is why the list of electronic bus stops to be installed by NET is made up of 30 locations. Probably it will not be possible to equip all the bus stops in the city within the deadline of the running PT contract which expires in November 2014, but the path is traced and in the next tender to issue for PT service the installation of such electronic devices will be considered necessary to participate to the tender.

D Process Evaluation Findings

D.0 Focused measure

X	0	No focussed measure
	1	Most important reason
	2	Second most important reason
	3	Third most important reason

D1 Deviations from the original plan

There have been no deviations from the original plan.

D2 Barriers and drivers

For all measures concerning initiatives on Public Transport some starting considerations are needed.

Public Transport in Italy is not in perfect health: for this reason most companies show negative budget sheets. The ticket sale proceeds reach the 18-20 of budget % in the worst cases and the 31-35% in the best ones.

Fuel price is more and more increasing since it is now considered one of the strongest levers for Government to raise incomes. However, latest rises in price of fuel have not been supported by the State or local authority (regions, provinces, cities) through more contractual compensation (in case of call for tenders) or more grants (in case of in house providing) to PT companies: on the contrary, fund transfers from the Central government have been reduced, so it has been necessary, in order to maintain a good standard of the service, to increase fares, whilst rationalizing routes, reducing duplications and reviewing exercise programs in order to focus on more popular routes and timetables.

Such a situation makes it difficult for PT companies to invest on improvements of the service offered to users, even though the only way to encourage people to keep on or to start using Public Transport is to offer them better quality and more personalized services.

This is the most important driver which can help Municipality decisors to fight against barriers caused by the economical crisis.

D.2.1 Barriers

Preparation phase

- **Organizational** – The merging of TPM with NET has delayed many activities and in particular the decision about keeping the the AVL/AVM system implemented by TPM or extending the system already used by ATM fleet to the new acquired fleet.
- **Problem related** – The implementation of the measure is made difficult by the fact that several PT companies operate in Monza and not all of them share the same AVL/AVM system, which is a fundamental prerequisite to give real time information.

Implementation phase

- **Financial** – Because of the huge investment required, NET has taken some time to decide about the installation of the devices.

- **Technological** – Problems in achieving energy connection for all electronic bus stops due to the long and slow bureaucracy of the unique supplier.

Operation phase

- **Involvement** – All PT operators have not agreed yet on a common system to interface their AVL/AVM system with the electronic bus stops so to offer a more complete information to travellers.
- **Technological –** As soon as the system was operational, some inaccuracies in data transmitted by the software managing the AVL/AVM system to the electronic bus stops were noticed, due to the fact that, at times, displays showed waiting time for buses coming from the opposite direction.

D2.2 Drivers

Preparation phase

- **Political** – Strong political commitment of Mobility Deputi Mayor to implement the measure in order to offer people information about Public Transport with the aim of shifting more citizens to sustainable mobility modes.
- **Technological** –Technological devices have been chosen exploiting experience gained by ATM Milan which had already installed some touchscreen interactive totems in Milan and by NET in another area in which NET itself is managing PT service as far as electronic bus stops are concerned: the good experience achieved has paved the way for the installation of the same devices in Monza as well.

Implementation phase

- **Planning** – Many inspections in the city have been made with Municipality and NET technicians to define technical aspects of the streetworks to do for installing the totem and the electronic bus stops.
- **Institutional** - Comune of Monza has exempted NET from paying fees for the occupation of public land and streetworks, in order to facilitate administrative accomplishments

Operation phase

- **Technological** – The installation of the first electronic devices along PT routes has represented an important step for the city of Monza to approach to citizens in a more interactive way and will pave the way to provide the whole network with electronic bus stops and interactive totems and to develop other technological opportunities to give citizens information about PT (smartphone applications, available Webservices)
- **Communication –** A wide press and web coverage has helped to inform citizens about the implementation of the measure.

D.2.3 Activities

Preparation phase

- **Planning** – The research stage has been dedicated to the study of PT routes in the city, in order to define which bus stops are more frequented and interested by the passage of different PT lines.
- **Technological** –NET, as responsible for procurement of AVL/AVM system for their PT fleet, has defined the AVL/AVM system to implement as a fundamental prerequisite to implement real time information.

Implementation phase

- **Spatial/Technological** – The totem has been installed in Piazza Castello, just outside the interchange node of Porta Castello, and a specific palimpsest has been developed in agreement between NET and Comune of Monza about information to be made available on the device in order to offer all useful features to citizens for infomobility.
- **Planning -** The exact position of electronic bus stops and power supply mode (solar or direct) where electronic displays has been agreed with NET during inspections with NET and Municipality technicians.

Operation phase

- **Planning -** The totem and the first two bus stops, installed in Piazza Castello, are operational since December 2011. Later, other 8 electronic bus stops have been installed and connected to energy supply and are operational since May 2012.
- **Technological** – The functioning of the system is daily checked by Project Automation through the Webservice implemented for Measure 78, since the information provided will be used to activate Public Transport priority in Measure 82.

D3 Participation of stakeholders

D.3.1. Measure Partners

- **Comune of Monza** – Mobility and Transportation Department, in its leading role, has coordinated inspections on the territory to define location of bus stops and of the totem
- **NET -** NET, as Public Transport operator for the city of Monza and as subcontractor for Comune of Monza, has installed electronic bus stops and the totem at its own expenses.
- **Project Automation –** Project Automation, as ARCHIMEDES partner, has defined technical requirements for the implementation of the infomobility system, which will also be used for Measure no. 82, in order to allow PT priority at traffic lights on CIVITAS corridor.

