Measure title: **School Travel Plans in Monza**

City: **Monza** *Project:* **ARCHIMEDES** *Measure number:* **41**

Executive summary

After conducting a study aimed at designing the scheme of pedestrian paths acting like a public transport line for children to walk to school, participatory workshops were activated in seven pilot classes in order to offer children a better knowledge of the territory where schools are located, to design the Walking Bus routes. After a communication campaign created by children, in April 2011 ten walking bus lines have been activated in four primary schools of the city. After a first implementation stage of 35 days, the Walking Bus started again at the beginning of the school year 2011/12, being operational for the whole school year. At the end of the school year, a guide has been elaborated where the "recipe" to make a good walking bus has been presented by children to the Mayor.

The evaluation strategy of this Measure (chosen as focus measure) sought to focus on a number of indicators across the areas of economy, energy, environment, transport and society, apart from considering results strictly connected to the participation to the walking bus and to results in terms of traffic reduction in front of the four schools involved.

Key result 1 – Basically, the percentage of children who have participated to the walking bus is 15%, which can be assessed as a good result, considering that this kind of measure is aimed at changing people's mobility habits.

Key result 2 – In some schools the Walking Bus have been operative for 161 days out of the 200 fixed by Italian law, which is a very important result in terms of continuity: parents are more confident to enroll their children to a walking bus (in case they are not available to accompany them) if they know that it is operational during the whole school year.

Key result 3 – Sensible fuel savings (**- 274,4 l** from April to June 2011; **- 764 l** from October 2011 to June 2012) and reduction in CO_2 emissions (**- 588 kg** from April to June 2011; **- 1.637 kg** from October 2011 to June 2012) have been estimated.

Key result 4 – An average 8,34% reduction of car traffic in front of the four schools involved, even though with different percentages for each school.

Key result 5 Surveys realized with families (both participants and non-participants) show a good level of awareness of the measure, in addition to the idea that the walking bus is "useful and interesting" or "convenient for families" and that it has a positive impact on children (on socialization and autonomy above all) and on pollution.

Key result 6 – The results in terms of health, autonomy, image value and consciousness have been very positive for Municipality of Monza. Moreover, all children who joined the walking bus were given a voucher of 20 € at the end of the school year as a contribution by Comune of Monza to families' expenses for school supplies: this initiative has been welcomed both by headmasters and teachers and by families of children involved in the demonstration activities.

The communication campaign has proved successful, being conveyed by children to other children. Nevertheless, there is the pressing need to disseminate the initiative more among parents of the schools, because they represent the key component of the success of the experiment. Moreover, every year it is necessary to recruit more parents to operate the walking buses. In some cases the entire demonstration has relied on the availability of few parents who do not know if they can sustain this commitment for all next year. This problem is present especially in the case of accompanying parents of children attending the fifth and last class, who will change school next year. A fundamental role in this activity is played by teachers of involved schools because they are the link with the parents for the dissemination of walking bus information and for stimulating the participation of children**.**

A Introduction

A1.1 Objectives

The measure objectives are:

(A) High level / longer term:

- To reduce congestion in streets surrounding primary schools

(B) Strategic level:

- To reduce the number of children being driven to school

(C) Measure level:

(1) To raise awareness of travel behaviour for journeys to school in order to encourage pedestrian mobility among children, parents and teachers

(2) To define with local stakeholders how to project pedestrian paths to school in order to show the positive effects of sustainable home – school mobility

A1.2 Target groups

- Teachers of 4 primary schools which have agreed to be involved in ARCHIMEDES.
- About 140 pupils attending the seven classes of the second degree of the involved schools.
- About 800 families of all children attending the involved schools.

A2 Description

A subcontract has been issued to obtain specialist support in order to hold participatory design workshops in seven classes of the second degree of 4 primary schools in Monza. These classes have been selected between teachers interested to be involved in ARCHIMEDES for the whole duration of primary school term (which in Italy has five degrees). During the workshops, called ARCHILABs, pupils were helped by skilled staff to define, in concert with teachers, pedestrian paths to their schools. Personal data of all students was collected with the aim to develop walking-bus routes.

Task 11.4.6 Development of a Walking Bus Route

Monza has undertaken research to design the scheme of pedestrian paths (“WALKING BUS”) acting just like a Public Transport Line for children to walk to school. Stops and timetables have been defined and agreed with the parents of the children involved. Key stakeholders such as the Local Police, teachers and school managers have been consulted to co-ordinate the scheme with the school timetables, start and end times and also to discuss security aspects of the scheme.

Task 4.16 School Travel Plans

As referredabove Monza has issued a subcontract for specialist support to design the participatory workshops. This subcontract included the participation of skilled staff in the workshops in order to define, in concert with teachers and according to their didactic programs, and together with pupils, how to project pedestrian paths to school. The demonstration has exploited the experience of Leading Cities demonstrations and exchange of best practises has been activated with the aim of producing a common strategy to maximise modal shift..

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

- **New conceptual approach** – Since 2001, Monza is the Italian coordinator for ”I Walk to School” internation organization. The Municipality is trying to develop between families a new conceptual approach to home – school mobility, aiming to introduce a new lifestyle, less car-oriented and more addressed to sustainability and to healthy behaviours.
- **Targeting specific user groups** – This measure will be addressed to teachers of the four primary schools which have accepted to be involved in ARCHIMEDES, to families with children attending these primary schools who are usually driven to school, so creating congestion and pollution in all the surrounding streets. More specifically, teachers and pupils will plan together pedestrian paths to school, with the help of skilled staff.
- **New policy instrument** – Since 2001, Monza’s town council, even though of different political parties, has acknowledged the importance of pedestrian school – home mobility as an important instrument to reduce air pollution and congestion in front of schools and to form new generations to a more sustainable lifestyle.
- **New organisational arrangements or relationships** – In order to demonstrate the usefulness of pedestrian paths to school, it will be necessary to bring into contact parents of children who will be involved in testing the ”walking buses”. In fact, as a first step towards demonstration, walking buses will be guided by voluntary parents which will organize rotating shifts along the different paths.

B2 Research and Technology Development

Monza has undertaken research to design the scheme of pedestrian paths acting like a public transport line for children to walk to school. During workshops with students, their personal data have been collected in order to study lines with the aim to pick up as many pupils as possible, placing stops along roads where most students live. Lines with stops and timetables have been defined and agreed with families of pupils involved in the demonstration. Security aspects of the scheme have been discussed with key stakeholders such as Local Police, teachers and school managers (details of this research are provided as an Annex ti this report).

B3 Situation before CIVITAS

Monza is the Italian coordinator for the “I Walk to School” international organization, since it was the first city in Italy to organize Walk to School Events in 2001. Since then, every year in Monza there is a Walk to School week at the end of which about ten/twelve schools (one for each grade in each of the town districts) are rewarded for sustainable behaviours of their pupils in their home-school journey. In order to increase awareness about positive effects of pedestrian mobility in children, some schools in Monza have also experienced forms of sustainable mobility and particularly walking buses. In 2007 two schools of Monza had joined a project aimed at improving family lifetimes thanks to actions concerning home-school mobility: the two schools considered were Citterio School, which has also participated in ARCHIMEDES project, and Salvo d’Acquisto School which, after this first experience, has no more shown interest in testing a more sustainable approach to home-school mobility. In both schools it was proposed to test the walking bus, and, in order to better understand mobility habits of families, a survey had been conducted between families of children attending the two schools: 815

questionnaires were distributed and 685 were returned (with a percentage of answers of about 84%): results of the survey had shown that 52% of children were driven to school in the morning, whilst 37% went to school on foot. In the afternoon (possibly because parents were already back from work) the percentage of children driven back home decreased to 36% against a 52% of children coming back home on foot .

The sample considered can be assumed as quite significative of the general situation concerning the school population in Monza, so it can be assumed that a similar percentage of driven children can be applied to other primary schools in Monza.

B4 Actual implementation of the measure

The measure has been implemented through the following stages:

Stage 1: Identifying schools interested to be involved in ARCHIMEDES *(M1)* – Headmasters of primary schools have been asked to identify forms of the second degree interested to be involved in designing pedestrian home to school routes. ARCHIMEDES has aroused interest in seven forms which decided to join the project.

Stage 2: Develop tender document *(M2 – M3)* – Building from the original description of work a detailed tender document was written and six skilled associations on school mobility themes operating on Monza and Brianza territory have been invited to present thier proposal for the development of the project.

Stage 3: Select and negotiate plan of work with contractor *(M4 – M5)* – Only two of the six invited associations have participated to the tender and CREDA Onlus has been selected by an internal Committee for the completeness and the correspondance of the proposed project to the aims of ARCHIMEDES. After collecting all documents required by Italian law before issuing the contract, meetings have been arranged with the contractor in order to define the plan of work.

Stage 4: Planning workshops (ARCHILABs) with teachers *(M6)* – Teachers have attended a meeting during which ARCHIMEDES Site Manager has explained them the aims of CIVITAS Plus and ARCHIMEDES and the specific importance of the measure concerning school travel plans in the city of Monza. During the meeting, teachers have met a representative of CREDA Onlus and planned dates of workshops in their classes.

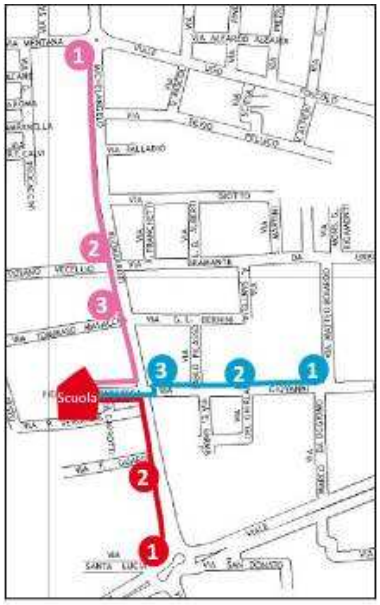
Stage 5: Activating ARCHILABs with students, teachers and families *(M7 – M9)* – Workshops were active during all project's lifetime through meetings with students and families.ARCHILABs are aimed to a better knowledge of the territory where schools are located, to the design of a safety plan for streets around schools, to the demonstration of walking routes for the seven classes involved in ARCHIMEDES and eventually for the whole schools.

Figure 1 - Shots from ARCHILabs

Stage 6: Technical studies *(M7 – M10)* – Starting from pupils' residential data, a technical study has been conducted to analyze pedestrian flows towards the schools and to design pedestrian paths. Routes have been chosen in order to satisfy criteria of proximity to residences of students and of safety, just like the presence of pedestrian crossings and pavements.

Stage 7: Study on mobility habits of families involved in ARCHIMEDES *(M8 – M10)* - A survey hand out to about 800 families whose children attend the schools involved in the measure has been designed in order to investigate mobility behaviours as well as to collect personal data of students with the aim of plannig pedestrian routes reaching schools with the aim of touching as many residences as possible. The survey has been conducted in May 2009 and has created the basis for the study which has been delivered at the end of the research stage of the measure. Results of the survey form part of the Annex to the present report.

Stage 8: Mobility plans design for schools involved in ARCHIMEDES *(M13 – M22)* – Plans have been designed on the basis of data collected during ARCHILABs,with the direct involvment of pupils, parents and teachers.



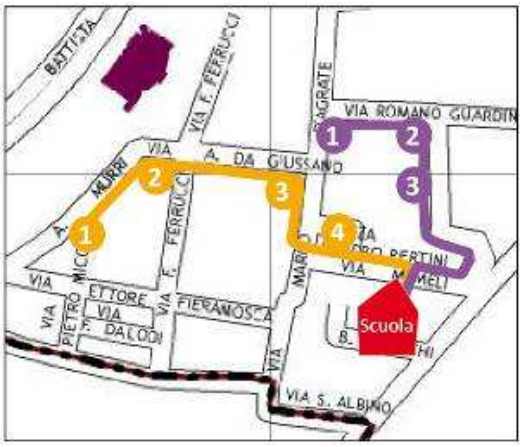


Figure 2 - Walking bus routes for Manzoni School

Figure 3 - Walking bus routes for Buonarroti School

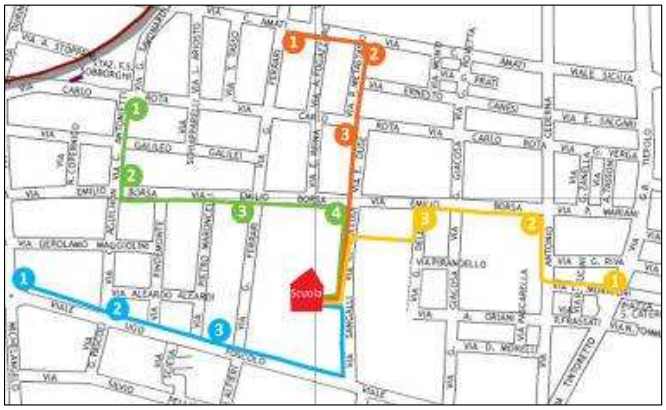


Figure 4 - Walking bus routes for Citterio School

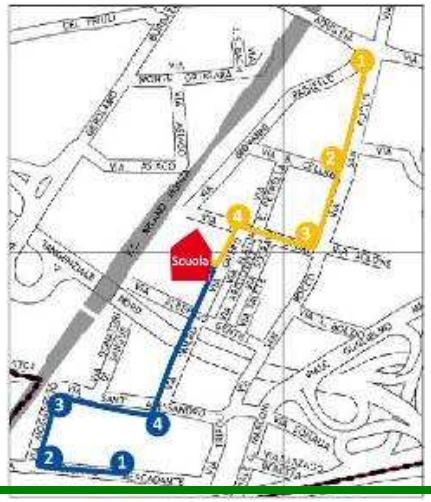


Figure 5 - Walking bus routes for Omero School

Stage 9: Communication campaign *(M25 – M30)* – During the third year of the project, work was aimed at defining themes and topics to make children and parents aware about the importance of sustainable mobility and the promotion of the walking bus service: thanks to the design of slogans and drawings, classes have contributed to gather information in order to prepare a strong communication campaign about the launch of the walking bus routes in their school. Ideas, themes, slogans and drawings have been of fundamental importance for the development of flyers aimed at raising the number of subscriptions to demonstration activities in each school. More specifically, a flyer for each school was created, which:

1) described the walking bus service;
2) presented walking bus route proposals for each of the schools;
3) offered a registration forms to join the walking bus service.

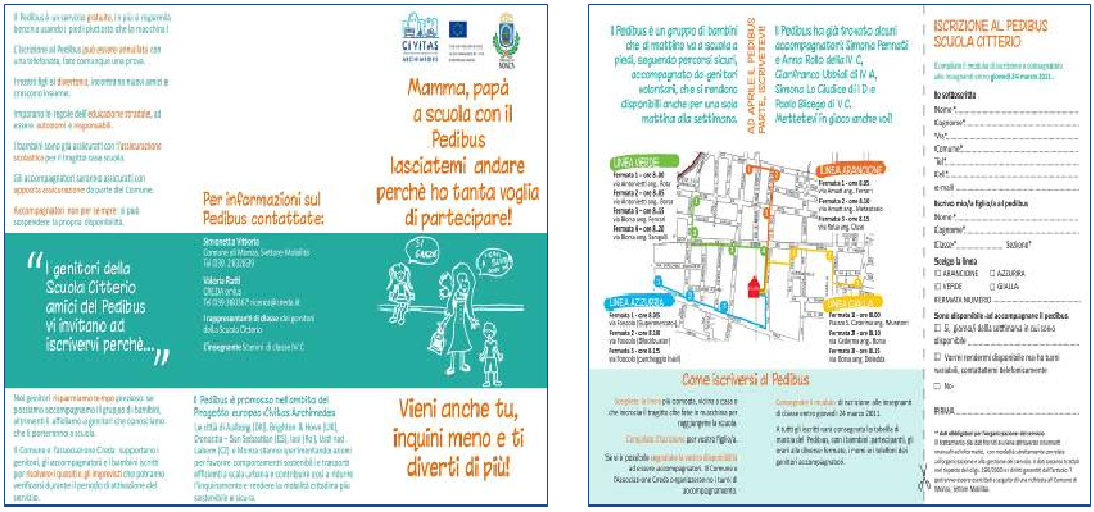


Figure 6 - Example of flyer

Stage 10 - Demonstration of walking buses *(M31 – M46)* –Walking buses have been activated since April 11th 2011 till the end of the school year (June 9th) for about 35 days in the schools involved in ARCHIMEDES. After the start of school year 2011/2012 the Walking Bus initiatives have been reactivated in order to go on with the implementation. During Monza Consortium Meeting, held in May 2011, children have sent a letter to their friends of ARCHIMEDES cities in order to show them their experience and inviting them to try to implement pedestrian home-school mobility. At the conclusion of the school year a guide to make a walking bus ("Il Walking Bus in tasca", which stands for "The Walking Bus in your pocket") has been developed and distributed to all children of the four involved schools and to all primary schools in Monza in order to exploit the experience gained and to extend it to other districts of the city. This guide has also been given by children to the Mayor of Monza in a public meeting where students have explained the "recipe" to make a good Walking Bus.

Figure 7 - Shots from walking buses

Figure 8

Meeting with the Mayor of Monza

B5 Inter-relationships with other measures

At the measure level Monza will learn from the experiences of the leading cities involved in WP4 Influencing Travel Behaviour and Modal Choice sharing knowledge from different situations and demonstration tasks implemented in ARCHIMEDES.

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 – only costs have been evaluated; benefits will be considered in the CBA section, but no direct operational revenues are expected.

Energy – through simulating methods fuel savings have been evaluated to define whether consumptions decrease thanks to the implementation of the walking bus.

Environment – impact on CO_2 reductions have been considered using simulating methods. Impact on air quality has not been measured since specific campaigns for air quality measurements are yearly planned in the different districts of the city, so the implementation of the measure had no impact on a massive level. Indicators concerning CO, NOx and PM_{10} emissions have been assessed using the on line calculation method of COPERT 4, but results have proved negligible.

Society – all evaluation subcategories related to society have been addressed.

Transport – the introduction of the measure impacted on modal split at school level, though results are not significant at the city level, on quality of service, on transport safety (no impact on transport injury accidents), on freight movements and on vehicle occupancy, since the aim of the measure is to raise awareness about the benefits of pedestrian home-school mobility, so society indicators are more significant in this specific contest. As for traffic and congestion levels, crowding of cars during entrance/exit time has been addressed to define whether the participation of children to Walking Buses reduces the number of cars outside the schools involved in ARCHIMEDES.

Other indicators have been addressed for CBA, as shown in the table in chapter C6.4, but some of them (especially as far as benefits are concerned) are difficult to monetize, since they refer to returns in terms of health, autonomy, image value, consciousness.

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C1.1.1 Selection of indicators

NO.	EVALUATION CATEGORY	EVALUATION SUB-CATEGORY	IMPACT	INDICATOR	DESCRIPTION	DATA /UNITS
	ECONOMY					
2b			Capital costs	Capital costs	Costs afforded to develop school travel plans	Money amount, quantitative
2c			Maintenance costs	Maintenance costs	Costs afforded to activate school travel plans after demonstration period	Money amount, quantitative
	ENERGY					
3		**Energy Consumption**	Fuel Consumption	Vehicle fuel efficiency	Fuel used per vim, per vehicle type	MJ/vim, quantitative, derived or measurement
	ENVIRONMENT					
8			Emissions	CO2 emissions	CO2 per vkm by type	G/vkm, quantitative, derived
	SOCIETY					
13		**Acceptance**	Awareness	Awareness level	Awareness of the policies/measures	Index (%), qualitative, collected, survey
14			Acceptance	Acceptance level	Attitude survey of current acceptance of the measure	Index (%), qualitative, collected, survey
15		**Accessibility**	Spatial Accessibility	Perception of accessibility	Perception of physical accessibility of service	Index(%), qualitative, collected, survey
17		**Security**	Security	Perception of security	Perception of security when using service	Index, qualitative, collected, survey
	TRANSPORT					
NEW!		**Crowding of cars outside the school**		Cars outside the school	Numbers of cars outside the school	Number, quantitative, collected

C1.1.2 Methods for evaluation of indicators

No.	INDICATOR	TARGET VALUE	Source of data and methods	Frequency of Data Collection
2b	Capital Costs	Evaluating capital costs afforded to design school travel plans	Capital costs afforded to design school travel plans have been considered	Data have been collected once during the project (after the start of the demonstration tasks)
2c	Maintenance Costs	Evaluating maintenance costs to update school travel plans	Since children joining the walking bus change every year, it is very important to evaluate maintenance costs to update school travel plans. .Data will derive from costs of subcontracts which will be necessary to issue in order to update school travel plans	Data have been collected once during the project (after the start of the demonstration tasks)
3	Fuel Consumption	Reducing fuel consumption	Simulating methods have been used to calculate fuel savings due to the participation of students to "Walking Buses"	Data have been collected twice during the project (before the start of the demonstration tasks and at the end of the project)
8	Emissions	Reducing emissions of air pollutants and greenhouse gases	Simulating methods have been used to calculate reductions in CO_2 emissions of cars after the implementation of the measure.	Data have been collected twice during the project (before starting the demonstration tasks and after the measure is introduced)
13, 14	Acceptance	Evaluating users' acceptance of the introduction of school travel plans	Qualitative surveys have been conducted to measure acceptance and awareness level of parents on the introduction of school travel plans to define the percentage of the target population knowing the measure and the understanding and usefulness level of the measure between users. For the collection of before data, 62 parents have been surveyed outside the schools involved in ARCHIMEDES, asking them more specific questions about awareness, acceptance and security about the implementation of the measure For the collection of after data, a survey has been realized on: ➢ 87 families (interviewed personally) whose children attend one of the four schools which have particiapted actively to the implementation of the measure and where now the Walking Bus Is regularly working; ➢ 23 families (interviewed through e-mail) whose children use Walking	Data have been collected twice during the project (after the start of demonstration tasks and at the end of the project)

No.	INDICATOR	TARGET VALUE	Source of data and methods	Frequency of Data Collection
			bus to reach the school attended.	
15	Accessibility	Ensuring the accessibility of "Walking Buses" to the highest number of pupils	It is important to define parents' perception of the physical accessibility of service, with particular care to the closeness of Walking Buses stops to residences, so that it can be easy for parents to take children to meeting points. Surveys have been conducted asking parents how easy they find reaching the nearest walking bus stop. Sample sizes are the same defined for the previous indicator.	Data have been collected twice during the project (after the start of demonstration tasks and at the end of the project)
17	Security	Improving attractiveness of Walking Buses by increasing parents' perception of security	In streets where there is a high level of traffic congestion, parents can fear for their children's security. This is why many parents drive children to school, so contributing to increase congestion. Streets of congested cities are more at cars' scale than at children' scale, but more children walking in the streets during peak hours should produce a turnabout. Surveys have been conducted to evaluate if Walking Buses, which allow children to live more intensely the streets of their residence district, increase users' perception of security. Sample sizes are the same defined for the previous indicator	Data have been collected twice during the project (before the start of demonstration tasks and at the end of the project)
NEW	Crowding of cars outside the school	Reducing the number of cars outside the school	Cars outside the schools involved in ARCHIMEDES have been counted in order to verify whether the introduction of the measure has reduced the number of cars which usually create traffic jams for cars driving along the streets where schools are located	Data have been collected twice during the project (before the start of demonstration tasks and at the end of the project)

C1.1.3 Planning of before and after data collection

EVALUATION TASK	INDICATORS INVOLVED	COMPLETED BY Please show the dates of the different moments of data collection (DATE)	RESPONSIBLE ORGANISATION AND PERSON
Evaluating capital costs afforded to design school travel plans	Capital Costs	Month 40 (only after data collection)	Comune of Monza – Simonetta Vittoria
Evaluating maintenance costs to update school travel plans	Maintenance Costs	Month 40 (only after data collection)	Comune of Monza – Simonetta Vittoria
Calculating fuel savings	Fuel Consumption	Month 32 (before data) Month 40 (after data)	Comune of Monza – Simonetta Vittoria
Calculating reductions in emissions of CO2	Emissions	Month 32 (before data) Month 40 (after data)	Comune of Monza – Simonetta Vittoria
Evaluating users' acceptance of the introduction of school travel plans	Acceptance	Month 32 Month 40	Comune of Monza – Simonetta Vittoria
Ensuring the accessibility of "Walking Buses" to the highest number of pupils	Accessibility	Month 32 Month 40	Comune of Monza – Simonetta Vittoria
Improving attractiveness of Walking Buses by increasing parents' perception of security	Security	Month 32(before data Month 40 (after data)	Comune of Monza – Simonetta Vittoria
Reducing the number of cars outside the school	Crowding of cars outside the school	Month 32(before data) Month 40 (after data)	Comune of Monza – Simonetta Vittoria

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EVALUATION TASK	INDICATORS INVOLVED	COMPLETED BY Please show the dates of the different moments of data collection (DATE)	RESPONSIBLE ORGANISATION AND PERSON
D12.2 Baseline and first results from data collection	All indicators	Month 34	Comune of Monza – Simonetta Vittoria
D12.3 Draft results template available	All indicators	Month 46	Comune of Monza – Simonetta Vittoria
D12.4 Final version of results template available	All indicators	Month 49	Comune of Monza – Simonetta Vittoria

C1.2 Establishing a Baseline

Comune of Monza has been working on pedestrian home-school mobility since 2001, when the Municipality became Italian coordinator for Walk to School event.

Since then, each year the event has been repeated, trying to involve more and more schools, in order to stimulate young children to reach their school walking. Now the event has become a traditional engagement for almost 50 schools of Monza, which each October gather their students in meeting places defined with the agreement of the Local Police.Gadgets are handed out to children who, guided by Local Police, volunteers, teachers and parents reach their schools walking.

In the last years, in order to obtain a commitment that is not limited to a single day, it has been decided to have a Walk to School Week event: schools are asked to walk to school for a whole week, and teachers collect data about the percentage of students who reach the school by sustainable means of transport (cycling, skating, walking, by bus). At the end of the week data are evaluated and schools which have demonstrated a more active participation in the event are rewarded with a supply of books for the school library.

Anyway, in order to increase awareness about positive effects of pedestrian mobility in children, two schools in Monza have also experienced forms of sustainable mobility and particularly walking buses, as better explained in Section B3. This experience did not prove successful in both schools, since Citterio School has always shown interest in projects concerning sustainability, whilst Salvo d'Acquisto school had just had a trial of the walking bus without showing the wish to pursue a longer and more structured educational project after the first testing phase.

For this reason, at the beginning of ARCHIMEDES project headmasters of all Monza primary schools were asked to report teachers of second classes (so to end the project at the end of the primary school cycle, having children growing together with the development of the project) who were strongly motivated to pursue the objective of education to sustainable mobility in order to be assured of full cooperation. Four primary schools, Citterio (already involved in the previous test), Buonarroti, Manzoni and Omero, decided to join the project with seven second classes. In the following pictures location of the four schools is shown, together with the walking bus routes which have been defined during Archilabs.

Before starting with the implementation of the measure, a survey has been conducted in May 2009 between the 887 families with children attending schools participating in the project Civitas Archimedes: 184 from Buonarroti, 350 from Citterio, 130 from Manzoni, 143 from Omero and 80 from S. Alessandro. This last school was included because within S. Alessandro structure there are the first and fourth classes, sections E and F, [1E, 1F, 4E, 4F] of Omero school.

The survey was conducted with the purpose of gathering information on mobility modes of families, and it allowed to:

- describe family structure according to some variables of interest (family composition, parents job and types, timetables and means of transport adopted) for the purpose of the design and testing of future walking buses (Walking Bus).
- analyze forms of home-school mobility, particularly pointing out the distribution of students attending the school, the means of transport used to make journeys and children's accompaniment.
- survey the propensity to experiment with alternative styles of mobility during the home-school route.

Results of this survey, which formed the baseline to understand mobility habits of the involved families and the starting point to develop the walking bus routes, are reported in the Annex 1 to the present report.

Starting from these results and in addition to this quantitative survey, also two qualitative surveys were conducted in order to assess society indicators before and after the implementation of the measure.

More specifically, in the first survey, conducted in March 2011, 62 people were interviewed outisde the four involved schools to assess their knowledge of the walking bus initiative, their perceptions and their expectations concerning the implementation of this measure. Questionnaires for the surveys were developed in order to test people's awareness, acceptance and perception of security of the walking bus, and of the communication campaign activated by the Municipality of Monza and directed to teachers, parents and headmasters of the four schools in order to promote a positive attitude towards the walking bus. The survey was anticipated by a communication from the Municipality of Monza directed to teachers, parents and headmasters of the four schools in order to promote a positive attitude in the interviewed people.

MANZONI SCHOOL, MAMELI STREET 18

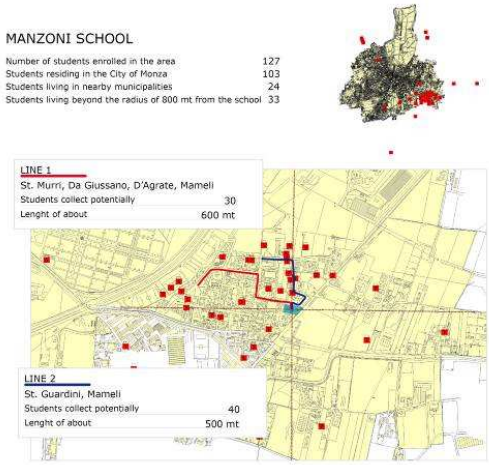

Figure 9- Location of Manzoni School

BUONARROTI SCHOOL, PIERO DELLA FRANCESCA STREET

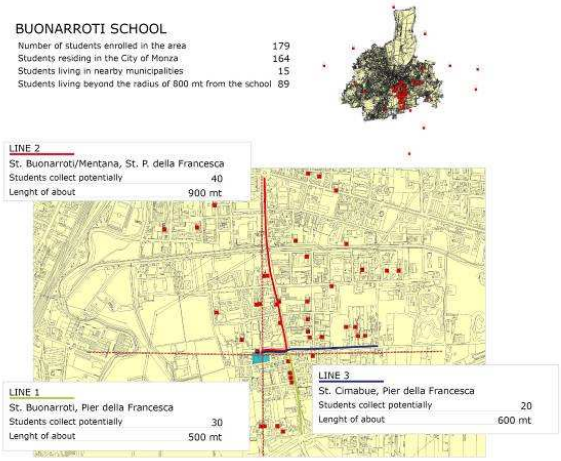

Figure 10 - Location of Buonarroti School

CITTERIO SCHOOL, COLLODI STREET

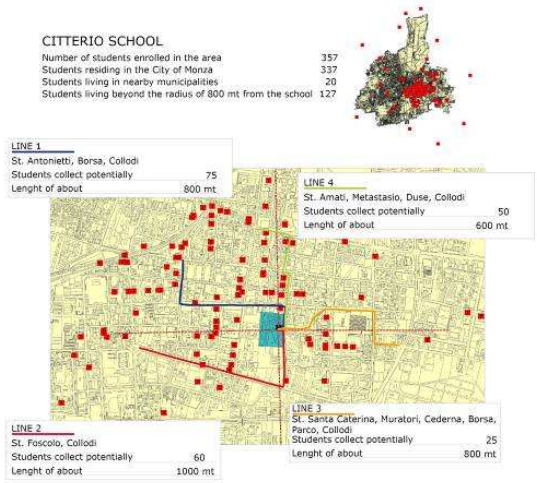

Figure 11 - Location of Citterio School

OMERO SCHOOL, OMERO STREET

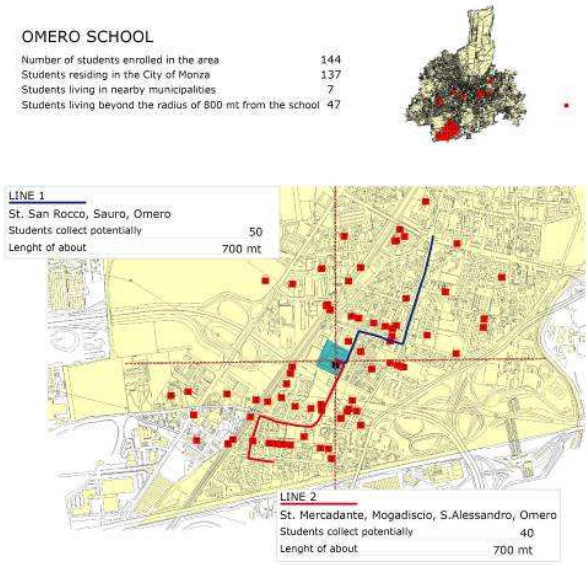

Figure 12 - Location of Omero School

C1.3 Building the Business-as-Usual scenario

In 2007 two schools of Monza had joined a project aimed at improving family lifetimes thanks to actions concerning home-school mobility: the two schools considered were Citterio School, which has also participated in ARCHIMEDES project, and Salvo d'Acquisto School which, after this first experience, has no more shown interest in testing a more sustainable approach to home-school mobility). In both schools it was proposed to test the walking bus, and, in order to better understand mobility habits of families, a survey had been conducted between families of children attending the two schools: 815 questionnaires were distributed and 685 were returned (with a percentage of answers of about 84%): results of the survey had shown that 52% of children were driven to school in the morning, whilst 37% went to school on foot. In the afternoon (possibly because parents were already back from work) the percentage of children driven back home decreased to 36% against a 52% of children coming back home on foot .

A similar survey was conducted at the beginning of ARCHIMEDES project in the four schools involved between 800 families, with the aim of estimating mobility behaviours related to home – school itineraries and of calculating the percentage of children actually being driven to school (results of this survey are reported in Annex 1 to the present report) . These data can serve as a baseline to evaluate the usual trend in the last years and to estimate the Business as Usual scenario: it can be stated that not introducing school travel plans, congestion and pollution outside schools will get worse (even though new technologies and trends will lead to cleaner vehicles) and perception of safety from parents to allow young children to walk to school will be reduced.

C2 Measure results

C2.1 Economy

Table C2.1.1: Benefits and Costs

A subcontract for an amount of 48.500 € has been issued to CREDA Onlus to develop the walking buses in the four schools which have joined ARCHIMEDES project for the whole duration of ARCHIMEDES. The sum of 4.500,00 € per year is necessary to update school travel plans, due to the yearly turnover of children in the schools. Costs faced for maintenance of street signs, with particular attention to pedestrian crossings have been assessed in the before and in the B-a-U section, since such costs are afforded about every 3-4 years by the Municipality, usually with rotating criteria across the city. Last but not least, at the end of the demonstration stage, the 126 children who have actively joined the walking buses have been rewarded with a voucher of 20 € to spend in a school bookshop, for a total expense of 2.520 €. Municipality of Monza has decided to help families in this period of economical crisis with a little contribution to expenses for next year school supplies which has been much appreciated by families: the voucher has been delivered together with the final school report.

Indicator	**Before (date)**	**B-a-U (date)**	**After (June 2012)**	**Difference: After –Before**	**Difference: After – B-a-U**
No. 2B: Capital Costs	Not applicable	Not applicable	**48.500 €** **€ 2.520** for vouchers	+ 48.500 € + € 2.520	Not applicable
No. 2C: Maintenance	Not applicable		**4.500 €** per year to update school	+ 4.500	Not applicable

Costs	About 8.000 € per year for maintenance of street signs along walking bus routes	About 8.000 € per year for maintenance of street signs along walking bus routes	travel plans	Not applicable	Not applicable

C2.2 Energy

In the survey held in April 2012, after the implementation of the measure, it emerged that 52% of families involved in the demonstration stage had changed their mobility habits as far as taking children to school is concerned, as shown in Graph 30. This result, if not significant at city level, is very interesting at a school level. Starting from these data, it can be assumed that half of the children which have joined the walking bus during the two periods of implementation would have gone by car without the activation of the school travel plans. In the first implementation period (35 days from April 2011 to June 2011) 145 children have joined the walking bus, so it can be assumed a modal shift for 75 children which were driven to school before the start of walking bus. In the second implementation stage (from October 2011 to June 2012), 126 children have actively joined the walking buses, so it can be assumed a modal shift for 65 children which were driven to school before the start of walking bus.

Eliminato: Graph 31

According to these assumptions, we have the following results:

- First implementation stage – 35 days of activation
  - 52% of 145 children = 75 x 0,8 km x 35 days of activation = 2100 km covered
- Second implementation stage – an average of 121 days of activation for each of the 10 routes in the four involved schools:
  - 52% of 126 children = 66 x 0,8 km x 121 average days of activation = 6389 km covered.

Considering the difficulty in calculating the amount of fuel consumed before the implementation of the measure from people driving their children to school, it has been decided to set the baseline of fuel consumption to zero, calculating fuel savings after the activation of school travel plans. It has been assumed that a mid-size car in city driving consumes about 7 litres of fuel per 100 km and, thanks to the shown calculations, it can be stated that:

- In the first implementation stage 147 litres of fuel have been saved:
  - 7 litres per 100 km = 147 litres per 2100 km
- In the second implementation stage 447 litres of fuel have been saved:
  - 7 litres per 100 km = 447 litres per 6389 km.

Indicator	**Before (March 2011)**	**B-a-U (date)**	**After (April 2012)**	**Difference: After –Before**	**Difference: After – B-a-U**
No. 3: Fuel consumption	0 l	Not applicable	**- 147 l** (fuel savings from April to June 2011)	**- 147 l**	

			- 447 l (fuel savings from October 2011 to June 2012)	**- 447 l**	

C2.3 Environment

The same simulating method used to calculate fuel savings has been used to calculate reduction in CO_2 emissions. The baseline of CO_2 emissions has been set to zero, assuming that a mid-size car in city driving emits about 150 gr of CO_2 per km.

According to these assumptions, we have the following results:

- First implementation stage – 35 days of activation
  - 52% of 145 children = 75 x 0,8 km x 35 days of activation = 2100 km covered x 150 gr/km = 315 kg CO_2 less produced
- Second implementation stage – an average of 121 days of activation for each of the 10 routes in the four involved schools:
  - 52% of 126 children = 66 x 0,8 km x 121 average days of activation = 6389 km covered x 150 gr/km = 958,35 kg CO_2 less produced.

An attempt to assess other greenhouse gas emissions has been made using the on line emission calculation with the COPERT 4 (http://www.enviroware.com/cgi-bin/copert4s.cgi#axzz2ADpmI5KB).

Since the calculator asks to specify consumptions in Mg, it was assumed that the 447 litres of fuel saved were produced by 39% by gasoline fuelled cars (Gasoline PC) and 55% by diesel fuelled cars (Diesel PC) according to data about cars' registrations in 2010: the missing percentage is for hybrid and CHG (so a very little number).

- 1 litre of fuel has been converted in kg (0,73), and then in tons to simulate the calculation, achieving results shown in

Country: Italy

Vehicle class	CO (Mg)	NOX (Mg)	NMVOC (Mg)	CH4 (kg)	PM (kg)	CO2 (Mg)
Gasoline PC	26.4	2.0	2.1	150.5	3.5	553.0
Diesel PC	0.8	2.7	0.2	12.3	211.6	772.4
Gasoline LDV	0.0	0.0	0.0	0.0	0.0	0.0
Diesel LDV	0.0	0.0	0.0	0.0	0.0	0.0
Diesel HDV	0.0	0.0	0.0	0.0	0.0	0.0
Buses	0.0	0.0	0.0	0.0	0.0	0.0
Mopeds	0.0	0.0	0.0	0.0	0.0	0.0
Motorcycles	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS	27.3	4.7	2.3	162.8	215.1	1325.4

Figure 13, Finally, resulting

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Eliminato: Figure 13

number were divided by 1000 (since at the beginning fuel kg had been converted in tons), thus achieving negligible results: for this reason, NOX, CO and PM emissions were not assessed.

Figure 13 -Greenhouse gas emissions calculation with COPERT 4 (in tons)

Indicator	Before (March 2011)	B-a-U (date)	After	Difference: After –Before	Difference: After – B-a-U
No. 8: CO_2 emissions	0 gr/km	Not applicable	**- 315 kg** (CO2 less from April to June 2011) **- 958,35 kg** (CO2 less from October 2011 to June 2012)	**- 315 kg** **- 958,35 kg**	

C2.4 Transport

As far as **cars crowding outside schools** are concerned, traffic surveys were designed to distinguish the current vehicle, to divide the vehicles for vehicle classes and to conduct direct observation of the habits of drivers and users of schools. These results are aimed at verifying if during the activation of walking buses traffic outside schools decreased or not, but they were not taken into account as far as emissions and energy savings are concerned. As a matter of fact these indicators were already assessed through simulating methods by counting the number of children participating to the walking buses, so not to assess them twice (one by counting children and the other by counting cars' reduction outside schools). In order to assess the Business as Usual situation, cars crowding outside schools have been assumed to remain the same if the measure was not implemented, since school pupils ans staff remain almost invariable every school year, and without any incentive to promote a shift away from car, people would maintain the same mobility habits.

As it can be noticed, there is a slight difference between the number of children participating to the walking buses and the reduction of cars outside the schools. It is quite predictable that numbers do not correspond, since some children may not attend school because they are ill or for other family

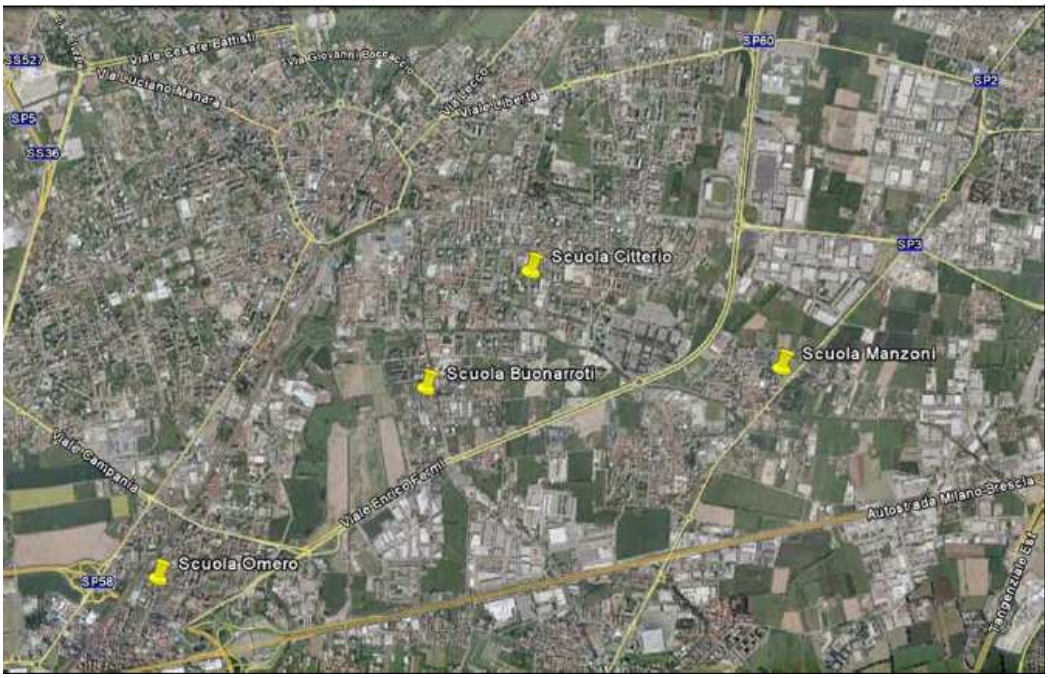
engagements. Moreover, other activities (offices, firms etc) exist on the road network close to the schools, so it is impossible to distinguish which cars are related to school mobility and which are not.