D.3.2 Stakeholders

- **Other PT companies –** Managers of other PT companies are interested in achievements derived from the implementation of the measure, since information about PT service are important for users and could be helpful to attract more people towqrds public transport
- **PT users and commuters-** People who have chosen PT as their mobility system appreciate the availability of real time information.
- **Citizens –** Also citizens who seldom use Public Transport can benefit from real time information about timetables and connections, but more generally from all information connected to mobility.

D.4 Recommendations

D.4.1 Recommendations: measure replication

- **Choice of the software to implement** – It is advisable to develop of a software which, besides being useful for the location of buses on the territory, is as well helpful in order to activate PT priority at traffic lights along CIVITAS corridor. Without ARCHIMEDES project, this functionality maybe would not have been developed.

D.4.2 Recommendations: process

- **PT companies' involvement** - It is necessary, in order to offer a more complete information to PT users, that all PT companies operating on the territory choose the same AVL/AVM system or develop an interface, so that every bus travelling on the territory can send real time information to the electronic devices. Such an improvement, even though in some cases can be seen as a means of control by the contract managers, will definitely implement the knowledge of PT performances and could possibly be a significant driver for people to shift to public transport.
- **Financial problem** – If such a system has to be implemented in all the city, it is crucial to include in tender documents an obligation for those who will award the contract to complete the installation of such devices. For this reason, it is advisable that the contract has a duration allowing depreciation of such an important investment.

ANNEX 1 TO MERT NO. 79

Improved Traveller Information in Monza

In order to evaluate core indicators concerning transport and society, and to assess mobility habits of surveyed people, two qualitative surveys were conducted before (May 2011) and after (June 2012) the start of the implementation stage of the measure.

The first survey, which was conducted on the 4 most frequented PT urban lines and in some nevralgic locations of the city, has interested 240 people in order to analyze their knowledge and their opinion about public transport improvements in progress in Monza thanks to ARCHIMEDES project, as well as detecting potential interest and perception about measures' development and which of the on going measures are considered mostly impacting on respondents mobility habits on going projects (even if they are not known)

A questionnaire of 23 questions was elaborated by statistic technicians according to Municipality of Monza's requirements and concerned not only measure no. 7, but also measures no. 19, no. 79 and no. 82.

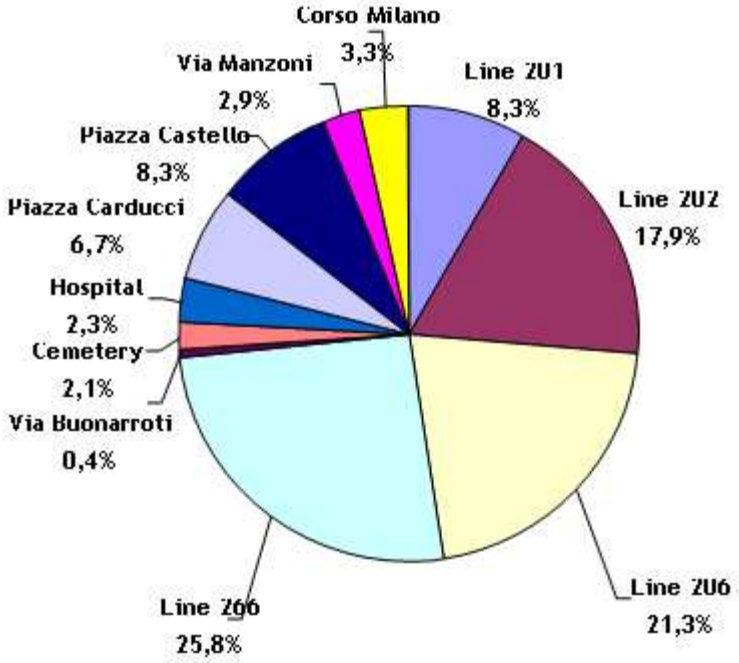
In June 2012 the second survey was realized on 236 people using public transport at Monza, on lines 206, 266, 202, 201 and at two main bus stop (Piazza Castello e Via Manzoni). The interview had the scope to assess awareness of the implementation of the measure as well as eventual changing of habits in using public transport and in quality of service. The opinions of the respondents were acquired through a questionnaire designed ad hoc.

The sample size guarantees the statistic reliability of the survey, according to the following parameters:

- Significance level: 95%
- Error margin – 5% .

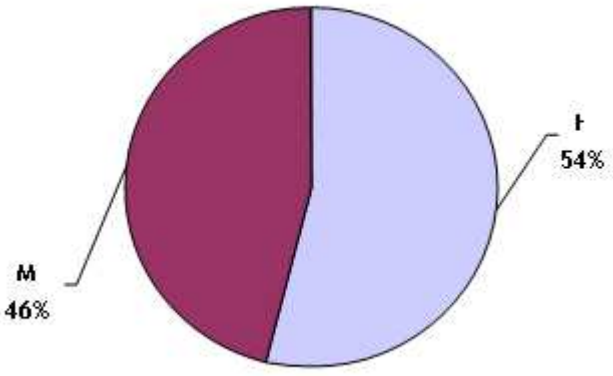
BEFORE DATA – May 2011 (sample size- 240 people)

Graph no. 1 shows the percentages of surveyed people for each public transport line and each city location.