Indicator	Before (September 19th-23rd 2011)	B-a-U (date)	After (September 24th-30th 2011)	Difference: After –Before	Difference: After – B-a-U
Cars crowding outside schools:		Cars crowding outside schools are assumed to remain the same if the measure was not implemented			Difference is assumed to be the same as the difference After-Before
Omero School	139		123	**-11,19%**	
Manzoni School	454		384	**-15,53%**	
Citterio School	242		244	**+ 1,24%**	
Buonarroti School	106		105	**- 0,47%**	
TOTAL				**- 8,34%**	
Children participating to walking bus:					
First stage of implementation (**April-June 2011**)	Walking bus was not operating	Not applicable	145		Not applicable
Second stage of implementation (**October 2011-June 2012)**	145 (data concerns first stage of implementation)	0	126	**-19**	-19
Volunteer parents:					
First stage of implementation (**April-June 2011**)	Walking bus was not operating	Not applicable	51		Not applicable
Second stage of implementation (**October 2011-June 2012)**	51 (data concerns first stage of implementation)	0	50	**-1**	-1

Data collected are described in detail below.

Traffic surveys have been conducted on an average working day outside the four schools involved in ARCHIMEDES in the week from 19th to 23rd of September, before the Walking Bus started again for school year 2011-2012, and in the week from 24th to 30th of September, after the activation of the Walking Bus. The aim was to verify whether the introduction of the measure reduces the number of

cars parked outside schools to drop children off which usually create traffic jams for cars driving along the streets where schools are located. As explained before, reduction in emissions and energy savings were not considered through traffic surveys, since they were already assessed by counting the number of children participating to walking buses.



Location of the four schools involved

To realize the survey the following methodology has been followed:

- exam of the results achieved during the RTD stage of the measure;
- definition of surveys' timetable;
- identification of suitable locations for surveys;
- study of road circulation discipline: one-way streets, regulation of intersections, crosswalks, speed bumps, speed limits.

Surveys have been conducted "at sight" from 7.45 to 8.45 during an average working/school day between 19th and 30th September 2011, according to the following schedule:

	BEFORE WALKING BUS ACTIVATION		**AFTER WALKING BUS ACTIVATION**	
	Tuesday 20.09.2011	Wednesday 21.09.2011	Tuesday 27.09.2011	Wednesday 28.09.2011
Omero School	7:45-8:45		7:45-8:45	
Manzoni School	7:45-8:45			7:45-8:45

Citterio School		7:45-8:45	7:45-8:45	
Buonarroti School		7:45-8:45		7:45-8:45

Time of the survey has been chosen taking into account time of entry at school, between 8.15 and 8.30. Traffic surveys have been made using a form to distinguish vehicles flows and classes. On each form the number of passing vehicles in a 15 minutes' interval have been written down during the whole period: with this system it has been possible to detect flows around school gates, on the one hand, and to observe car drivers' and school users' habits.

For each school both directions of travel (to and from school) have been considered and vehicles have been classified as follows, with an indication of the coefficient of equivalence (1 car = 1 equivalent vehicle):

1. Bicycles (0,5)
2. Bikes (0,5)
3. Cars (1)
4. Vans and small buses (1,5)
5. Trucks over 35 tons (2)
6. Buses (2,5)

In the following figures sections chosen for traffic survey are depicted

Figure 14 -Omero School – Section for traffic survey

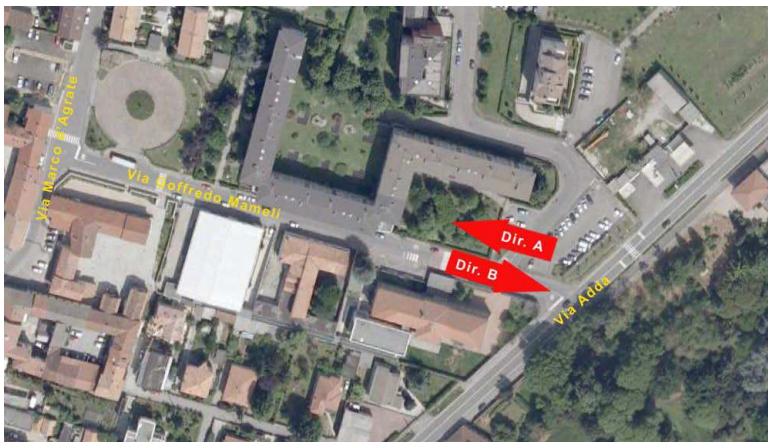


Figure 15 -Manzoni School – Sections for traffic survey

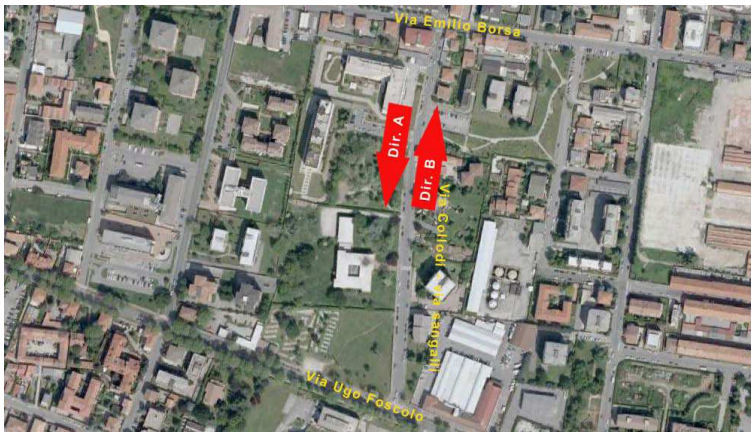


Figure 16 -Citterio School – Sections for traffic surveys

Figure 17 - Buonarroti School – Sections for traffic surveys

TRAFFIC COUNTS

Traffic counts before the start of Walking Buses have been made in the week between September 19th and 25th in stable weather conditions. Traffic flows in the different sections which have been analyzed can be summarized as follows:

TRAFFIC IN DIFFERENT SECTIONS BETWEEN 7.45 AND 8.45 (BEFORE WALKING BUSES ACTIVATION)			
SECTION	Direction A	Direction B	Both directions
Omero School (Via Omero)	139		**139**
Manzoni School (Via Mameli)	331	123	**454**
Citterio School (Via Collodi)	168	74	**242**
Buonarroti School (Via Pier della Francesca)	74	32	**106**

Table 1 - Traffic surveys - Before Walking bus activation

TRAFFIC IN DIFFERENT SECTIONS BETWEEN 7.45 AND 8.45 (AFTER WALKING BUSES ACTIVATION)			
SECTION	Direction A	Direction B	Both directions
Omero School (Via Omero)	123		**123**
Manzoni School (Via Mameli)	275	109	**384**
Citterio School (Via Collodi)	153	91	**244**
Buonarroti School (Via Pier della Francesca)	80	25	**105**

Table 2 - Traffic surveys - After Walking bus activation

TRAFFIC VARIATIONS IN DIFFERENT SECTIONS BETWEEN 7.45 AND 8.45			
SECTION	Flows before	Flows after	Variation %
Omero School (Via Omero)	139	123	**- 11,19%**
Manzoni School (Via Mameli)	454	384	**- 15,53%**
Citterio School (Via Collodi)	242	244	**+ 1,24%**
Buonarroti School (Via Pier della Francesca)	106	105	**- 0,47%**

TOTAL	940	856	**- 8,34%**

Table 3 - Traffic surveys – Variations after/before walking bus activation

From results obtained, it is interesting to notice that a decrease in traffic flows after the activation of the Walking Bus has been detected, even though with different percentages for each school. More specifically, a very slight increase has been noticed in Citterio School (which, as shown later, is also the school with the lowest percentage of children participating to the demonstration), whilst sensible decreases have been detected in Omero and Manzoni schools: here it is interesting to notice that, whilst Omero School is the one with the highest percentage of participating children (which obviously explains why traffic reduction has been quite significant), in Manzoni School the percentage of participating children is rather low (10,8%), in spite of the traffic reduction that has been detected (-15,53%). In Buonarroti School the difference is almost unsignificant (- 0,47%)

The total composition of traffic during peak hours nearby the four school buildings is thus shared between collection of data before and after launch of walking bus: As Graph 1 shows, about 84% of travel is by car, while the remaining 6% is divided between the other modes.

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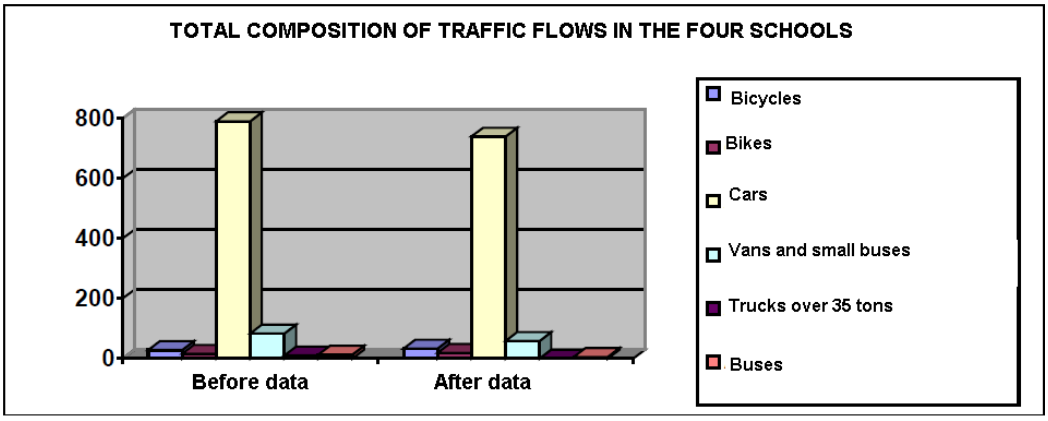
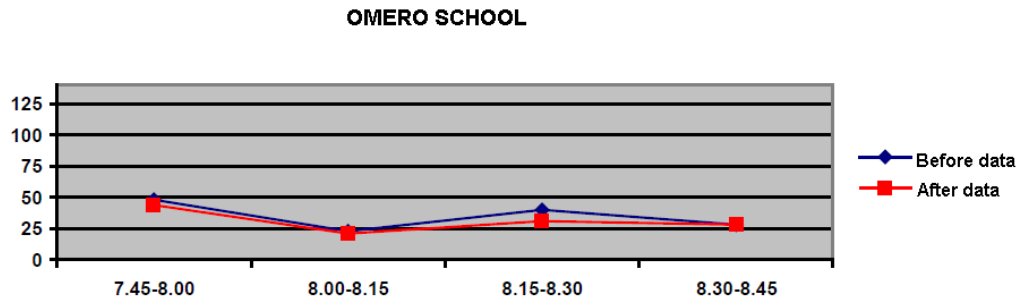
Eliminato: Graph 1

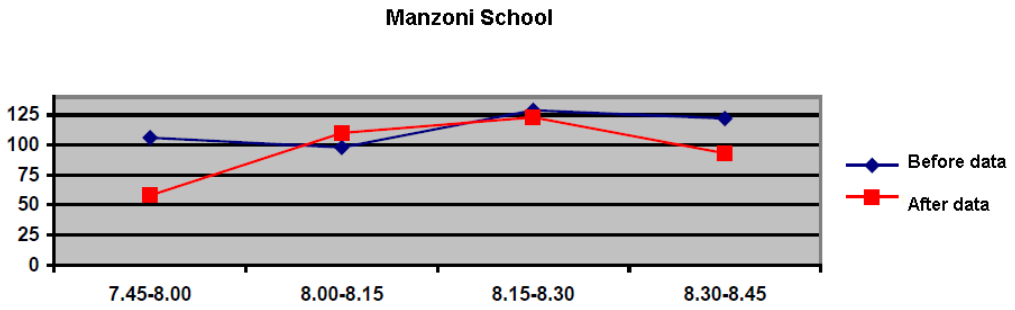


Graph 1- Composition of traffic flows in the four schools

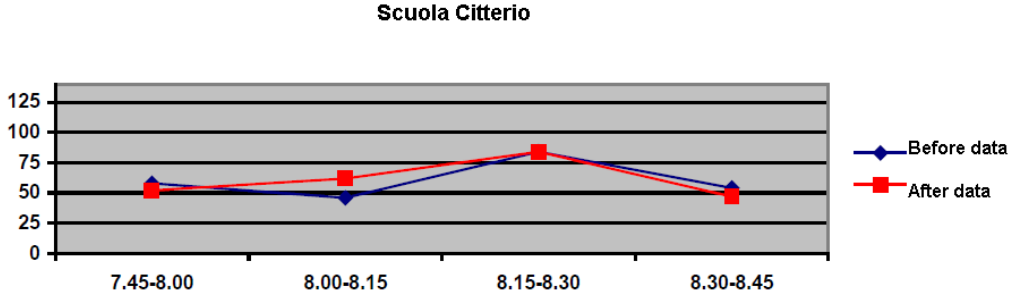
In order to better understand the dynamics in each school graphs of the variations of traffic before and after the start of the walking bus are reported divided by quarter-hour detection.



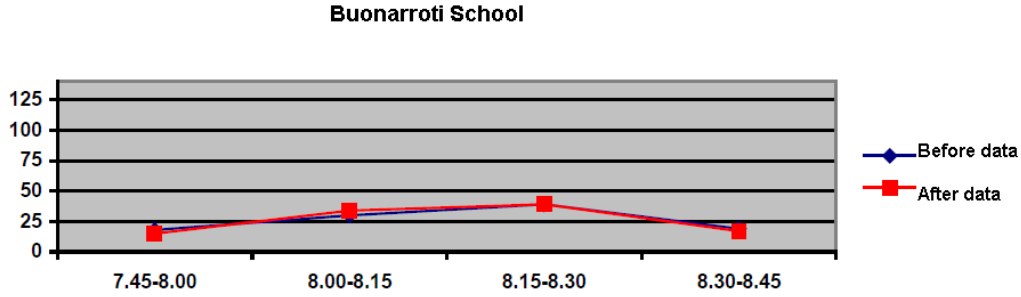
Graph 2 - Omero School - Variation of traffic flows



Graph 3 - Manzoni School - Variation of traffic flows

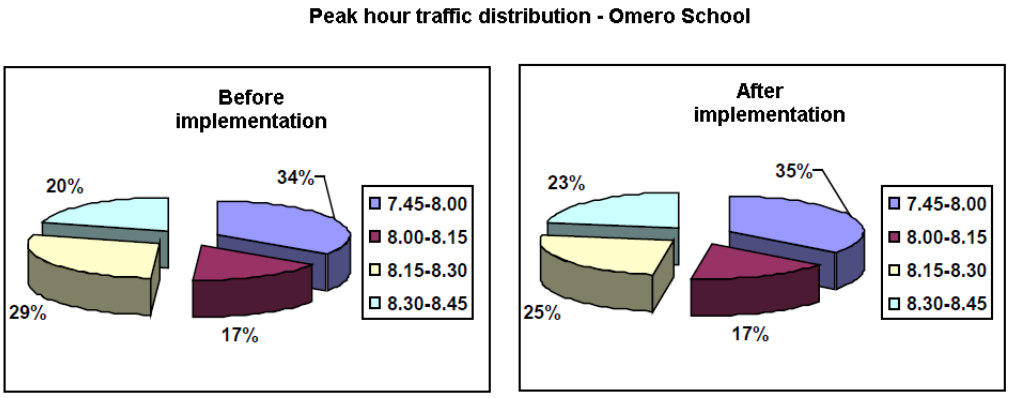


Graph 4 - Citterio School - Variation of traffic flows



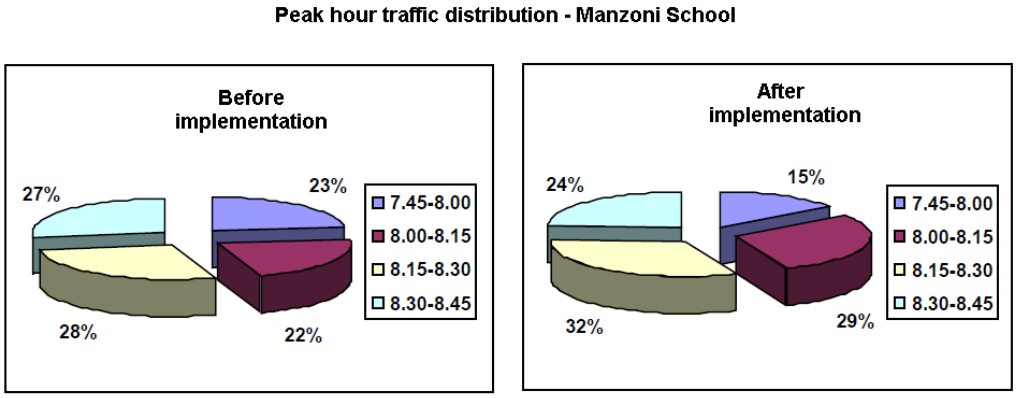
Graph 5 -- Buonarroti School - Variation of traffic flows

The graphs show that during the hour chosen for the survey traffic peaks tend to occur in the range between 8.15 am and 8.30 am at the entrance of students. In particular, the input traffic in the range of schools is between 25% and 40% of the total traffic time as shown in the following graphs:

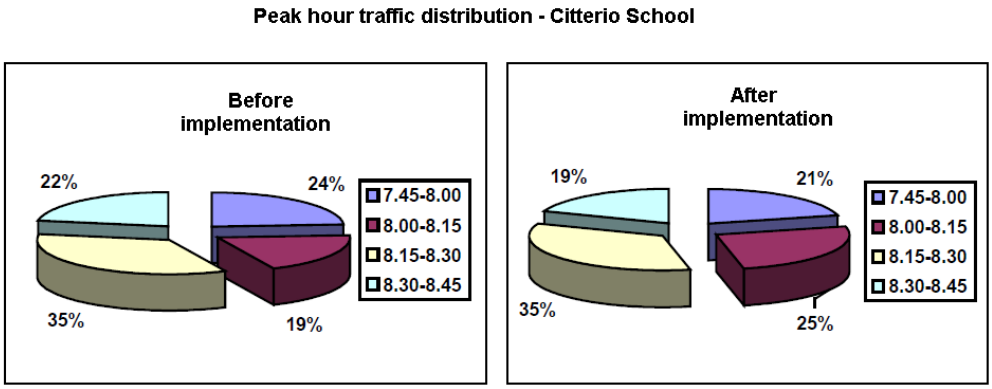


Graph 6 – Omero School – Peak hour traffic distribution

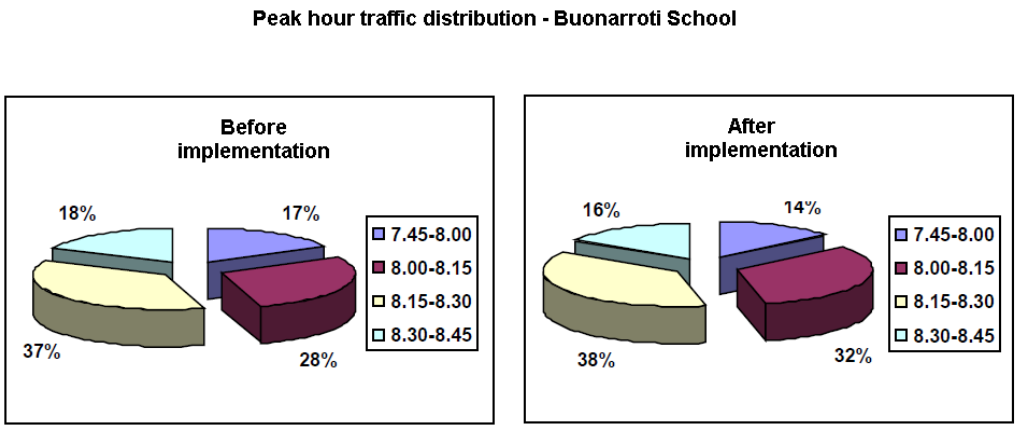
In Omero School the percentage of people reaching school between 7.45 and 8.00 is rather high due to the fact that many children attend the pre-school service, so they belong to the group that do not use the walking bus.



Graph 7 - Manzoni School – Peak hour traffic distribution



Graph 8 – Citterio School – Peak hour traffic distribution



Graph 9 – Buonarroti School – Peak hour traffic distribution

The surveys were conducted initially in order to verify the variations of traffic in the proximity of the four schools involved in demonstrating the measure during a time slot which includes the entrance of students. The data resulting from the survey showed that between 8:15 and 8:30 traffic usually increases, even though it has not been possible to identify a significant reduction in the number of vehicles in front of schools during the activation of walking buses. It must be stressed that the increase of traffic, associated with some bad practises in driving, causes congestion at the time of school entry, which is perceived by motorists and in particular by students as a problem. Moreover, flows detected in the time slot between 7:45 and 8:45 are well below the outflow capacity of the road system, but improper behaviour of users alter the normal flow of vehicles causing delays and disruption to traffic.