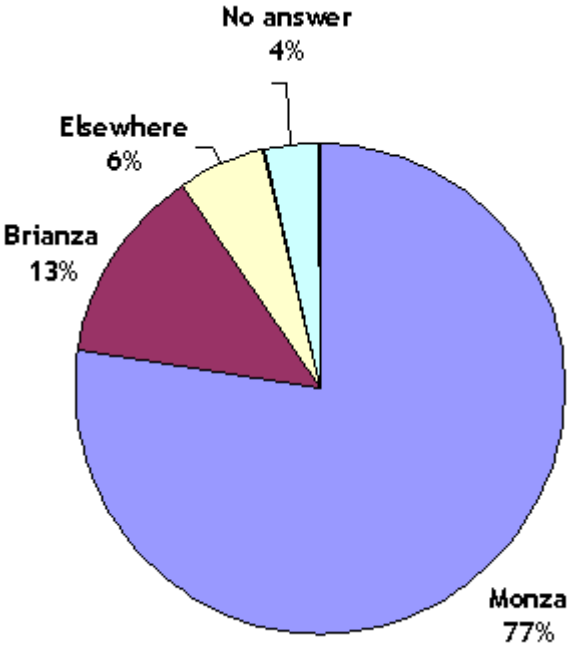
Graph 10 - Percentage of surveyed people for each PT line and location

The sample size (240 people) was made up by 46% of males and 54% of females.



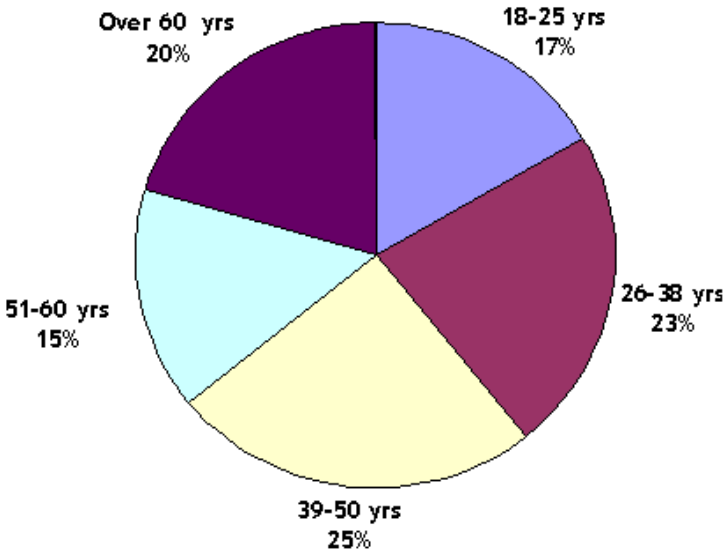
Graph 11 - Sex of surveyed people

77% of surveyed people live in the city of Monza, 13% live in Brianza and 6% live elsewhere: 4% of the sample did not answer to the question.



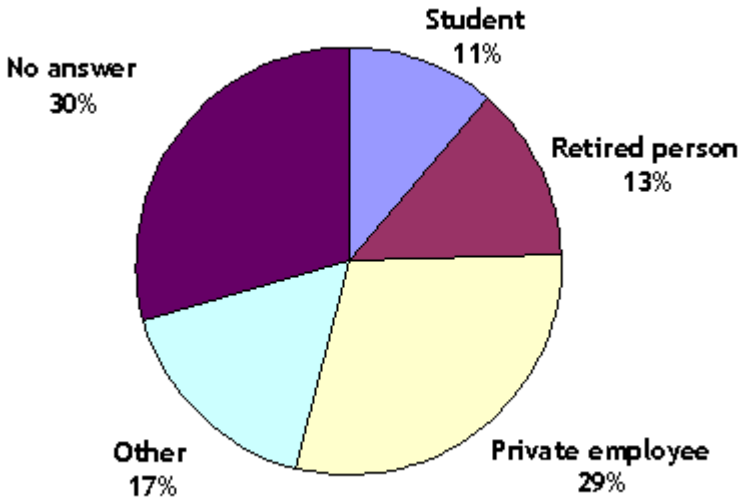
Graph 12 - Residence of surveyed people

Age of surveyed people is shown in the below graph.

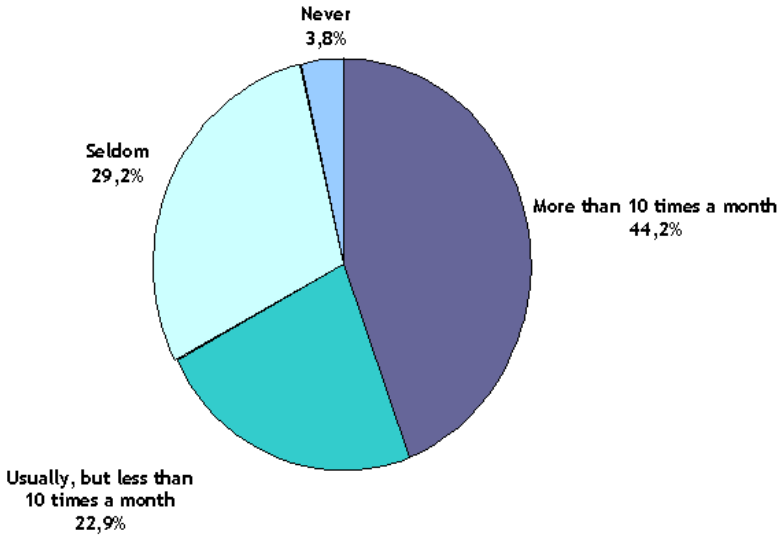
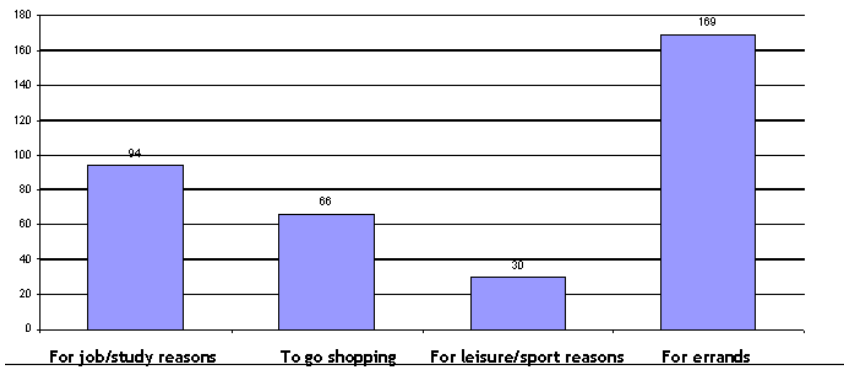


Graph 13 - Age of surveyed people

The following graph shows the professional condition of interviewed people: several different conditions are represented, even though the 30% of surveyed people did not answer.

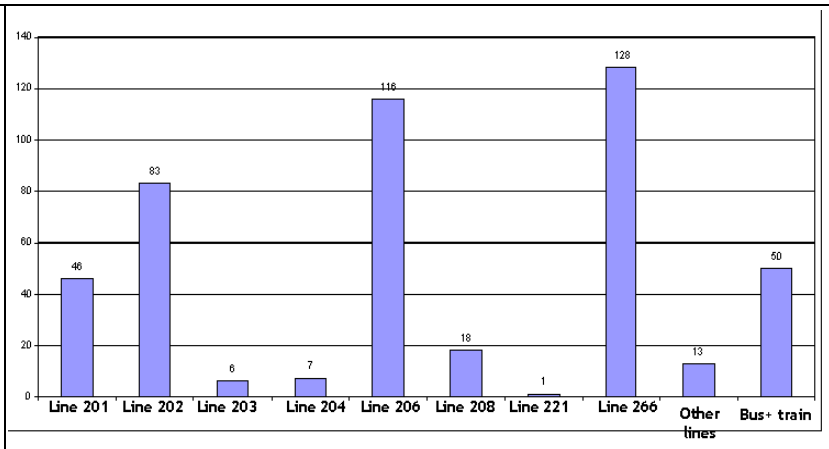
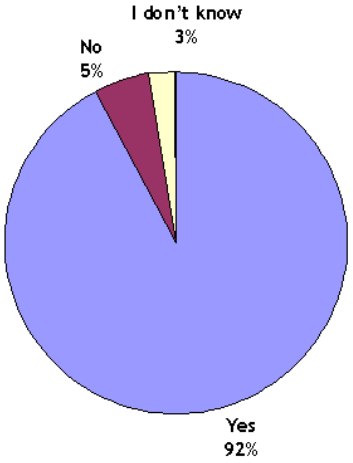
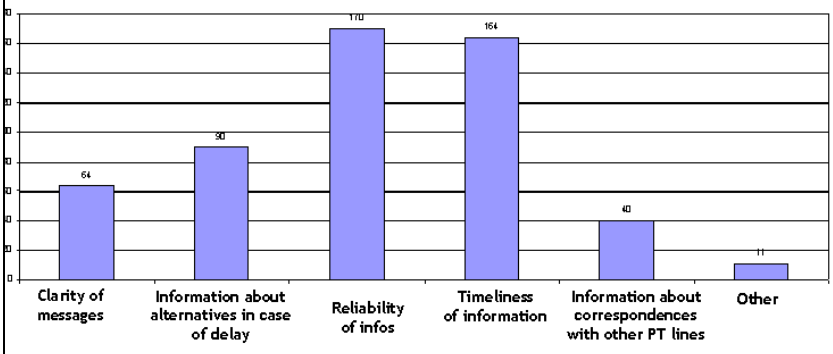


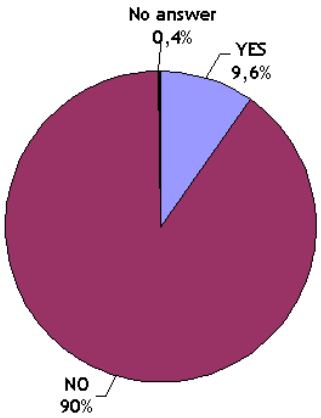
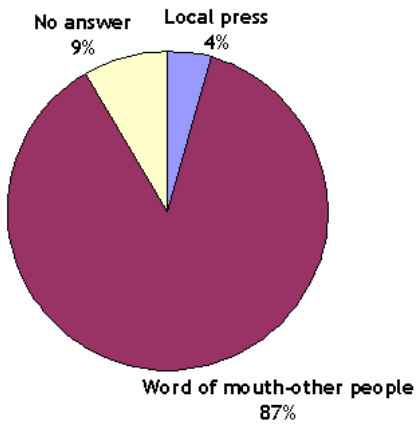
Mobility habits

Question asked	Answers
How often do you use public transport?	
Why do you use public transport?	