As far as **the participation to the walking bus** is concerned , the following tables show in detail the number of subscribers and of accompanying parents in the first stage of implementation of the school travel plans (from April 2011 to June 2011) and in the second stage (for the whole school year 2011/12).

FIRST STAGE OF IMPLEMENTATION (APRIL - JUNE 2011)

In this first stage the walking bus was activated for 35 days.

CITTERIO SCHOOL			BUONARROTI SCHOOL		
	Start	**Closing**		**Start**	**Closing**
Green Line	18	18	Pink line	17	17
Blue Line	15	17	Red line	4	4
Orange Line	8	9	Turquoise line	20	23
Yellow Line	2	2			
TOTAL	**43**	**46**	**TOTAL**	**41**	44
%	11,8%	12,6%	%	22,7%	24,3%
Parents	16	17	Parents	14	14

MANZONI SCHOOL			OMERO SCHOOL		
	Start	**Closing**		Start	Closing
Gold line	16	16	Sapphire line	17	17
			Amber line	21	22
TOTAL	**16**	**16**	**TOTAL**	**38**	**39**
%	13,3%	13,3%	%	23,8%	24,4%
Parents	7	8	Parents	12	12
Overall Total					
TOTAL PUPILS	138	145			
TOTAL PARENTS	49	51			

Table 4 – First stage of implementation – Participation to walking bus

SECOND STAGE OF IMPLEMENTATION (OCTOBER 2011 – JUNE 2012)

OMERO SCHOOL

Omero School has behaved like "the first of the class": the highest percentage of enrolled children (24,8%), the highest number of days of activation and a very high percentage of students living within 800 metres from school (which is a reasonable distance to be covered on foot).

Students Omero School	165											
Students living within 800 metres from school	123											
CO_2	0,15											
	Enrolled children 6/2012	Enrolled children 9/2011	Enrollments during school year	Retirements during school year	Students leaving school	**Volunteer parents**	Retiring vounteer parents	**Lenght of routes (km)**	**Days of activation**	**Covered km**	**Estimate of non-emitted CO2**	**Fuel savings' estimate**
Sapphire Line	21	15	8	2	13	8	3	0,7	161	2366,7	355,0	153,8
Amber Line	20	22	0	2	14	6	3	0,7	144	2016	302,4	131,0
Total enrolled children to walking bus	41											
Total % of students	24,8%											
% within 800 metres	33,3%											

Table 5 - Second stage of implementation - Omero School

MANZONI SCHOOL

Considering the location of the school, which also enrols children coming from the nearby city of Brugherio, which are often forced to come by car, it is easy to understand the limited number of enrollments and of days of activation.

Students Manzoni School	130											
Students living within 800 metres from school	66											
CO_2	0,15											
	Enrolled children 6/2012	Enrolled children 9/2011	Enrollments during school year	Retirements during school year	Students leaving school	**Volunteer parents**	Retiring vounteer parents	**Lenght of routes (km)**	**Days of activation**	**Covered km**	**Estimate of non-emitted CO2**	**Fuel savings' estimate**
Gold Line	11	11	0	0	5	6	4	0,3	87	287,1	43,1	18,7
Purple Line	3	0	3	0	0	2	0	0,3	45	40,5	6,1	2,6
Total enrolled children to walking bus	14											
Total % of students	10,8%											
% within 800 metres	21,2%											

Table 6 - Second stage of implementation – Manzoni School

BUONARROTI SCHOOL

Percentage of students enrolled in this school is veery good (22,1 %) and demonstration of the measure has been constant during the school year.

Students Buonarroti School	190											
Students living within 800 metres from school	84											
CO_2	0,15											
	Enrolled children 6/2012	Enrolled children 9/2011	Enrollments during school year	Retirements during school year	Students leaving school	**Volunteer parents**	Retiring vounteer parents	**Lenght of routes (km)**	**Days of activation**	**Covered km**	**Estimate of non-emitted CO2**	**Fuel savings' estimate**
Turquoise Line	20	20	0	0	12	6	5	0,5	161	1610	241,5	104,7
Pink Line	13	14	1	2	6	4	1	0,9	124	1450,8	217,6	94,3
Red Line	9	5	4	0	4	2	1	0,5	124	558	83,7	36,3
Total enrolled children to walking bus	42											
Total % of students	22,1%											
% within 800 metres	50,0%											

Table 7 - Second stage of implementation – Buonarroti School

CITTERIO SCHOOL

Citterio school has shown the lowest percentage of children enrolled to the walking bus and during the second stage of implementation of the measure one of the four lines had to be cancelled because there were no children enrolled. Nevertheless, for two of the lines, days of activation were 161 and here parents have proved very concerned about “driving” the walking buses, to the point that two parents will continue to volunteer next year even though their children are leaving the primary school..

Students Citterio School	370											
Students living within 800 metres from school	159											
CO_2	0,15											
	Enrolled children 6/2012	Enrolled children 9/2011	Enrollments during school year	Retirements during school year	Students leaving school	**Volunteer parents**	Retiring volunteer parents	**Lenght of routes (km)**	**Days of activation**	**Covered km**	**Estimate of non-emitted CO2**	**Fuel savings' estimate**
Yellow Line	0	0	0	0	0	0	0	0,4	0	0	0	0
Green Line	8	8	1	1	3	4	1	0,8	161	1030,4	154,6	67,0
Orange Line	13	8	5	0	5	9	3	0,6	161	1255,8	188,4	81,6
Blue Line	8	7	1	0	2	3	1	0,9	41	295,2	44,3	19,2
Total enrolled children to walking bus	29											
Total % of students	7,8%											
% within 800 metres	18,2%											

Table 8 - Second stage of implementation – Citterio School

TOTAL RESULTS

In the following table total results are reported. Even though the percentage of children who regularly joined the walking bus (15%) may seem not particularly significant, it must be considered that such a measure impacts on mobility habits of people which are very difficult to change, since they are not only connected to the simple act of accompanying children to school, but also to other engagements of the family, like reaching job place, shopping, errands etc. Moreover, the slight reduction observed between the first and the second stage of implementation (from 145 to 126 children) is easily understandable if we think that in the first stage days of activation were only 35, whilst in the second stage walking bus has been operational for the whole school year, so requiring a longer and more continue engagement by volunteer parents, who, in spite of this, have kept on accompanying children.

Students enrolled to walking bus 6/2012	**126**
Students leaving school	**64**
Enrollments during school year	**23**
Retirements during school year	**7**
% students enrolled	**15%**
% students living within 800 metres from school	**29%**
Volunteer parents	**50**
Retiring volunteer parents (for children leaving school)	**22**
Covered km	**10.911**
Estimate of non-emitted CO2 (kg)	**1.637**
Fuel savings' estimate (litres)	**709**

Table 9 - Summary results after one year implementation

C2.5 Society

In the survey concerning mobility habits of the 887 families involved in ARCHIMEDES project realized before the implementation of the measure, and whose results are reported in the Annex 1 to the present report, some questions concerning knowledge of the Walking Bus experience and of its positive/negative aspects have been asked. Data showed that very few children go to school by themselves whilst most of them are usually accompanied by parents or grandparents. Among the reasons why children do not go to school independently identified by the parents interviewed, there are:

- the perception that children are too young to make the trip alone (30%);
- the fear that they can have bad meetings (23%);
- too heavy rucksacks to carry (9%);
- the presence of heavy traffic routes (7%);
- home-school distance and dangerous roads (5%).

There are only 7% of the families who say they accompany their children to school for convenience during the trip to go to work or other destinations.

With a specific question the willingness of parents to participate in initiatives like Walking Bus or carpooling has been investigated. The scenario that has emerged is that of splitted up opinions: 45% of survey participants welcomes the possibility of experiencing a new arrangement for the journeys from school to home and from home to school. But 49% shows no interest at all for the initiative, and the remaining 5% is not responding.

The Walking Bus may be an important service, since 25% of households interviewed think that the children can become more autonomous, that this experience allows them to socialize with other children (16%) and to explore the neighborhood and the environment in which they live (9%). In addition to this, 12% of families believe Walking Bus could be a valuable aid for the family organization, facilitating the task of accompaniment of the children to school. On the other hand, 20% claimed that their children are too young for Walking Bus, preferring instead to share with them the time to make the journey home-school, 16% said that children could face bad encounters during the journey and about 27% did not answer.

Starting from these results and in addition to this quantitative survey, also two qualitative surveys were conducted in order to assess society indicators.

Tthe first survey, conducted in March 2011, has been described in Section C1.2.

The second survey was made just before the end of the school year 2011-2012, during the month of April 2012, after more than one year of activation of walking bus routes, interviewing through a questionnaire presented personally or by e-mail, 100 families, and more specifically:

- 87 families (interviewed personally) whose children attend one of the four schools which have participated actively to the implementation of the measure and where now the Walking Bus is regularly working;
- 23 families (interviewed through e-mail) whose children use Walking bus to reach the school attended.

Questionnaires for the survey was developed in order to test people's awareness, acceptance and perception of security of the walking bus, and of the communication campaign activated by the

Municipality of Monza and directed to teachers, parents and headmasters of the four schools in order to promote a positive attitude towards the walking bus. Obviously, in this second survey some questions were different from the first one, since both people who have tested or not the walking bus have been interviewed, so it was necessary to ask walking bus users specific questions regarding their opinion about the implementation of the measure and their availability to go on with the initiative as an accompanist parent. Furthermore, opinion of people who have not tested the walking bus has been asked as well, especially as far as the opportunity of testing the service or of becoming an accompanist parent is concerned

Like the first survey, also the second one was anticipated by a communication from the Municipality of Monza directed to teachers, parents and headmasters of the four schools in order to promoteg a positive attitude in the interviewed people.

B-a-U has not been assessed, due to the fact that indicators like awareness, acceptance and security depend on people's perception.

In this section results of the two surveys held in March 2011 and April 2012 will be summarized.

Indicator	Before (March 2011)	B-a-U (date)	After (April 2012)	Difference: After –Before	Difference: After – B-a-U
Awareness	**96%** know Walking Bus, mostly through school (**85%**)	Not applicable	**79%** know people using walking bus Initiatives for sustainable mobility in schools are well known: **80** people know Walking Bus, **29** know Walk to School Week, **22** know Try Walking Bus, **24** know road safety education (**100%** through school)	Not applicable	Not applicable
Acceptance:	40% will participate to walking bus		**82%** of users and **44%** of non-users will use Walking Bus in future 55% will not join the Walking bus 70% find it useful and 17% convenient for families		

			Walking bus service is considered good (48%) or even excellent (39%) 96% use it regularly 82% find it useful and interesting; 65% find it convenient for families		
Accessibility	**Barriers to joining:** **37%** see home location and timetables as a barrier to joining, **11%** think there are few children, **5%** fear lack of sidewalks **Reasons for joining:** reliability of accompanying parents (**26%**), less pollution (**21%**), good functioning and continuity (**11%**), children's autonomy (**11%**)		**Barriers to joining:** bus stops (**40%**), timetables (**22%**) and home location (**18%**) not convenient, lack of safe paths (**13%**) **Reasons for joining:** socialization (**49%**), autonomy (**45%**), less pollution (**31%**), sharing accompanying with other parents (**20%**) and fuel savings (**11%**) **Drivers** : punctuality to school (**90%**), good communication (**75%**), convenient stops and safe routes (**80%**) and easy registration procedure (**85%**)		

In this first survey almost all surveyed people had already heard about walking bus and knew exactly what it is. Most of them knew about the initiative because they had been informed at school through reports, class meetings or notices of teachers or headmasters.

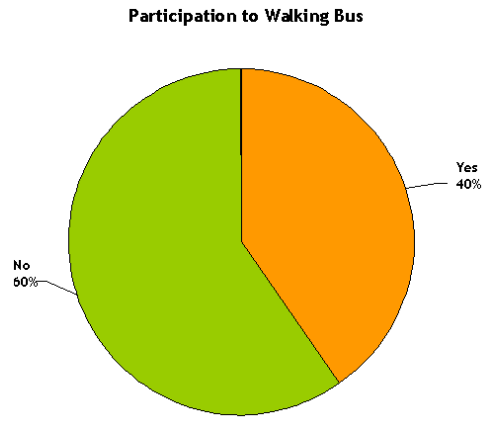
Although 37 respondents out of 62 said they were not joining the walking bus, 5 of them said they could think back about joining in future due to their child age or personal temporary situations.

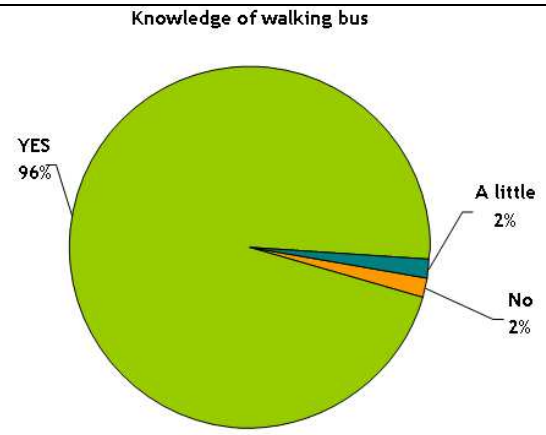
Barriers to joining are mostly home location and timetables, the idea that few children will participate and the lack of sidewalks.

Expectations of surveyed people are mostly about improvement of child life as far autonomy, socialization and fun are concerned.

Detailed graphs explaining findings of the two surveys are reported below.

MARCH 2011 SURVEY

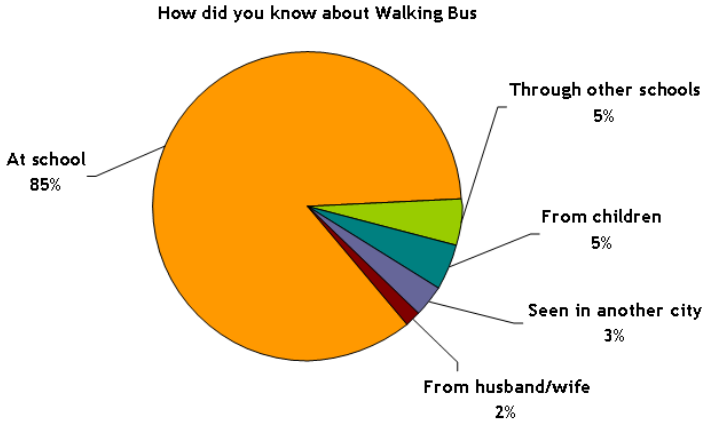
Question asked	Answer
Will you participate to the walking bus? **INDICATOR NO. 14 (Acceptance)**	 **Graph 10 – Participation to walking bus - March 2011 Survey**
Do you know what is a walking bus? **INDICATOR NO. 13 (Awareness)**	



Graph 11 – Knowledge of walking bus

How did you know about the Walking Bus?

INDICATOR NO. 13 (Awareness)

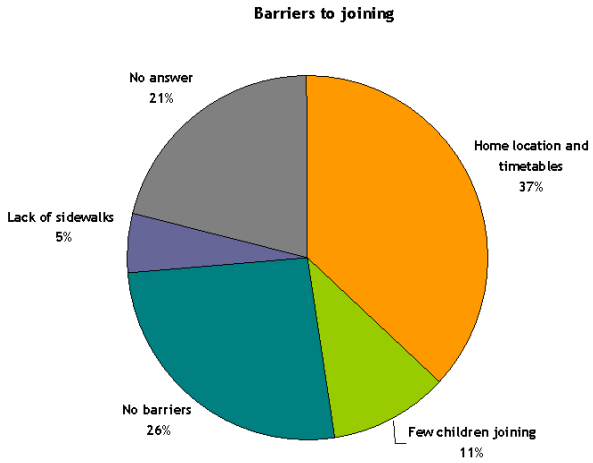
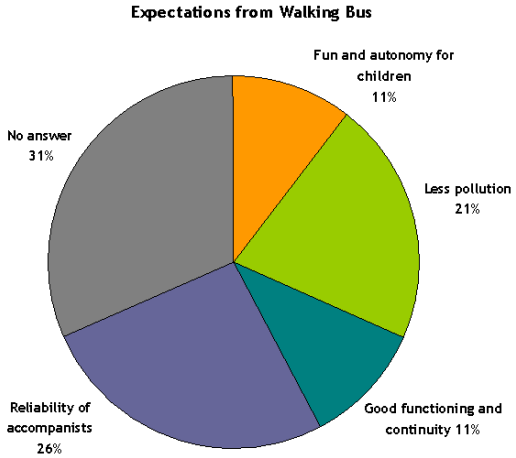


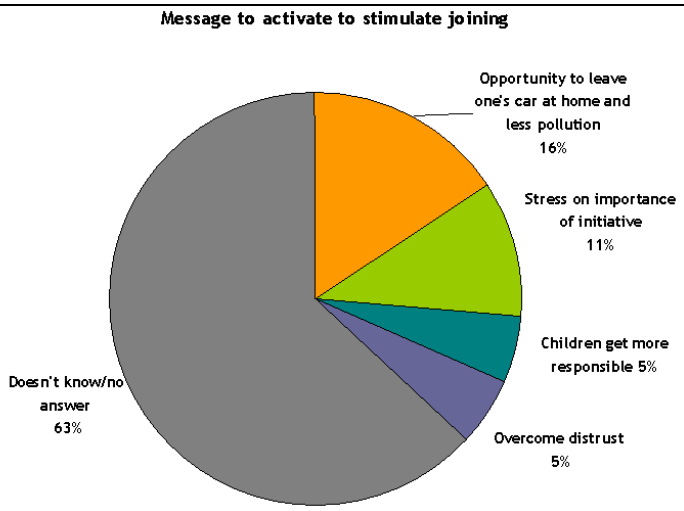
Graph 12 – Means of knowledge of walking bus – March 2011 Survey

Why did you decide to join or not the walking bus?

INDICATOR NO. 14 (Acceptance)

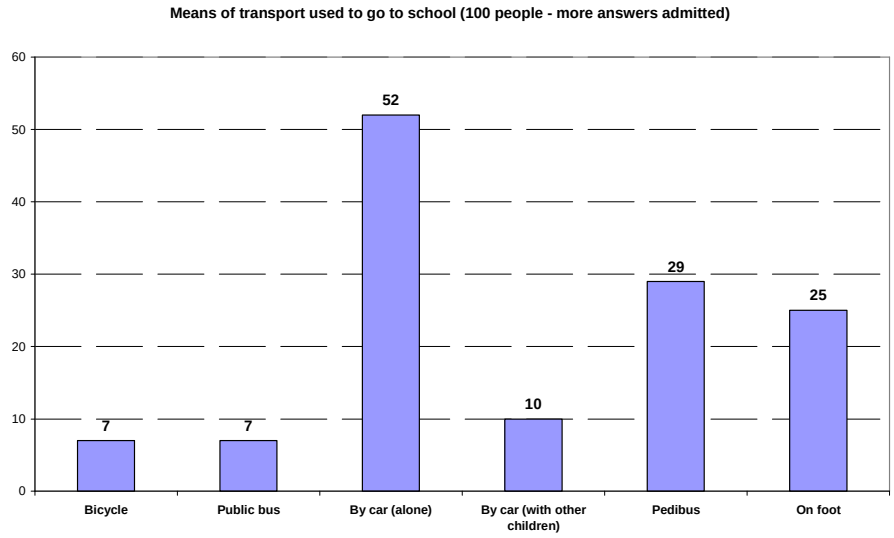
Numbers in the graph are referred to the number of answering people

	Graph 13 - Reasons for joining the walking bus - March 2011 Survey
Which barriers (real or potential) hold you back from joining the walking bus? **INDICATORS NO. 15 (Accessibility) AND 17 (Security)**	 **Graph 14 - Barriers - March 2011 Survey**
Which are your expectations about the walking bus? **INDICATORS NO. 15 (Accessibility) AND 17 (Security)** **More than one answer was allowed**	 **Graph 15 - Expectations about walking bus - March 2011 Survey**
Which message could be activated to stimulate people to join the walking bus? **INDICATORS NO. 15 (Accessibility) AND 17 (Security)**	



Graph 16 - Message to stimulate joining - March 2011 Survey

APRIL 2012 SURVEY

Question asked	Answer
Which means of transport do you use to go to school?	

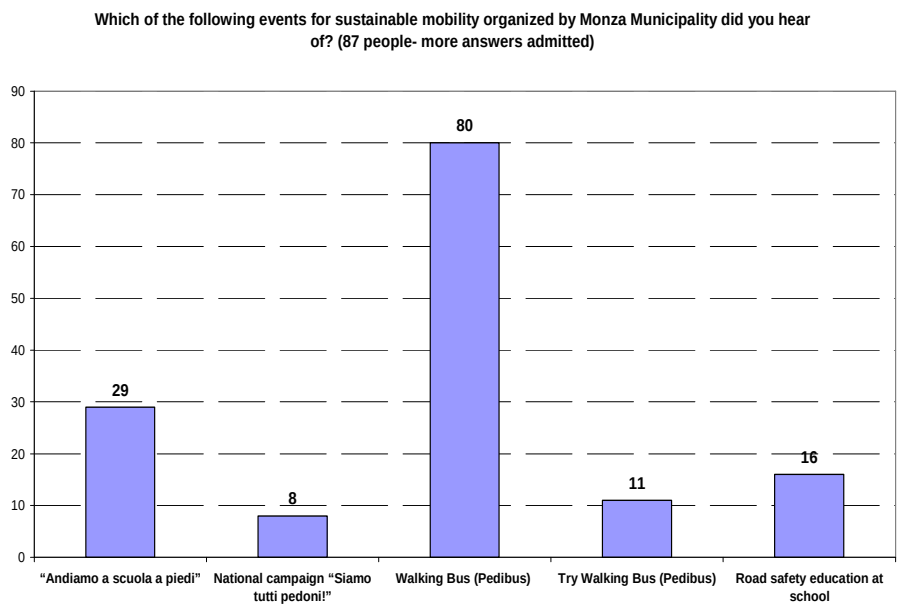
Graph 17 - Means of transport - April 2012 Survey

Measure title: **School Travel Plans in Monza**

City: **Monza** *Project:* **ARCHIMEDES** *Measure number:* **41**

Which of the following events for sustainable mobility organized by Monza Municipality did you hear of?

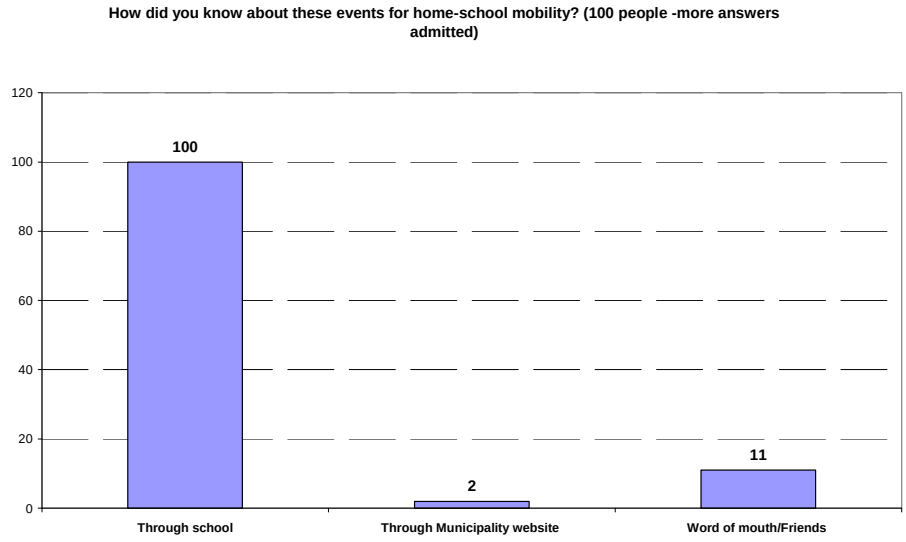
INDICATOR NO. 13 (Awareness)



Graph 18 - Knowledge of events - April 2012 Survey

How did you know about these events for home-school mobility?

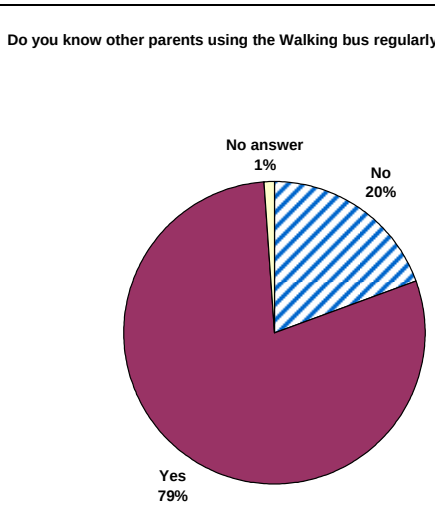
INDICATOR NO. 13 (Awareness)



Graph 19 - Means of knowledge of events - April 2012 Survey

Do you know other parents using the Walking bus regularly?

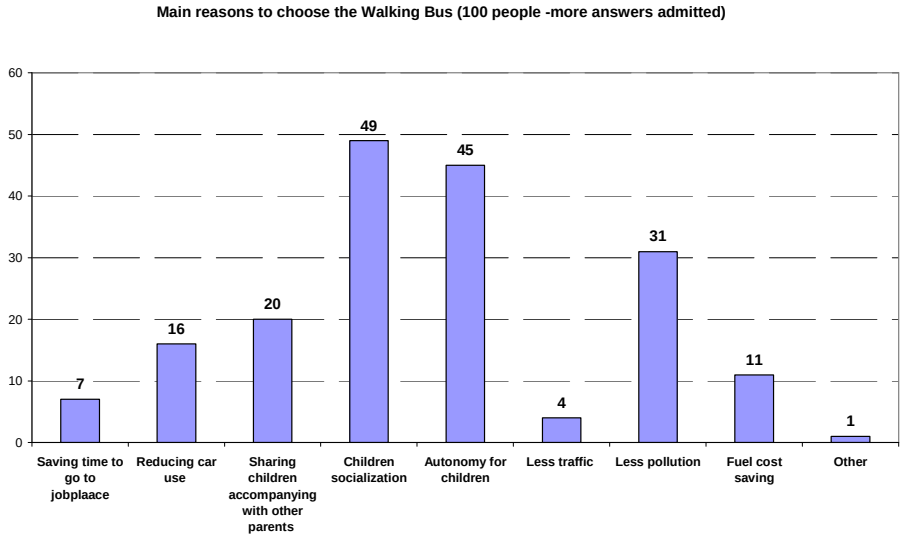
INDICATOR NO. 13 (Awareness)



Graph 20 - Knowledge of people using walking bus - April 2012 Survey

Main reasons to choose the Walking Bus (more answers admitted)

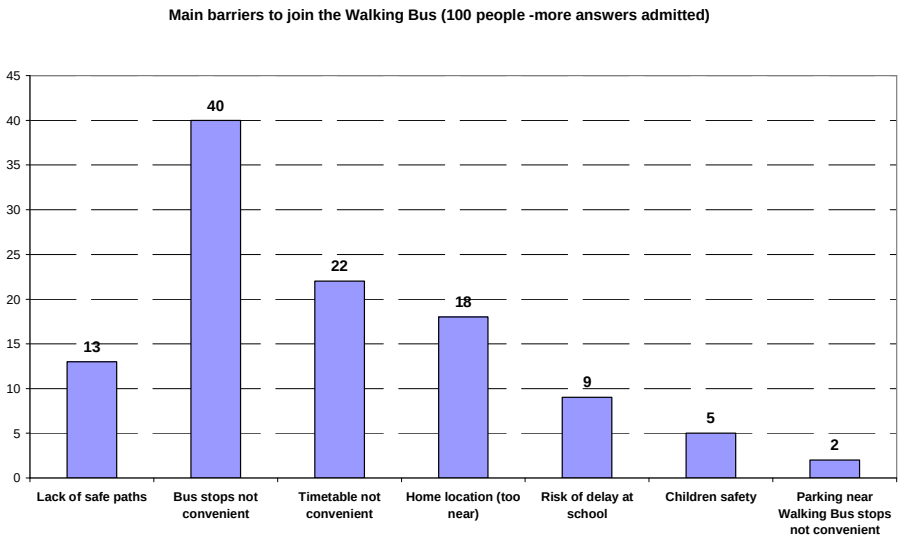
INDICATORS NO. 15 (Accessibility) AND 17 (Security)



Graph 21 - Reasons for choosing walking bus - April 2012 Survey

Which are in your opinion the main barriers to join the Walking Bus?

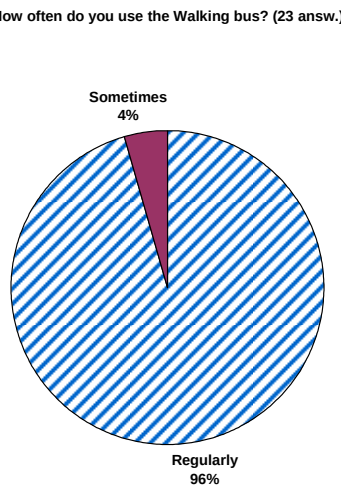
INDICATORS NO. 15 (Accessibility) AND 17 (Security)



Graph 22 - Barriers to join walking bus - April 2012 Survey

How often do you use the Walking bus?

INDICATOR NO. 14 (Acceptance)

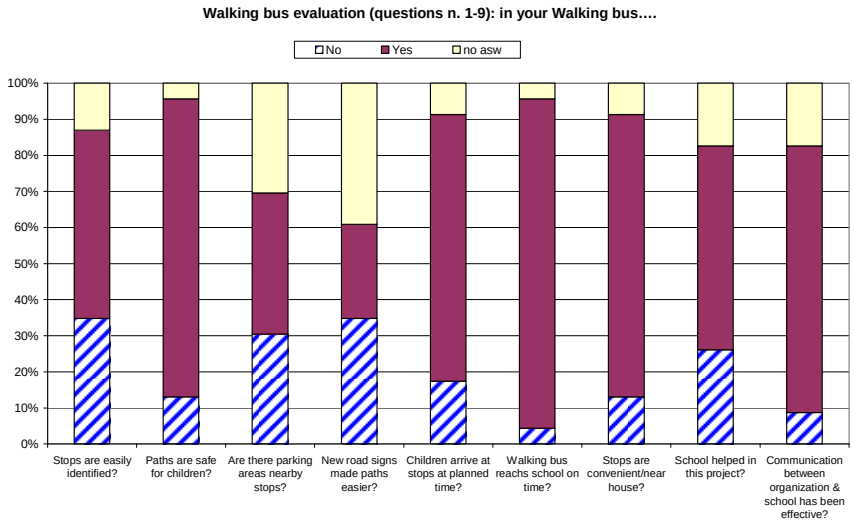


Graph 23 - Frequency in using walking bus (users) - April 2012 Survey

Eliminato: 24

According to you, in your Walking bus …

INDICATOR NO. 14 (Acceptance), NO. 15 (Accessibility) AND 17 (Security)



Graph 24 - Walking bus evaluation (Users - 1) - April 2012 Survey

Eliminato: 25

According to you, in your Walking bus …

INDICATOR NO. 14 (Acceptance), NO. 15 (Accessibility) AND 17 (Security)

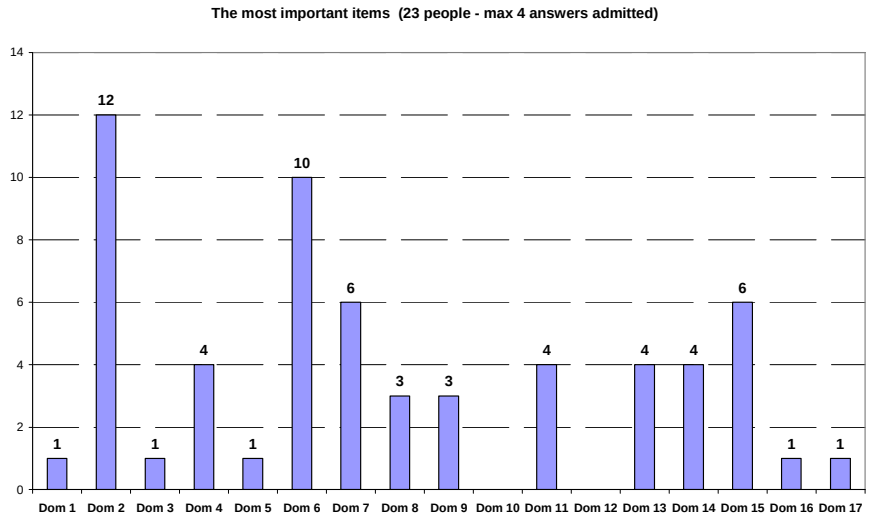
Graph 25 - Walking bus evaluation (Users - 2) - April 2012 Survey

Eliminato: 26

According to you, the 4 most important items in your Walking bus are…

INDICATOR NO. 14 (Acceptance), NO. 15 (Accessibility) AND 17 (Security)

These answers are referred to questions about walking bus evaluation, shown in previous tables from 1 to 17

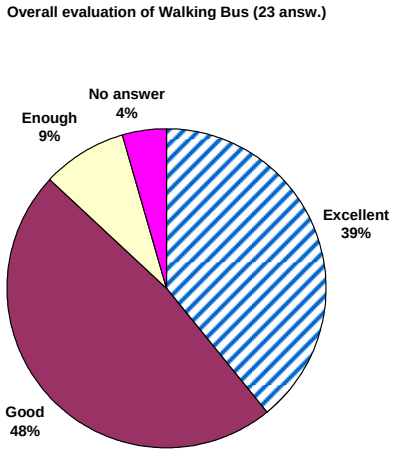


Graph 26 - Most important aspects (Users) - April 2012 Survey

Eliminato: 27

Considering all items, your Walking bus is (overall evaluation)

INDICATOR NO. 14 (Acceptance), NO. 15 (Accessibility) AND 17 (Security)

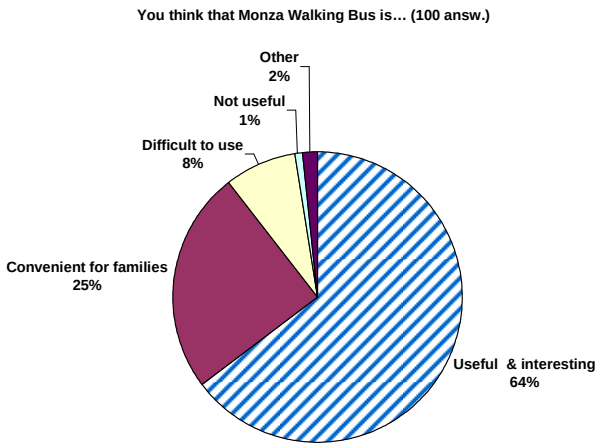


Graph 27 - Overall opinion (users) - April 2012 Survey

Eliminato: 28

What do you think Monza Walking Bus is like?

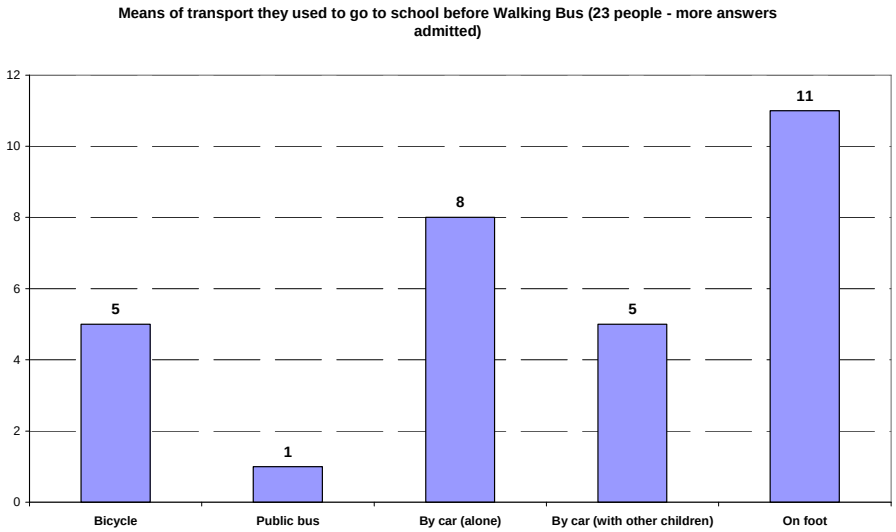
INDICATOR NO. 14 (Acceptance)



Graph 28 - Opinion about walking bus - April 2012 Survey

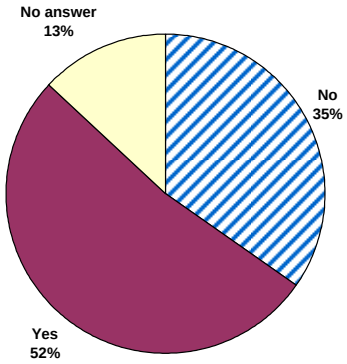
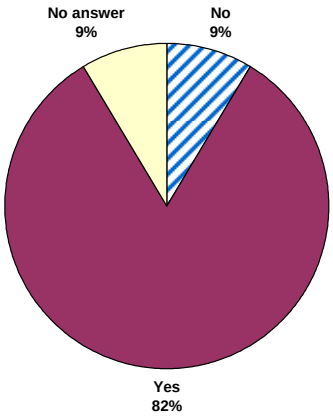
Eliminato: 29

Before Walking Bus, which means of transport did you use to go to school?



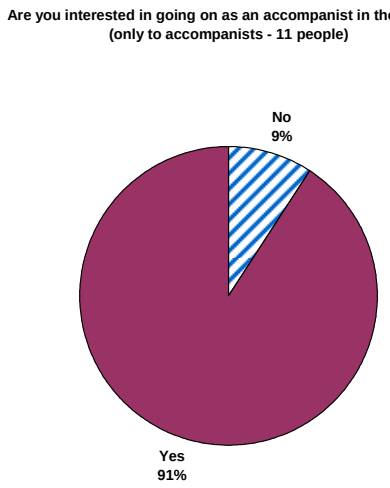
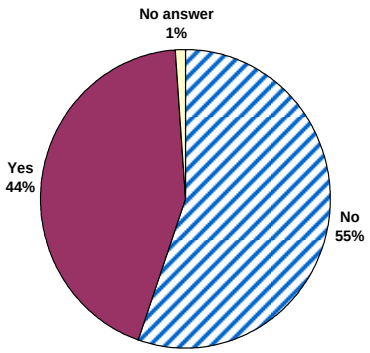
Graph 29 - Means of transport used before activation (users) - April 2012 Survey

Eliminato: 30

Did Walking Bus change your habits about timetables and mobility?	 **Graph 30 - Change in habits after implementation (users) - April 2012 Survey**
Are you thinking of going on using Walking Bus in the future? **INDICATOR NO. 14 (Acceptance)**	 **Graph 31 - Future use of walking bus (users) - April 2012 Survey**

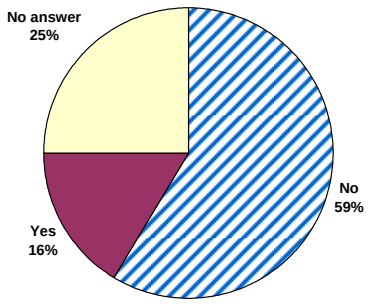
Eliminato: 31

Eliminato: 32

Are you interested in going on as an accompanist in the future? (only to accompanying parents) **INDICATOR NO. 14 (Acceptance)**	 **Graph 32 - Availability as accompanying parent (users) - April 2012 Survey**
Do you think you'll use the Walking Bus in the future? **INDICATOR NO. 14 (Acceptance)**	 **Graph 33- Future joining to Walking Bus (non users) - April 2012 Survey**

Eliminato: 34

Eliminato: 23

In case of joining the Walking Bus, could you be an accompanist? **INDICATOR NO. 14 (Acceptance)**	 **Graph 34 - Availability as accompanying parent (non users) - April 2012 Survey**

Eliminato: 33

The 100 respondents, all belonging to families whose child attends one of the four schools where Walking bus is working, use mainly the car to take their children to school (62%, alone or with others) or go on foot (54%) – if they live nearby the school. Most of them are aware of Walking Bus (much more than other events the Municipality organize on sustainable mobility!), heard of it at school and even if they do not use it, they know other people who do. Almost 90% of the respondents find it "useful and interesting" or "convenient for families" and quoted a positive impact on children (on socialization and authonomy above all) and on pollution.

The main barriers quoted are linked to bus stops position and timetable, as many families live very near or very far from the schools (and in fact some of them ask for a change of bus stop position). For these reasons, only 44% of the respondents think of using Walking bus in the future and only 20% of them would accept to volunteer as a Walking bus driver, due to work-time problems above all.

The 23 respondents, all frequent users of Walking bus, are also aware of many of the other events Municipality of Monza organizes on sustainable mobility and heard of them at school. They find Walking bus "useful and interesting" (82%) and "convenient for families" (65%) and the reasons to have chosen it are lied to socialization and authonomy of their children above all.

Among the Walking bus items, the most positive for the respondents are lied to path safety, punctuality (which are also the two most important items, in their opinion), communication between organization & school, bus stop position (near their home), reliability of preliminary information, registration procedure and communication in case of changes. On the other hand, the respondents think that Walking bus stops are not easily identified, there are not enough parking areas nearby them, and new road signs have not yet made paths easier. More support from schools is also requested.

As for general evaluation (overall), 39% of the respondents feel that Walking bus service is "excellent", 48% "good" and this is really a great result.

As for Walking Bus impact on mobility habits, 52% of the respondents have really changed their habits (great result) and 82% are going to use Walking bus in the future.

Those who are at present volunteer parents think that rules have been followed by all families involved and are interested in going on in this role (91%); not volunteer parents trust on Walking bus and the parents who drive walking buses, but could not help them (75%), due to work-time problems above all.

C2.6 Cost Benefit Analysis

A Cost Benefit Analysis has been carried out to assess the economic impact of this measure. In particular CBA has been carried out applying the Net Present Value approach over a project life of 10 years that has been chosen as a typical time horizon necessary to raise awareness in teachers and headmasters so to ensure that schools become autonomous in planning walking buses, so that the project can continue without the need for further investment by the Municipality of Monza.

In the following paragraphs detailed data used in the formula and a copy of the Excel sheet used for the computations are reported.

C2.6.1 Evaluation period for CBA

- **Defining reference case for CBA:** In order to define the reference case, it has been considered as a reference scenario is the "Do-Nothing" one, with no intervention at all on home – school mobility. For this reason, the CBA for this measure has been applied considering the capital costs spent for the subcontract issued to CREDA Onlus in order to follow the process in the four involved schools and the maintenance costs necessary to update school travel plans and comparing them with monetizable benefits deriving from the implementation of the measure.
- **Defining lifetime of the measure:** In order to assess a definitive project life, it has been considered a ten years' period, which is considered necessary to raise awareness in teachers and headmasters so to ensure that schools become autonomous in planning walking buses, so that the project can continue without the need for further investment by the Municipality of Monza. As a matter of fact, the specific target of the measure are pupils of primary schools, but every year there is a remarkable turnover since pupils of the last year leave their place to those who enter the first year of the school. This implies that, in order to activate an educational process for parents and children, at the beginning of every school year, activities must be done to approach the new users in order to show them benefits of sustainable mobility in school – home journeys and to update school travel plans. Moreover, every year the number of children joining the walking bus may change, so it has been assumed that this number remains the same for every year.
- **Discount rate:** the value proposed in the NPV computation is 0.05, a value recommended by the EU for this type of investments.