Measure title: **Improved Traveller Information in Monza**

City: **Monza** *Project:* **ARCHIMEDES** *Measure number:* **79**

Which line do you use more often?	
Do you think that real time information devices can improve quality of service? **INDICATOR NO. 19 (Quality of service)**	
What are your expectations about the real time information service? **INDICATOR NO. 19 (Quality of service)**	

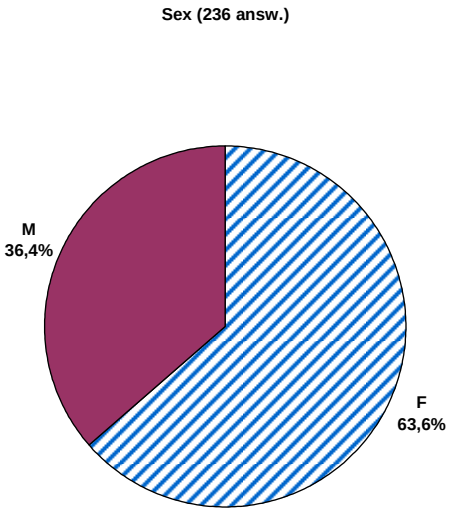
Do you know Comune of Monza will implement a real time information system for PT users? **INDICATOR NO. 14 (Awareness)**	
If you are informed about the real time information system, how did you know? **INDICATOR NO. 14 (Awareness)** SAMPLE SIZE FOR THIS QUESTION IS OF 23 RESPONDANTS	

AFTER DATA – June 2011 (sample size- 236 people)

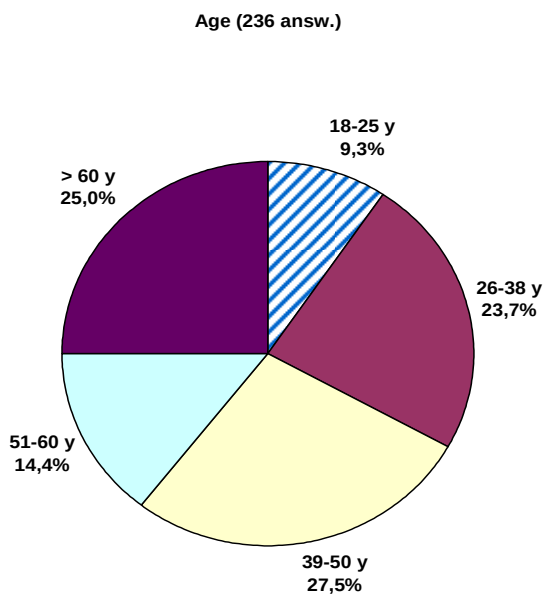
SEX OF SURVEYED PEOPLE

Measure title: **Improved Traveller Information in Monza**

City: **Monza** *Project:* **ARCHIMEDES** *Measure number:* **79**



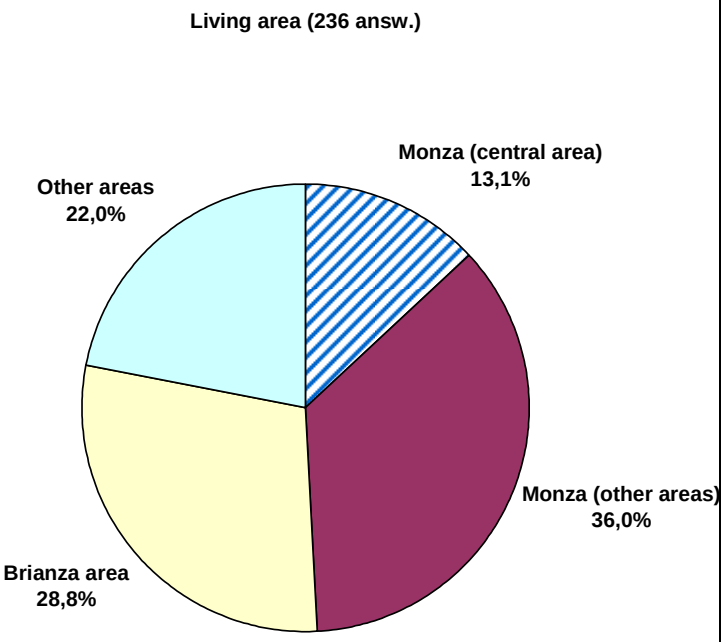
AGE OF SURVEYED PEOPLE



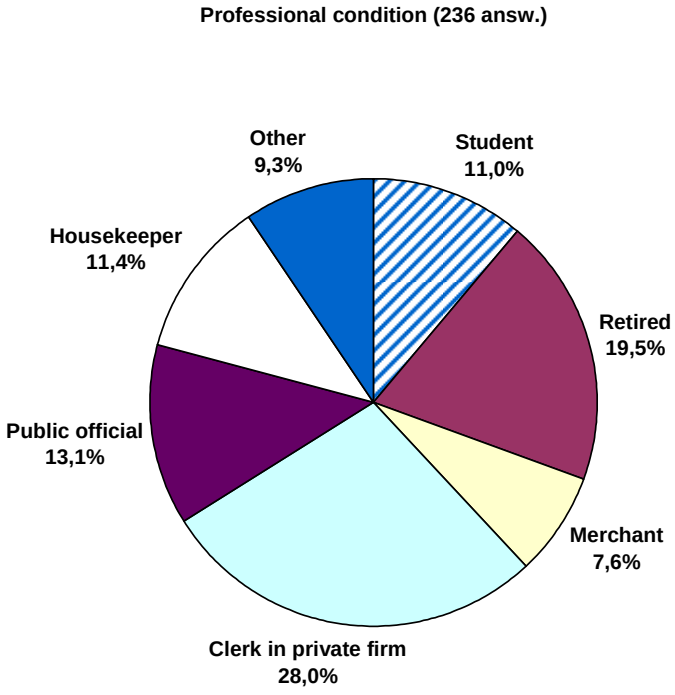
Measure title: **Improved Traveller Information in Monza**