C2.6.2 Method and values for monetization

In the survey held in April 2012, after the implementation of the measure, in which it emerged that 52% of families involved in the demonstration stage had changed their mobility habits and timetables as far as taking children to school is concerned, as shown in Graph 30, Therefore, half of the children who joined the walking bus during the implementation stage traveled by car before the activation of the school travel plans.

Eliminato: Graph 31

In the survey about mobility habits of the 887 families involved in the demonstration stage (better described in Annex 1 to the present document), most of the families stated living near the school, with 72% claiming to reside within the distance of one kilometre, 15% between 1-2 km and the remaining

9% over 2 km: for this reason, it has been assumed that an average home-school route is of 800 metres.

In the first implementation period (35 days from April 2011 to June 2011) 145 children have joined the walking bus, so it can be assumed a modal shift for 75 children which were driven to school before the start of walking bus. In the second implementation stage (from October 2011 to June 2012), 126 children have actively joined the walking buses, so it can be assumed a modal shift for 65 children which were driven to school before the start of walking bus.

According to these assumptions, we have the following results:

- First implementation stage – 35 days of activation
  - 52% of 145 children = 75 children x 0,8 km x 35 days of activation = 2100 km covered
- Second implementation stage – an average of 121 days of activation for each of the 10 routes in the four involved schools:
  - 52% of 126 children = 66 children. x 0,8 km x 121 average days of activation = 6389 km covered.

Starting from these assessment, the most difficult task to accomplish CBA for this measure stands in estimating monetary values for time and fuel savings expected in the project lifetime. Following the suggestions and the references obtained by POINTER, the "Handbook on estimation of external costs in the transport sector", produced within the study "Internalisation Measures and Policies for All external Cost of Transport (IMPACT)", Version 1.1, released in Delft on Feb. 2008, has been analysed, with particular attention to Chapter 3 "of this document, "Best Practices for Cost Category.

Value of Travel Time Savings (VTTS) - Paragraph 3.1.1 "Type of cost and main drivers" describes that "… Travel time increases constitute the most important component of congestion. Applying standard valuations of travel time losses this category commonly accounts of 90% of economic congestion costs. The Value of Time (VOT) or Value of Travel Time Savings (VTTS) can be distinguished between trip purposes, modes and journey length in passenger travel… (page 23)". At page 28, presenting the list of input values to be considered, it is stated that "…the Value of Time (VOT) is required for translating time losses… into monetary units".

Among the different available **Value of Time** studies, HEATCO, 2006a recommends similar time values based on vehicle instead of passenger hours. Differences occur in particular for commuting (8.48-10.89 €/vkm) and for private trips (7.11-9.13 €/vkm) for delays due to congestion, as shown in Table 10. Values of travel time saving proposed by the HEATCO project by country, mode, travel purpose and trip length are recommended as default values, as they include most recent evidence on willingness-to-pay surveys.

Eliminato: Table 1

Sector/purpose	Unit	Car/HGV	Rail	Bus/Coach	Air
Passenger transport					
– Work (business)	€2002/passenger, hour	23.82		19.11	32.80
– Commuting, short distance		8.48		6.10	*
– Commuting, long distance		10.89		7.83	16.25
– Other, short distance		7.11		5.11	*
– Other, long distance		9.13		6.56	13.62
Freight transport	€2002/ton, hour	2.98	1.22	/	n. a.

Table 10 - Recommended values in passenger and freight transport (EU 25 average)

Source: HEATCO, Deliverable 5 - Tables to 0-6 0-8

Given these assumptions, in order to calculate VTTS achieved by parents who have joined the walking bus, the following items have been computed:

1. number of children who have changed their mobility habits after the implementation of the walking bus;
2. average days of activation of the walking bus per year;
3. average length of home-school route;
4. average time to cover home – school route (this time has been calculated assuming an average speed in walking of about 5 km per hour, so that a 800 metres' walk takes about 9 minutes) .

Home – school route has been considered a private trip, thus results shown in Table 11 have been achieved.

Eliminato: Table 11

Value Travel Time Savings-VTTS cost per Km	7,11
Pupils	126
Share	0,52
Pupils affected	66
Average PEDIBUS activation days	121
Average home-school distance (Km)	0,8
Average lead time saved by parent (min)	9
Minutes saved by parents (per year)	71874
Hours saved by parents (per year)	1198
Value travel time Savings-VTTS (Euro)	**6814**

Commento [sv1]: CORRECTED: thanks to Google Maps, benefits increased!

Table 11 – Value of Travel Time Savings per year

Value of fuel savings - As shown in Section C2.2, fuel savings have been calculated with simulating methods, assuming that a mid-size car in city driving consumes about 7 litres of fuel per 100 km.

Therefore, thanks to the shown calculations, it can be stated that:

- In the first implementation stage 147 litres of fuel have been saved:
  - 7 litres per 100 km = 147 litres per 2100 km
- In the second implementation stage 447 litres of fuel have been saved:
  - 7 litres per 100 km = 447 litres per 6389 km.

Given these assumptions, in order to calculate value of fuel savings achieved by parents who have joined the walking bus, the following items have been computed:

1. kilometres covered during implementation stage;
2. average fuel consumption (km/litre);
3. average cost of one litre of fuel;

Results shown in Table 12 have been achieved.

Eliminato: Table 12

Km covered 1st stage	2100
Km covered 2nd stage	6389

Total Km	8489
Km/litre	13,333
Cost of 1 litre fuel (€)	1,85
Litres of fuel saved	636,68
Value of fuel saved (yearly, estimated)	**1177,8**

Table 12 – Value of fuel savings for first and second implementation stage

Value of CO_2 reduction – This value has not been considered since it is negligible. In fact, usually values of CO_2 are expressed in tonnes. HEATCO (2006a) recommends an external cost factor of € 26 per tonne of CO_2 which, for emissions between 2010 and 2019, increasing by decades. Even though sensible reduction of CO_2 emissions have been achieved through the implementation of the walking bus (- **958,35 kg** in the second implementation stage, for an average of 121 days during the whole school year**,** as better described in Section C.2.3), results are still too limited to be monetized. In fact, according to HEATCO recommendations, savings deriving from the reduction of almost one tonne of CO2 would amount to about € 26 per year, a sum that cannot be considered relevant in the context of the present analysis.

C2.6.3 Life time cost and benefit

In the following table capital costs afforded to implement the walking bus are described: more specifically, a subcontract for the four years of ARCHIMEDES has been issued to CREDA Onlus for an amount of 48.500 €. At the end of the fourth year, the amount of 2.520,00 € has been invested to buy vouchers for school supplies for the 126 children who joined the walking bus. From the fifth year on, this last sum has been left unchanged, assuming the number of children is always the same, although it can vary every year.

	Cases for comparison	Cost (e.g. €200,000)
Year 1	CIVITAS measure	€ 48.500,00
	Reference case (or BAU)	
Year 2	CIVITAS measure	
	Reference case (or BAU)	
Year 3	CIVITAS measure	
	Reference case (or BAU)	
Year 4	CIVITAS measure	€ 2.520,00
	Reference case (or BAU)	
Year 5	CIVITAS measure	€ 2.520,00
	Reference case (or BAU)	

. .	. .	. .
Year 10	CIVITAS measure	€ 2.520,00
	Reference case (or BAU)	

Table 13 - Capital cost in the evaluation period (not discounted)

From the fifth year on, it has been considered an expense of 4.500,00 € per year to update school travel plans.

	Cases for comparison	Values (e.g. €200,000)
Year 1	CIVITAS measure	
	Reference case (or BAU)	
. .	. .	. .
Year 5	CIVITAS measure	4.500,00 €
	Reference case (or BAU)	
Year 6	CIVITAS measure	4.500,00 €
	Reference case (or BAU)	
. . . .	. . . .	. . . .
Year 10	CIVITAS measure	4.500,00 €
	Reference case (or BAU)	

Table 14 - Maintenance cost in the evaluation period (not discounted)

Computing all items considered (namely kilometres covered by participant pupils/parents and the average time to cover home – school route) in order to calculate value of time savings achieved by parents who have joined the walking bus, the following results have been achieved during Year 3 (first implementation stage) and Year 4 (second implementation stage): the value of Year 4 has been left unchanged for the following years, assuming the number of children is always the same, although it can vary every year.

	Cases for comparison	Values (e.g. €200,000)

Year 1	CIVITAS measure	
	Reference case (or BAU)	
Year 2	CIVITAS measure	
	Reference case (or BAU)	
Year 3	CIVITAS measure	€ 2.241,00
	Reference case (or BAU)	
Year 4	CIVITAS measure	€ 6.814,00
	Reference case (or BAU)	
Year 5	CIVITAS measure	€ 6.814,00
	Reference case (or BAU)	
Year 6	CIVITAS measure	€ 6.814,00
	Reference case (or BAU)	
. .	. .	. .
Year 10	CIVITAS measure	€ 6.814,00
	Reference case (or BAU)	

Table 15 - Savings from journey time reductions in the evaluation period (not discounted)

Computing all items considered (namely kilometres covered, average fuel consumption and average fuel cost) in order to calculate value of fuel savings achieved by parents who have joined the walking bus,, the following results have been achieved during Year 3 (first implementation stage) and Year 4 (second implementation stage) as far as fuel savings are concerned: the value of Year 4 has been left unchanged for the following years, assuming the number of children is always the same, although it can vary every year.

	Cases for comparison	Values (e.g. €200,000)
Year 1	CIVITAS measure	
	Reference case (or BAU)	
Year 2	CIVITAS measure	
	Reference case (or BAU)	
Year 3	CIVITAS measure	291,38 €
	Reference case (or BAU)	

Year 4	CIVITAS measure	886,47 €
	Reference case (or BAU)	
. . . .	. . . .	. . . .
Year 10	CIVITAS measure	886,47 €
	Reference case (or BAU)	

Table 16 - Fuel savings (not discounted)

C2.6.4 Compare the lifetime costs and benefits

Measure title: **School Travel Plans in Monza**

City: **Monza** *Project:* **ARCHIMEDES** *Measure number:* **41**

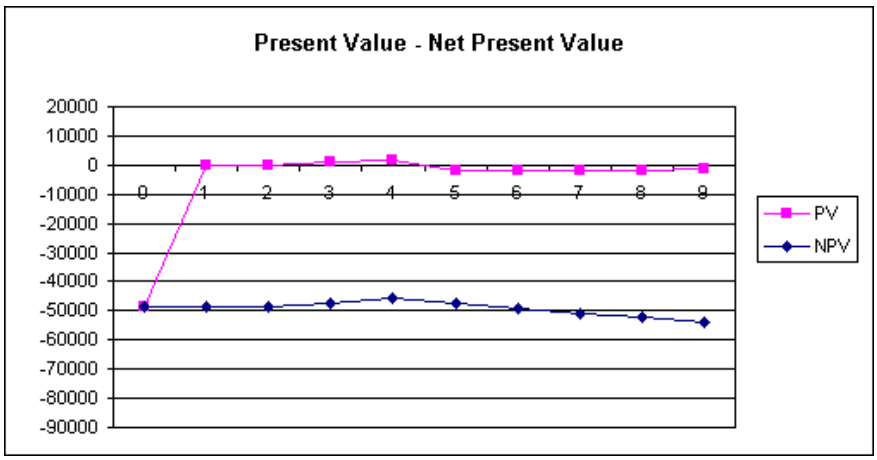
	Capital cost	Maintenance cost	Other cost	Revenue	Savings from accident reductions	Savings from fuel savings	Savings from Journey time savings	Savings from reductions of environmental emissions	Total cost	Total Benefit	Cumulated cost
Year 0	€ 48.500								€ 48.500		- € 48.500
Year 1											- € 48.500
Year 2											- € 48.500
Year 3						€ 292,1	€ 2.241			€ 2.533,1	- € 46.312
Year 4			€ 2.520			€ 869,6	€ 6.814		€ 2.520	€ 7.700,47	-€ 42.064
Year 5		€ 4.500	€ 2.520			€ 869,6	€ 6.814		€ 7.020	€ 7.700,47	-€ 41.544
Year 6		€ 4.500	€ 2.520			€ 869,6	€ 6.814		€ 7.020	€ 7.700,47	-€ 41.049
Year 7		€ 4.500	€ 2.520			€ 869,6	€ 6.814		€ 7.020	€ 7.700,47	-€ 40.577
Year 8		€ 4.500	€ 2.520			€ 869,6	€ 6.814		€ 7.020	€ 7.700,47	-€ 40.128
Year 9		€ 4.500	€ 2.520			€ 869,6	€ 6.814		€ 7.020	€ 7.700,47	-€ 39.700
Total	**€ 48.500**	**€ 22.500**	**€ 15.120**			**€ 5.509.60**	**€ 43.125**		**€ 86.120**	**€ 48.634,7**	

Table 17 - Lifetime cost/benefit of CIVITAS measure (discounted, with rate = 0.05)

Measure title: **School Travel Plans in Monza**

City: **Monza** *Project:* **ARCHIMEDES** *Measure number:* **41**

Rate:	**0,05**	PV	NPV	Oper/Maint costs	Income	Mnth-amount
Year	Act rate:					
0	1	-48500	-48500	-48500	0	-48500
1	1,05	0	-48500	0	0	0
2	1,1025	0	-48500	0	0	0
3	1,1576	1329	-47171	0	1538,1	1538,1053
4	1,2155	1759	-45412	2520	4657,6	2137,6391
5	1,2763	-1851	-47263	7020	4657,6	-2362,361
6	1,3401	-1763	-49026	7020	4657,6	-2362,361
7	1,4071	-1679	-50705	7020	4657,6	-2362,361
8	1,4775	-1599	-52304	7020	4657,6	-2362,361
9	1,5513	-1523	-53827	7020	4657,6	-2362,361



Rate:	**0,05**	PV	NPV	Oper/Maint costs	Income	Mnth-amount
Year	Act rate:					
0	1	-48500	-48500	-48500	0	-48500
1	1,05	0	-48500	0	0	0
2	1,1025	0	-48500	0	0	0
3	1,1576	2188	-46312	0	2533,1	2533,1053
4	1,2155	4248	-42064	2520	7683,6	5163,6391
5	1,2763	520	-41544	7020	7683,6	663,6391
6	1,3401	495	-41049	7020	7683,6	663,6391
7	1,4071	472	-40577	7020	7683,6	663,6391

8	1,4775	449	-40128	7020	7683,6	663,6391
9	1,5513	428	-39700	7020	7683,6	663,6391

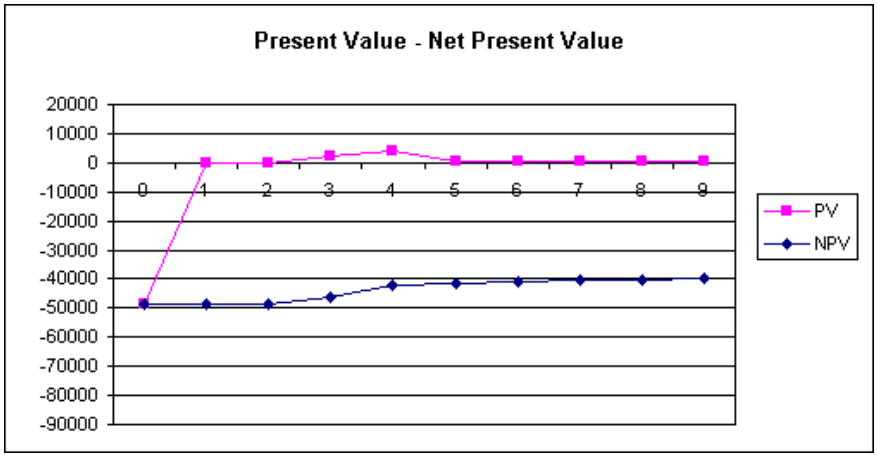


Figure 18 - CBA formulas and results from the Excel sheet

C2.6.5 Summary of CBA results

If only costs afforded and monetizable benefits achieved were considered for the implementation of this measure, results would be far from being positive, since costs are definitely higher than benefits: in fact, the resulting NPV is - € 39.700.

Nevertheless, this measure implies a huge work in order to stimulate and raise awareness between parents, children, teachers, headmasters and citizens in general about benefits of pedestrian home – school mobility, which are not monetizable. Such benefits are summarized in Table 18:

Eliminato: Table 17

Agents	**Not quantifiable benefits**
Parents of school children	Socialization
School children	Health benefits Increased autonomy Increased consciousness about sustainability
Local Authority	Diffusion of environmental culture Acquisition of best practices to share Image value
Schools	Diffusion of environmental culture Increased accessibility
Rest of society	More liveability in the streets

Table 18 - Non monetizable benefits

Municipalities are always strongly committed in planning and offering many social fundamental services, like nursery schools or school canteens, to citizens, although they are not profitable at all: actually, nursery schools or school canteens are very costly and they are not paid back by revenues coming from fees paid by citizens. Nevertheless, these services are still guaranteed even though they often prove to represent a loss for the Municipality budget.

A similar approach can be used for the implementation of school travel plans: costs have proved higher than benefits, but results achieved in terms of socialization between parents and children, health, increased autonomy and environmental consciousness, image value, increased accessibility for schools and liveability in the streets, although non monetizable, are much more important for society than economic revenues.

For these reasons, Comune of Monza intends to proceed with school travel plans, trying to extend this initiative also to other primary schools.

C3 Achievement of quantifiable targets and objectives

No.	Target	Rating
2B	Evaluating capital costs afforded to design school travel plans	**
2C	Evaluating maintenance costs to update school travel plans	**
3	Reducing fuel consumption in trips	**
8	Reducing emissions of air pollutants and greenhouse gases	**
13-14	Increasing users' acceptance of the introduction of school travel plans	**
15	Ensuring the accessibility of "Walking Buses" to the highest number of pupils	**
17	Improving attractiveness of Walking Buses by increasing parents' perception of security	**
NEW 1	Reducing the number of cars outside the school	*
NA = Not Assessed O = Not Achieved * = Substantially achieved (at least 50%) ** = Achieved in full * = Exceeded**		

According to results of data collection, it can be assessed that, even though the implementation of this measure has not achieved a substantial change in mobility habits of the interested population, nevertheless it has allowed to gain good results in terms of reduction of emissions, fuel savings, days of activation and reduction of the number of travels by car (52% of walking bus users said they changed their mobility habits) and of the number of cars ouside the schools (8,34% as a total between the four schools), so all target and objectives have been achieved.

C4 Up-scaling of results

Upscaling of this measure would mean introducing the walking buses in all primary schools of the city of Monza. There are 25 primary schools in total in the city in addition to the four pilot schools.

Nevertheless, an approach for upscaling of the measure is not easy to define. From a theoretical point of view, from the results of the survey, it could be possible to estimate the trend in driving children at school for all other primary schools in Monza. If school travel plans managed to reduce the number of driven children in the four pilot schools, the up scaling of the measure could ensure that a similar trend would be recorded also in other schools. The benefits of the introduction of the measure, if spread all

over the city, would involve less congestion and pollution and noise outside schools, a higher perception of safety and a healthier behaviour in young children.

However, the effects of the implementation in every primary school of the city could not be the same due to the different situation of every school: school population changes every year, since children from the fifth class change school and new children enter the first class, and parents' approach is not easily predictable. The choice on how to accompany children at school is strictly related to the means of transport chosen to reach the working place. Moreover, the availability of parents to drive the Walking bus is one of the key factors for the success of the implementation of the measure, and the effort required is lenghty and cumbersome, since it has to be guaranteed every day for the whole school year for at least five years.

C5 Appraisal of evaluation approach

The evaluation approach can be considered in line with the measure objectives, even though after this experience surveys activated to assess society indicatoris could have been planned differently, by using pilot classes as sample size to ask questions before and after the implementation of the measure. This would have allowed to better describe changes in mobility modes chosen for home-school journeys by the same families from the beginning to the end of ARCHIMEDES project, in order to be able to assess the modal change and to detect the inclination of students and parents to embrace low impact ways to make short trips in town, such as pedestrian mobility, the Walking Bus or carpooling.

Moreover, specific attention to the reader-friendliness and complexity of how the questionnaires are presented can be a driver to families which, in some cases, have been somehow reluctant to answer to all questions needed for a deeper evaluation approach.

Main difficulties, anyway, have been faced to calculate fuel savings and non-emitted CO_2, through simulating methods, which may seem somehow uncertain and not based on scientific calculations.

C6 Summary of evaluation results

The survey held during the RTD stage about mobility habits of families whose children attend the four schools and have joined ARCHIMEDES project shows that a good percentage of children usually walk to school. In fact, from the results, we have a percentage of 45% of children walking to school, which is positive and significant. After the implementation of the measure these significant results can be reported.