City: **Monza** *Project:* **ARCHIMEDES** *Measure number:* **79**

LIVING AREA



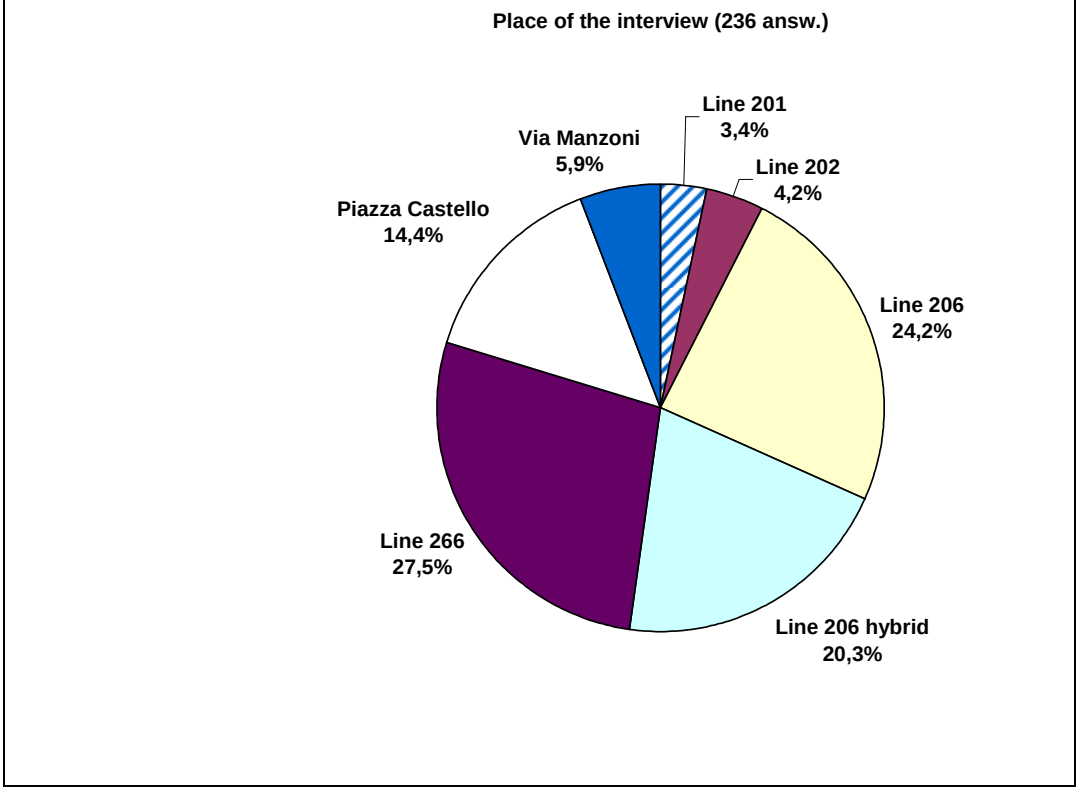
PROFESSIONAL CONDITION



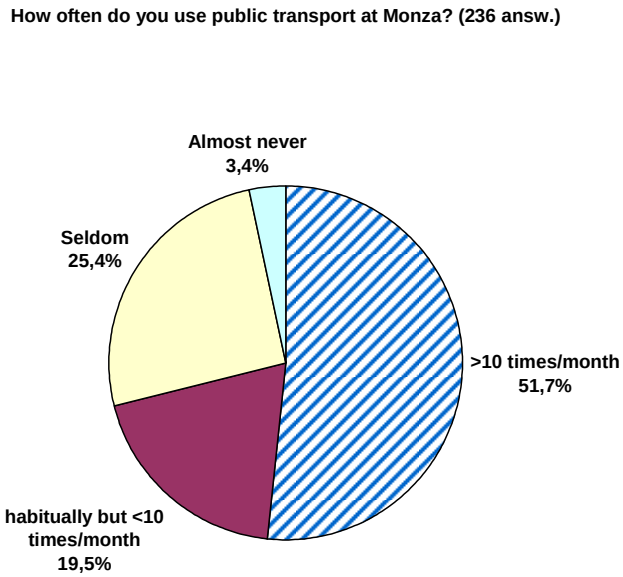
Measure title: **Improved Traveller Information in Monza**

City: **Monza** *Project:* **ARCHIMEDES** *Measure number:* **79**

INTERVIEW SITE



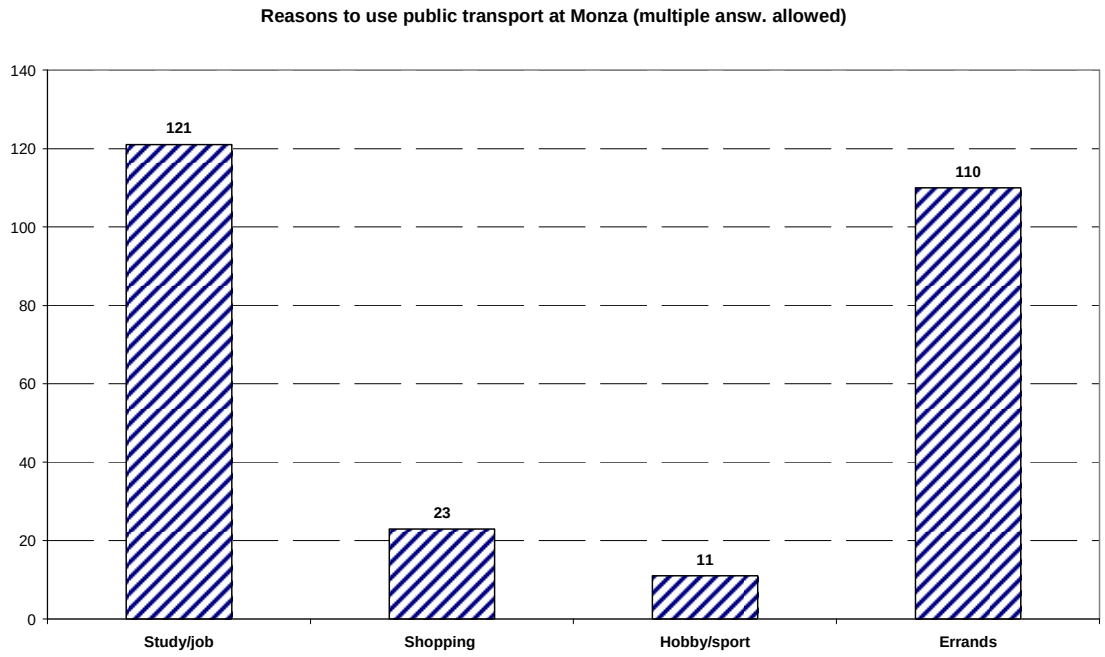
MOBILITY HABITS



Measure title: **Improved Traveller Information in Monza**

City: **Monza** *Project:* **ARCHIMEDES** *Measure number:* **79**

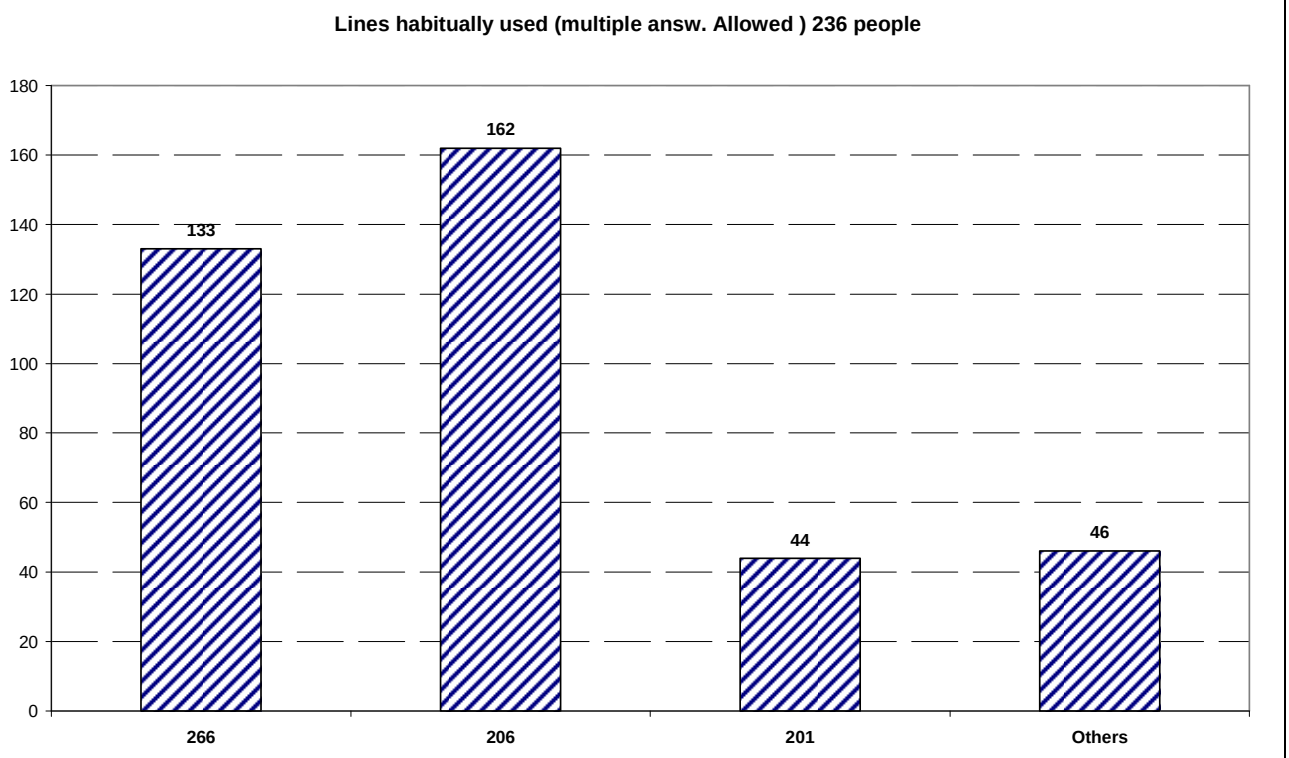
MOBILITY HABITS



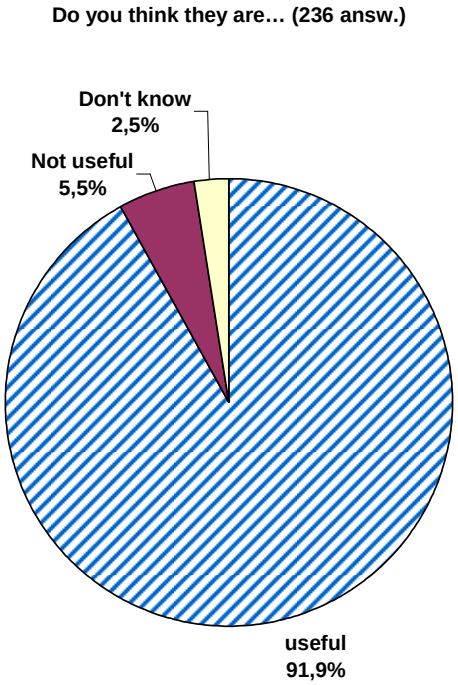
MOBILITY HABITS

Measure title: **Improved Traveller Information in Monza**

City: **Monza** *Project:* **ARCHIMEDES** *Measure number:* **79**



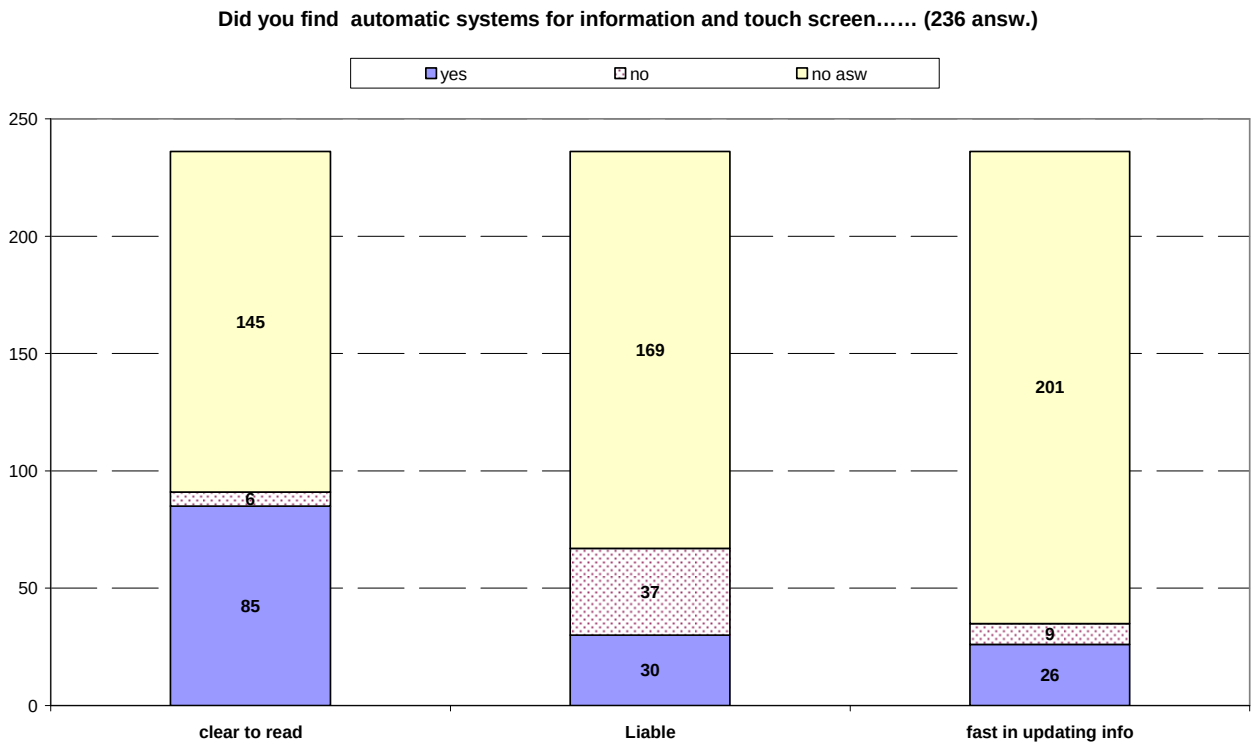
INDICATOR NO. 19 (Quality of service)



Measure title: **Improved Traveller Information in Monza**