- The percentage of children who have participated to the walking bus is 15%, which can be assessed as a good result, considering that this kind of measure is aimed at changing people's mobility habits.
- In some schools days of activation have been 161 out of the 200 fixed by Italian law, which is a very important result in terms of continuity (an average of 121 days of activation for each one of the 10 walking bus routes) : parents are more confident to enroll their children to a walking bus (in case they are not available to accompany them) if they know that it is operational during the whole school year.
- Sensible fuel savings (**- 274,4 l** from April to June 2011; **- 764 l** from October 2011 to June 2012) and reduction in CO2 emissions (**- 588 kg** from April to June 2011; **- 1.637 kg** from October 2011 to June 2012) have been estimated.
- An average 8,34% reduction of car traffic in front of the four schools involved , even though with different percentages for each school.
- Surveys realized with families (both participants and non-participants) show a good level of awareness of the measure, in addition to the idea that the walking bus is "useful and

interesting" or "convenient for families" and that it has a positive impact on children (on socialization and autonomy above all) and on pollution.

- In terms of health, autonomy, image value, consciousness, results for Municipality of Monza have been very positive. Moreover, all children who joined the walking bus were given a voucher of 20 € at the end of the school year as a contribution by Comune of Monza to families' expenses for school supplies: this initiative has been welcomed both by headmasters and teachers and by families of children involved in the demonstration activities.

As far as cost-benefit analysis is concerned, even though the BCR shows that expenses are higher than benefits, it must be considered that, when activities concern a behavioural measure, results achieved in terms of socialization between parents and children, health, increased autonomy and environmental consciousness, image value, increased accessibility for schools and liveability in the streets, although non monetizable, are much more important for society than economic revenues, since they represent a good opportunity of creating an environmental consciousness since an early age.

C7 Future activities relating to the measure

For school year 2011/2012, the final of the ARCHIMEDES project, activities have been dedicated to retracing and strengthening the experience of the last part of this school year. In particular, the aim is the development of communication aspects and of documentation to promote the experience by a local point of view: more specifically, the experience of the four schools involved will be exploited for other schools of the city with the aim of having even more children walking to school and less traffic during peak hours.

Unfortunately, the strong request coming from teachers and pupils to establish a direct contact and exchange of information, ideas and projects with children of other European cities involved in ARCHIMEDES project has not been achieved due to several problems to have the authorization to use web platforms that allow direct contact and exchange of real-time information (e-mail, Skype), and also because of difficulty in using a foreign language.

After the success achieved for the entire school year, demonstration of walking bus services will continue, with the expectation that larger and larger groups of parents will get involved, also thanks to results of the learning history workshop and to the Mayor's assurances about the continuation of the measure. Exploiting the experience of pilot classes to promote the initiative, new subscriptions of children entering the first year of primary schools will be gained, also trying to recruit new parents who will participate actively to the demonstration stage showing them the good results of this first period of implementation.

Moreover, new schools will be approached in order to start the upscaling of the experience of the pilot schools to the whole city.

D Process Evaluation Findings

D0 Focused measure

The most important reasons for selecting this measure as focus measure have been:

2	The measure fits into the city policy towards sustainable urban transport and / or towards sustainability in general
7	Participation of a range of different actors
9	The measure is regarded as an example measure

D1 Deviations from the original plan

No deviations from the original plan have been reported.

D2 Barriers and drivers

The City of Monza, with approximately 121,000 inhabitants, is divided in five administrative districts, as shown in the below picture, and has 16 quarters roughly corresponding to the territorial venue of parish churches.

.

Of the four schools which have chosen to join ARCHIMEDES project, three (Citterio, Buonarroti and Manzoni) are located in District 2 , whils the other one, Omero Primary School, is located in District 3.

District 2 is the largest district in the city, with many important suburban roads and radial lines of primary viability for the distribution of urban traffic. District 3, on the other hand, is crossed by the road system to access the city from the south.

For each school, meetings with parents were organized in order to plan demonstration activities aimed at testing walking bus routes and to assess, from the point of view of adults, walking bus routes. More specifically, useful information emerged about the routes to be tested, according to the adults' experience both as car drivers and pedestrians along those routes.

Omero School

The paths resulting from the analysis of the students' place of origin (home-destination) have been considered suitable by parents involved in the workshop. During meetings, there was some general criticism concerning narrow streets of the neighborhood, more specifically in the areas surrounding the school.

Moreover, it was pointed out that in Sauro Street, Omero Street and Mogadishu Street there are several violations of parking rules, since at the time of entry and exit from the schools in the area (nursery, primary and secondary schools with different entry/exit times), many illegal and antisocial parking behaviors can be noticed (second row, occupation of parking places reserved for disabled people or to school bus, parking in no parking areas), especially on in rainy days, when parents driving their children to school are not willing to leave them far from the entrance of the school.

Citterio School

Citterio School has been the first primary school in Monza which has tested the walking bus service, so parents were already used to this kind of demonstration activity: no difficulties have been reported by parents of children attending the school along the proposed routes.

Buonarroti School

No difficulties have been reported by parents of children attending the school along the proposed routes, despite some narrow streets in the neighborhood. There have been no critical aspects highlighted.

Nevertheless, the area is affected by the presence of men-at-work for extensive street works due to the construction of a tunnel aimed at improvements in traffic flow between Buonarroti Street and Industrie Road.

These works are causing difficulties and inconvenience especially to families of children attending the school but living on the side of Buonarroti Street located south with respect to Industrie Road, which are compelled to use their car to take children to school, as shown in the two following figures

Measure title: **School Travel Plans in Monza**

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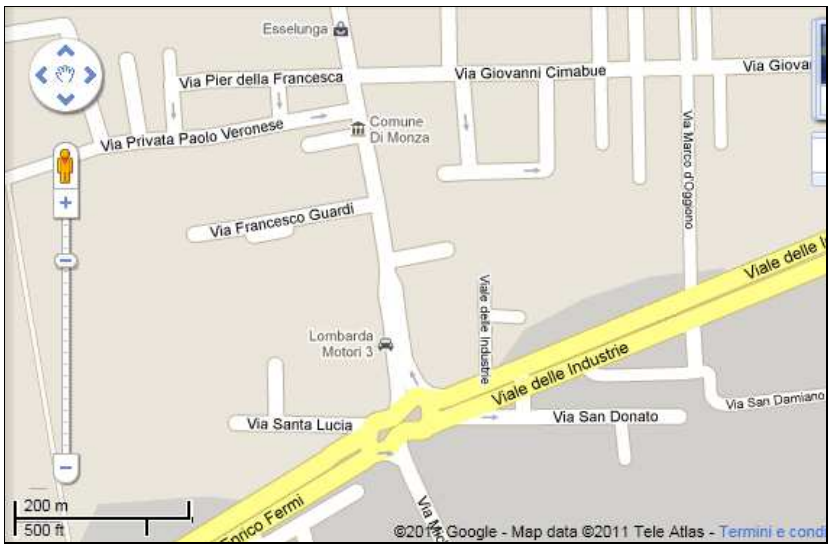


Road network surrounding Buonarroti school

Satellite view of the area

Manzoni School

The street walkability of the district has been evaluated positively by the parents participating in the workshop, who have emphasised two general aspects: first of all, there is a need to enhance the road signs, with particular reference to the visibility of pedestrian crossings (Guardini street). A second aspect is to improve the presence of traffic flows through the district, with particular reference to the axis of Mameli Street (where the school is located), used as the axis of easy access to highways and Industrie Road from the near city of Brugherio.

D.2.1 Barriers

Preparation phase

- **Involvement / communication –** Parents' distrustfulness at the beginning represents a hindrance to the activation of the measure. Parents have to entrust their children to someone else and are often afraid.
- **Cultural -** Some parents do not participate because they have already an established timetable that they find difficult to change.
- **Other –** At times Even purely practical matters, such as the **heaviness of the schoolbags**, may become a strong deterrent to participation.

Implementation phase

- **Involvement –** Participation stands around 10-15% rate of the school population, since the majority of parents are not convinced yet of positive effects of the walking bus.
- **Problem related -** There is always the need to recruit more parents. In some cases the entire trial has relied on the availability of a few parents who do not know if they can sustain this commitment for all next year.

Operation phase

- **Problem related -** Every year there are some accompanying parents who have children attending the last class of primary school, so it is possible that for next school year some walking bus lines could not be reactivated in the same way, so new efforts will have to be done to find new parents.
- **Organizational –** Due to funds' reductions because of economic crisis, schools are undergoing a shortage period and teachers are not particularly interested in committing in further projects which involve more work with no economic return. This situation may represent a hindrance to the active involvement of teachers, which is vital for a successful implementation of the walking bus.
- **Other -** Weather conditions can definitely affect participation: generally defections occur during rainy and bad weather.

D2.2 Drivers

Preparation phase

- **Organizational –** The network built during parents' workshops was helpful to clarify many doubts about logistic details of the service which were carefully planned: this allowed to manage safely small problems that occurred during the routes, like the management of troubled children, timetable modifications, shifts of accompanying parents and communication to parents of the children enrolled.
- **Cultural –** The interconnection between the walking bus initiative and I Walk To School event, organized in Monza since 2001, has somehow prepared families and children to learn about the walking bus. "I walk to school" is an aggregating and emotionally involving initiative, but it is a sporadic experience, limited to one week, but that collects joining of almost the whole school. The Walking bus instead represents an opportunity to go to school on foot all the year long. In this way the initiative "I walk to school" has helped to communicate the advantage of the walking bus, to enhance the number of new followers of the service and to induce more people to change their habits in the everyday life.

Implementation phase

- **Communication –** Children played a very important role as promoters of the enrollment in Walking bus. The work with pilot classes, which have activated the communication campaign about the service addressed to schoolmates, has been very successful: children, if properly stimulated and encouraged, become the key to motivate their parents to take part in the service.
- **Other –** In order to promote the visibility of the groups, parents have furnished colored bibs for subscribers to ensure that groups could be more visible. The distribution of a small gadget, useful to carry out the service in a safe way, has helped children to increase the sense of belonging to the group

Operation phase

- **Involvement –** The constant participation of members who have used the walking bus on an ongoing basis throughout the whole activation period has made the experience a daily habit for the participants and different groups are now well established and motivated.
- **Other** - Nice weather has played an important role as an incentive. According to all participants a further component of the success of the experiment was a mild winter that has certainly encouraged the participation to the walking bus, reducing the number of days when the measure was not operational due to bad weather

D.2.3 Activities

Preparation phase

- **Planning –** Routes for walking buses have been designed so to operate as public transport lines for children to walk to school. During workshops with students, their personal data have been collected in order to study lines with the aim to pick up as many pupils as possible, placing stops along roads where most students live. Lines

with stops and timetables have been defined and agreed with families of pupils involved in the demonstration. Security aspects of the scheme have been discussed with key stakeholders such as Local Police, teachers and school managers.

- **Involvement/Communication** - Both teachers and parents have been involved through communication activities in order to explain the importance of pedestrian home-school mobility and to share the approach for participatory workshops to be held with pupils.
- Organizational action; A survey has been held with the 800 families of children involved in ARCHIMEDES in order to learn more about their home-school mobility habits with the aim to better plan walking bus routes.

Operation phase

- **Cultural** - Problems have been shared with people involved in the implementation of the measure and a network has been created to exchange experiences with other cities which have already implemented Walking Buses. It has been asked to schools' headmasters to place the walking buses activity in the planned educational offer of the school so to constitute a "Quality Trademark" for parents who are choosing a school for their children.
- **Communication**– Thanks to the design of slogans and drawings, classes have contributed to gather information in order to prepare a strong communication campaign about the launch of the walking bus routes in their school. Ideas, themes, slogans and drawings have been of fundamental importance for the development of flyers aimed at raising the number of subscriptions to demonstration activities in each school.
- **Spatial –** Revamping and maintenance of street signs, with particular attention to pedestrian crossings.

Implementation phase

- **Planning -** Walking buses have been activated since April 11th 2011 till the end of the school year (June 9th) for about 35 days in the schools involved in ARCHIMEDES,and after the start of school year 2011/2012 the Walking Bus initiatives have been reactivated for the whole school year.
- **Communication -** At the conclusion of the school year a guide to make a walking bus ("Il Walking Bus in tasca", which stands for "The Walking Bus in your pocket") has been developed and distributed to all children of the four involved schools and to all primary schools in Monza in order to exploit the experience gained and to extend it to other districts of the city. This guide has also been given by children to the Mayor of Monza in a public meeting where students have explained the "recipe" to make a good Walking Bus.

D.3 Participation

D.3.1. Measure Partners

- **Comune of Monza –** Mobility and Transportation Office Department (leading role).

- **Creda onlus** – Subcontractor for developing research and demonstration stage of the measure in the four involved school principal role in research stage.
- **Primary schools** – Primary schools Omero, Citterio, Buonarroti, Manzoni have participated actively since the research stage to plan walking bus routes, and in the demonstration activities, with an important role in communciation activities (principal role in demonstration stage)

D.3.2 Stakeholders

- **Local Police –** Local Police has evaluated of safety of pedestrian paths to schools
- **Other primary schools** – The example of the four schools involved in the measure has served as an example to be followed by other schools, who have participated to learning history workshop to see results of the implementation for a future upscaling of the measure

D4 Recommendations

D.4.1 Recommendations: measure replication

- **Role of children in communication**. This important role must be highlighted, since parents are more available to join the walking buses if children feel strongly involved in communicationg the importance of their activity.
- **Involving new parents.** There is the pressing need to disseminate the initiative more among parents of the schools, because parents represent the key component of the success of the experiment. They decide the enrollment of their children to the service and, overcoming fears and apprehensions, they assist the group of children in the walking bus, offering, for example, to be supervisors. It seems important to the meeting participants to repeat in-depth meetings and events dedicated to parents.
- **Presenting the walking bus service to the parents of future first classes** so that new parents can evaluate the subscription to the walking bus service in the beginning of the new school cycle.
-

D.4.2 Recommendations: process

- **Parents' involvement - T**o implement the project and to realize the planned actions cooperation with parents is of fundamental importance, because they offer their availability as supervisors on the one hand, but they also decide about the enrollment of children on the other hand. Moreover parents, through hearsay, can effectively disseminate information about the service.
- **Teachers' cooperation -** It is important to strengthen the collaboration with teachers of involved schools because they are the link with the parents for the dissemination of walking bus information and for stimulating the participation of children.

Informative campaign –It is very important to develop a strong informative campaign, aimed at identifying suitable target groups to implement the measure and at finding the right drivers to use in order to push people to test the service.

MEASURE 41

SCHOOL TRAVEL PLANS IN MONZA
ANNEX 1 TO MERT

RESULTS OF THE SURVEY DEVELOPED DURING RTD STAGE

Before starting with the implementation of the measure, a survey has been conducted between the 887 families with children attending schools participating in the project Civitas Archimedes: 184 from Buonarroti, 350 from Citterio, 130 from Manzoni, 143 from Omero and 80 from S. Alessandro. This last school was included because within S. Alessandro structure there are the first and fourth classes, sections E and F, [1E, 1F, 4E, 4F] of Omero school.

The survey was conducted with the purpose of gathering information on mobility modes of families, and it allowed to:

- describe family structure according to some variables of interest (family composition, parents job and types, timetables and means of transport adopted) for the purpose of the design and testing of future walking buses (Walking Bus).
- analyze forms of home-school mobility, particularly pointing out the distribution of students attending the school, the means of transport used to make journeys and children's accompaniment.
- survey the propensity to experiment with alternative styles of mobility during the home-school route.

The survey was conducted in May 2009 with the distribution of a questionnaire for families to fill in and return to class teachers.

The phases of work planned for the realization of the research were as follows:

- defining the questionnaire form in coordination with the Transport and Mobility Office of the City of Monza;
- retrieving data about the school population covered by the survey;
- delivering the questionnaire form to all families with children enrolled at schools Buonarroti, Citterio, Manzoni, Omero and S. Alessandro through classroom teachers;
- collecting collecting compiled questionnaires with the collaboration of classroom teachers;
- database design;
- data entry;
- data processing;
- report of investigation.

The questionnaire was developed in close synergy with the Transport and Mobility Office of the City of Monza, capitalizing the results achieved through previous surveys on home-school mobility.
The questionnaire has four sections – general information on households, data on the home-school and school-home routes and, finally, a section about testing the Walking Bus – including seventeen closed-ended questions, either with single or multiple choices, and open-ended questions to collect some specific data.
The following areas were investigated:

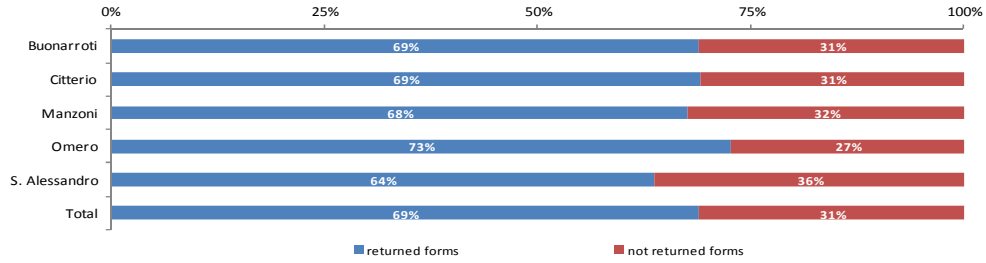
- families: their composition, parental employment, workplace, schedule, means of transport and time used to reach the workplace;
- home – school routes and school-home mobility: exit time in the morning, the means used, the distance, modes of accompaniment ;

- perceptions about the degree of autonomy in the child's travel to school and their motivation to accompany;
- the Walking Bus: willingness to participate, convenience, issues.

Overall, 612 questionnaires were returned and analyzed, reaching the 69% of delivered forms, so that a wide coverage of the total sample universe was obtained, also thanks to the active collaboration of all the teachers who supported this phase of the project.

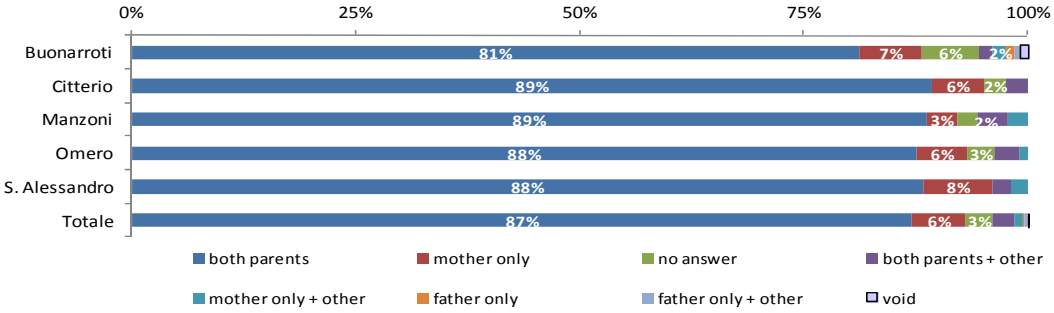
The results of this survey are shown below.

In the graph below the percentage of the returned forms is showed for each school.



Data regarding the characterization of the families involved in the investigation is analyzed in the following graphs. In details:

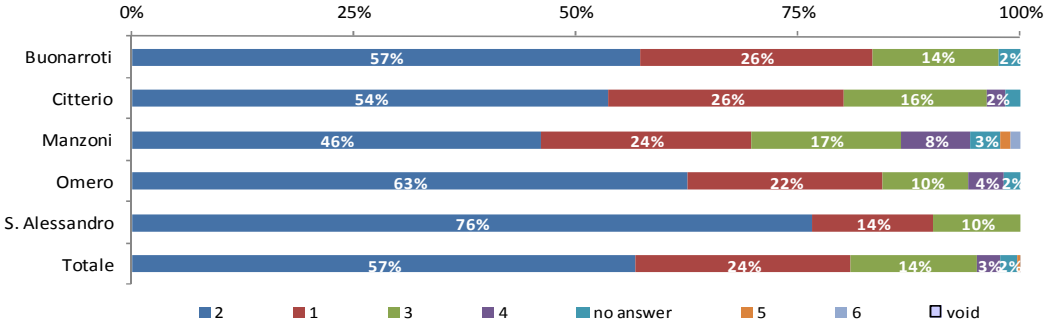
- ***HOUSEHOLDS***



Household composition

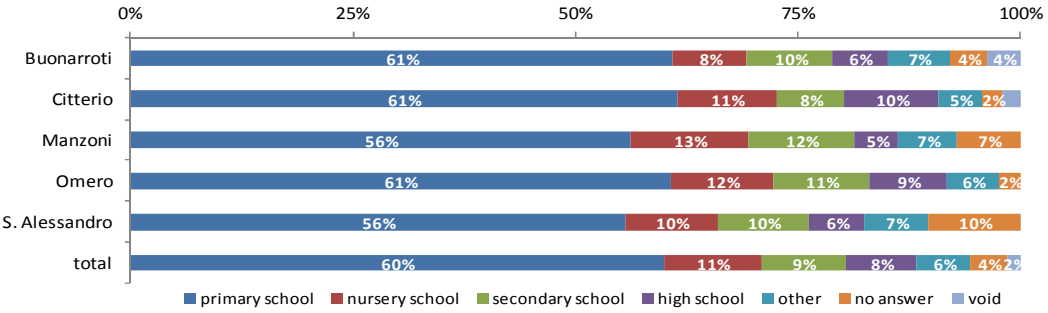
Families are mostly composed by both parents with a 87% of two-parent families.

- ***Number of children per family***



There is the presence of two children in 57% of cases, only child representing the 24% of the situations analyzed, whilst families with three children or more are 17% .