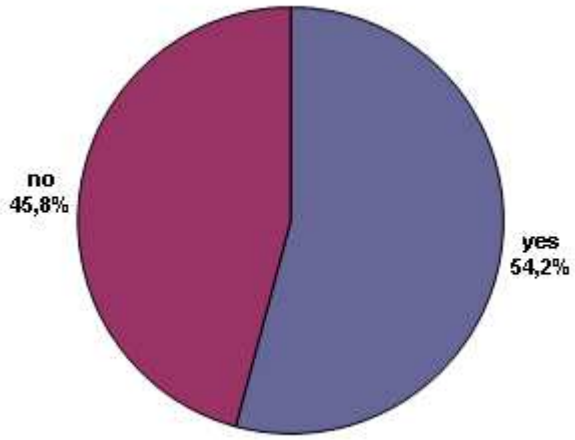
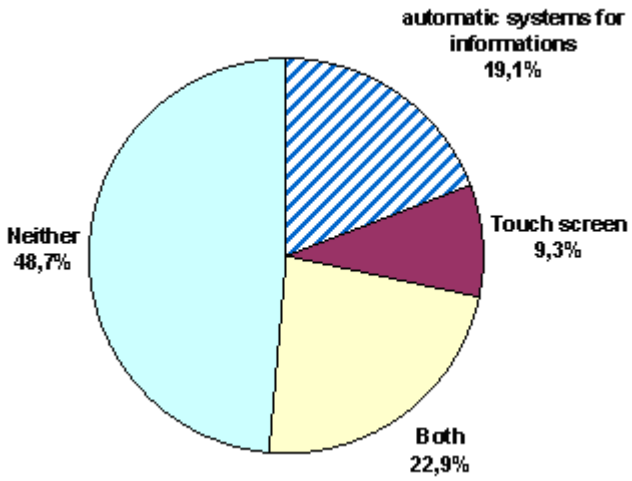
City: **Monza** *Project:* **ARCHIMEDES** *Measure number:* **79**

INDICATOR NO. 19 (Quality of service)



Measure title: **Improved Traveller Information in Monza**

City: **Monza** *Project:* **ARCHIMEDES** *Measure number:* **79**

Do you know Comune of Monza has installed automatic systems for information and a touch screen for PT users? **INDICATOR NO. 14 (Awareness)**	
What devices you noticed in town? **INDICATOR NO. 14 (Awareness)**	
How did you know about the installation of the devices? **INDICATOR NO. 14 (Awareness)**