- ***Type of school attended by children***



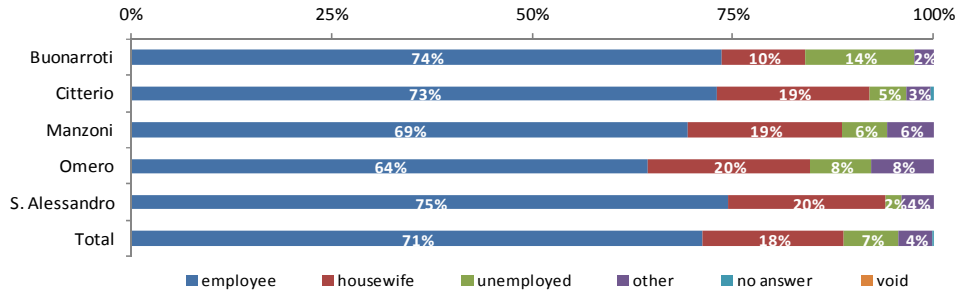
The distribution of children with respect to the type of school attended and thus, indirectly, to their age reveals a strong presence of children attending primary school (60%), followed by children attending in the nursery school (11%) then secondary (9%) and high schools (8%).

- ***Type of employment of parents***

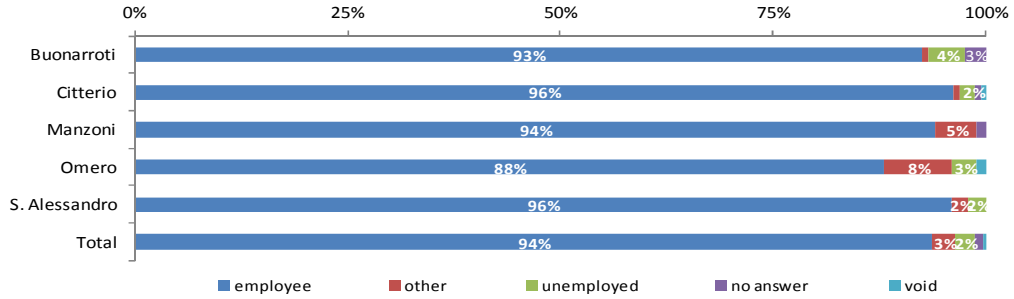
Data regarding the occupation of parents show a nearly full occupation of fathers (94%) with a 2% unemployment and 3% that responded "other". Working mothers are the majority and the percentage

of employment stands at 71%, while 18% are housewives and 8% instead claims to be unemployed. So that 27% families who responded have at least one parent who is not currently employed and that can potentially manage the family full-time, whilst about 71% families who responded to the questionnaire have both parents working, with possible difficulties in managing the family, especially as regards the movement of children that is to be surveyed in this research.

Job situation – mothers



Job situation - fathers

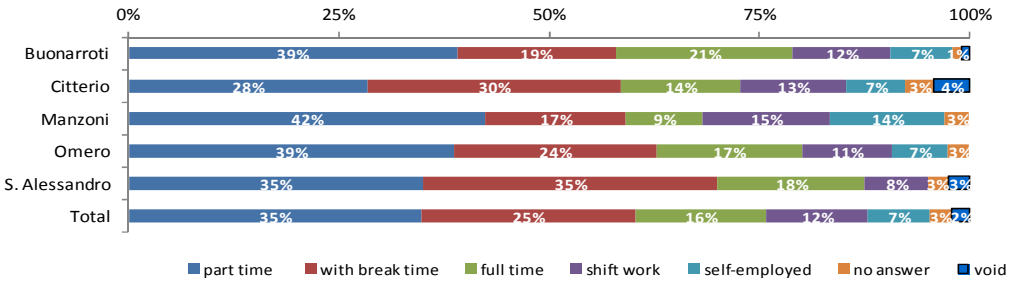


Data on the type of work reveal a rather complex situation and with some significant gender differences. 41% of working fathers have a scheduled break, 23% have full time, 19% are self-employed, while 13% work shifts. There are about 2% of fathers employed part time while 35% of mothers are employed this way. Jobs with break time stand steadily for women representing 25% of the total. Full time employees follow up with 16%, the ones working shifts with 12%. Only 7% of mothers said they can manage their own working hours.

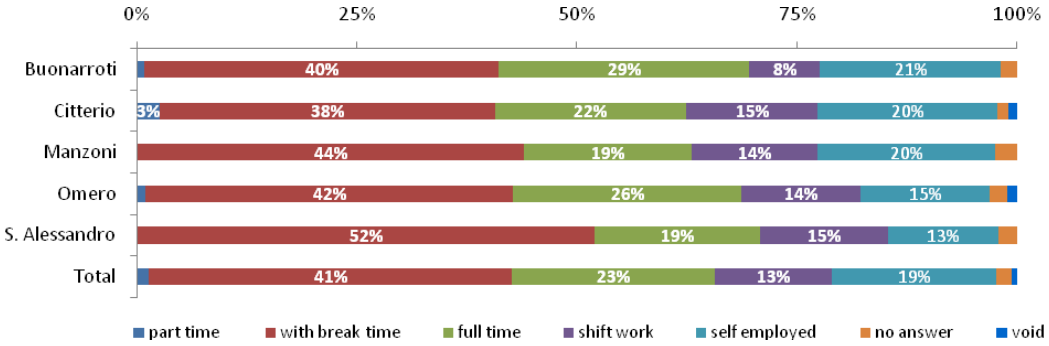
Measure title: **School Travel Plans in Monza**

City: **Monza** *Project:* **ARCHIMEDES** *Measure number:* **41**

Type of working time - mothers

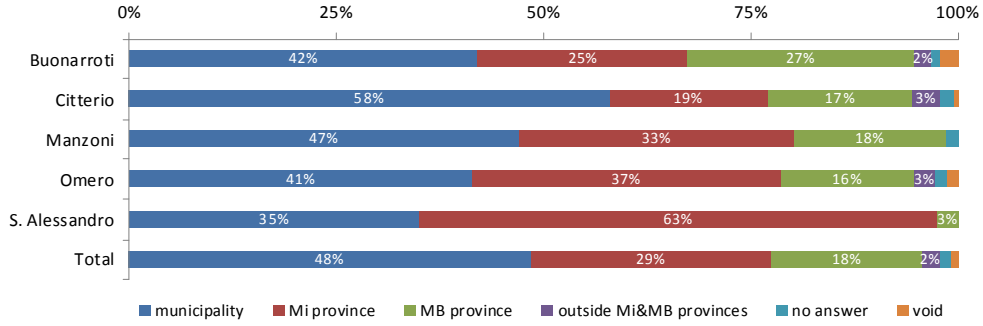


Type of working time - fathers

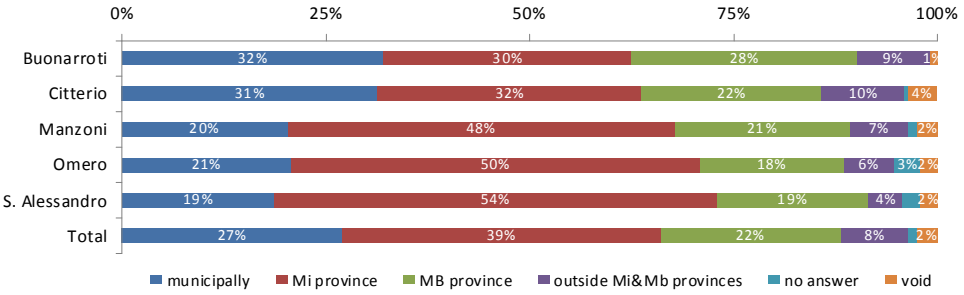


Regarding the location of workplaces, especially mothers work in the same municipality of residence (48%) while 39% of fathers work in the province of Milan (mothers 29%) and just 27% in the same municipality of residence.

Workplace - mothers

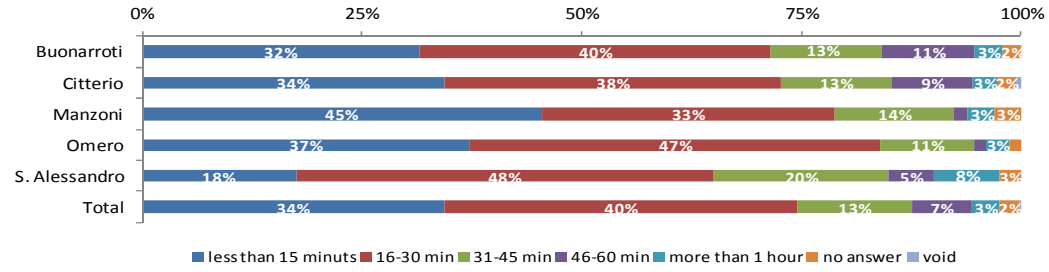


Workplace – fathers

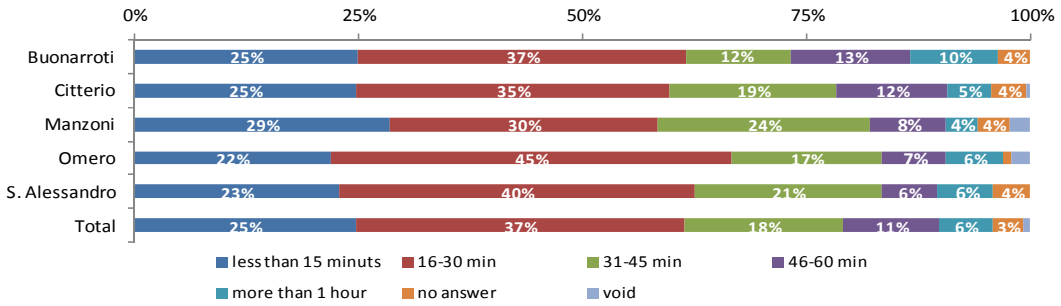


Distribution of workplaces is closely correlated with the time needed to get to work: 40% of mothers said to use in this activity between 16 and 30 minutes (37% of fathers), 34% less than 15 minutes (25% of fathers), 13% between 31 and 45 minutes, 7% about an hour and only 3% more than an hour. Same situation for fathers, with rates slightly rising in the longer distance: 18%, in fact, claims to need between 31 and 45 minutes, 11% between 46 and 60 minutes, 6% more than an hour.

Time needed to reach workplace - mothers



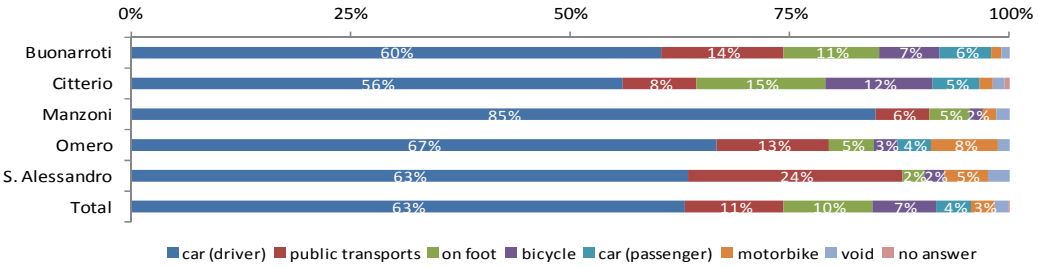
Time needed to reach workplace - fathers



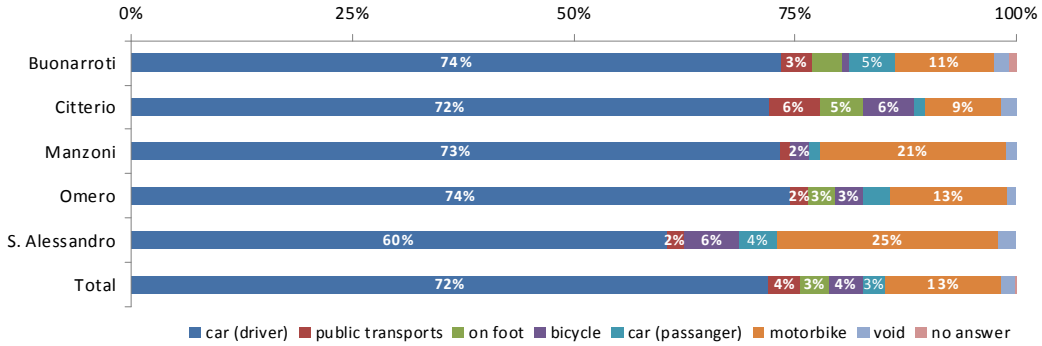
Mobility modes of parents

The car is still the most used means of transport to get to work: 68% of employed parents who answered the questionnaire use the car in his daily route toward workplaces. But there are gender differences in mobility too. In particular, men tend to use cars – 72% against 63% – and motorbikes (13%), women more often choose public transport (11%) and even more frequently walk (10%) and cycle (7%).

Means of transport used to reach workplaces - mothers



Means of transport used to reach workplaces - fathers

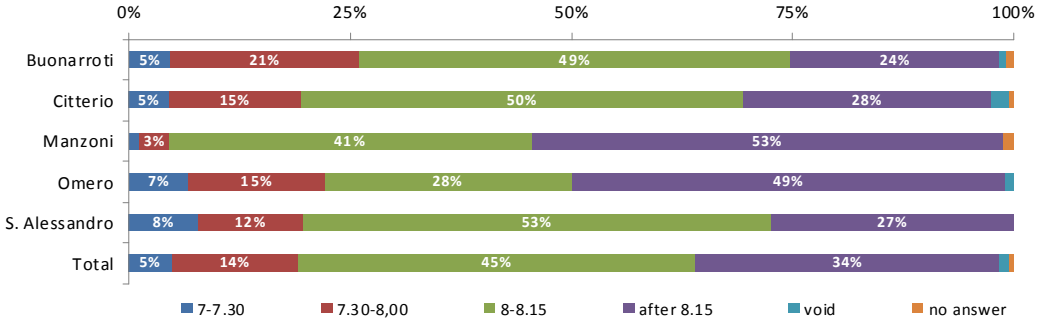


Home-school, school-home routes

The following data are concerning the home-school and school-home routes, focusing in particular on the exit time to go to school in the morning, on the perceived distance between home and school, and on accompanying modes used for mobility.

- ***Home – school journey***

Exit time to go to school

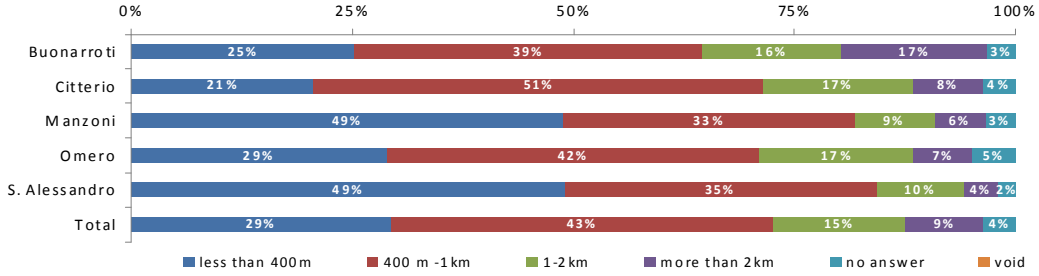


Approximately 79% of families surveyed stated that in the morning their child goes out to go to school after 8.00, 14% between 7.30 and 8.00 and only 5% between 7.00 and 7.30. Moreover, most of the of families stated living near the school, with 72% claiming to reside within the distance of one kilometer, 15% between 1-2 km and the remaining 9% over 2 km.

Within this scenario, we must report the case of S. Alessandro school, where, despite 49% of interviewed claimed to live within 400 meters away from school and 35% between 400 meters and 1

km, just 8% chose "between 7.00 and 7.30" and 12% "between 7.30 and 8.00" as exit time option. This could either be determined by the position of the school, located in S. Alessandro street which is near the junctions of the North Freeway [Tangenziale Nord] and the Milan-Brescia highway with consequent possibility of congestion and traffic problems, or by a greater presence of children attending pre-school.

Home-school distance

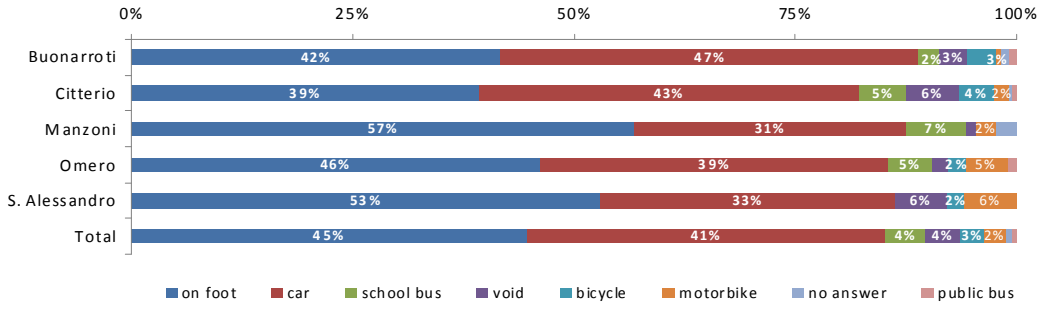


Questioned about the means of transport used to go to school, 45% replied that the child goes to school on foot, 41% that the child is accompanied by car and 4% instead that the child uses the school bus and bicycle.

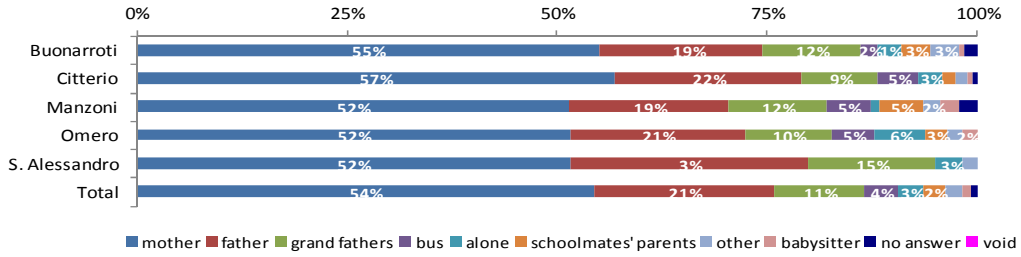
Mainly mothers accompany their children to school (54%), followed by fathers (21%) and grandparents (11%), and only twenty-two children, representing 3% of the total, go to school alone, respectively four children from Buonarroti, eight from Citterio, one from Manzoni, seven from Omero and two from the school S. Alessandro.

Of great interest in the project the situation highlighted at the Manzoni school in which 57% claimed to accompany their children to school on foot.

Means of transport used to go to school



Who takes children to school



Further analysis upon time of accompaniment of children by working parents, lead to discovering more and more working mothers committed to carry out the task of accompaniment to school, i.e. 214 women compared to 126 men. Moreover, cross-checking the data on the means chosen to reach the workplace with the one about means used to accompany their children to school shows that 72% of mothers and fathers who use the car to get to work choose the same to accompany their children to school while about 25% are likely to accompany their children on foot and then take the car and go to the workplace. 74% of grandparents who take care of grandchildren prefer to accompany them to school walking and only 24% make the journey by car. The case of S. Alessandro school is worth emphasising because all of the grandparents are moving on foot.

The picture that emerges from the data collected shows a potentially critical situation for the number of parents who, despite the proximity to school, decided to make the short distance between home and school by private means, probably due to the limited time available in the morning before reaching their workplaces, and the perception of car as the quickest mean, with consequent traffic problems and safety issues for pedestrians near the school.

The fact that 45% of children go to school on foot is still positive and significant. In future it could be the driving force for involvement in initiatives such as those of Walking Bus even those parents who currently carry out the accompaniment to school with private car.

Mobility modes of working mothers accompanying their children to school

		Mobility modes accompanying children to school							
		car	on foot	bicycle	motorbike	school bus	bus	void	Total
Mobility modes to work	car	103	34	2	0	1	0	3	**143**
	on foot	6	18	0	0	1	1	0	**26**
	public transport	2	12	0	0	0	0	0	**14**
	bicycle	0	4	5	0	0	0	1	**10**
	car (passenger)	5	1	0	0	0	0	1	**7**
	motorbike	0	0	0	4	0	0	0	**4**
	bicycle + car	1	0	1	0	0	0	1	**3**
	on foot + bicycle	1	1	0	0	0	0	0	**2**
	bicycle + public transport	0	1	0	0	0	0	1	**2**
	on foot + bicycle + car	0	1	0	0	0	0	0	**1**
	motorbike + car	0	1	0	0	0	0	0	**1**
	car + public transport	0	1	0	0	0	0	0	**1**
									214

Mobility modes of working fathers accompanying their children to school

		Mobility modes accompanying children to school					
		car	on foot	motorbike	bicycle	void	Total
Mobility modes to work	car	69	24	1	0	2	**96**
	on foot	0	1	0	0	0	**1**
	public transport	0	3	0	0	0	**3**
	bicycle	0	1	0	0	0	**1**
	car (passenger)	2	1	0	0	0	**3**
	motorbike	2	2	8	0	1	**13**
	bicycle + public transport	0	0	0	0	1	**1**
	on foot + bicycle + car	0	0	0	1	0	**1**
	motorbike + car	2	0	0	0	0	**2**
	on foot + car	1	0	0	0	0	**1**
	car + public transport	1	0	0	0	0	**1**
	no answer	2	1	0	0	0	**3**
							126

- ***School – home journey***

Compared to the journey from school to home, the percentage of children who walk rises to 52%, while the preference for car declines to 35%. The percentage of children using school buses and cycling remains almost unchanged. Especially mothers (389 i.e. 57% of total) have to deal with the return from school of children, just as it was for the home-school journey, while fathers' involvement in accompaniment decrease to 79 (i.e. about 12%). The role of grandparents assumes great importance being committed to return the grandchildren in 17% of cases, mostly on foot (68%) and car (26%).

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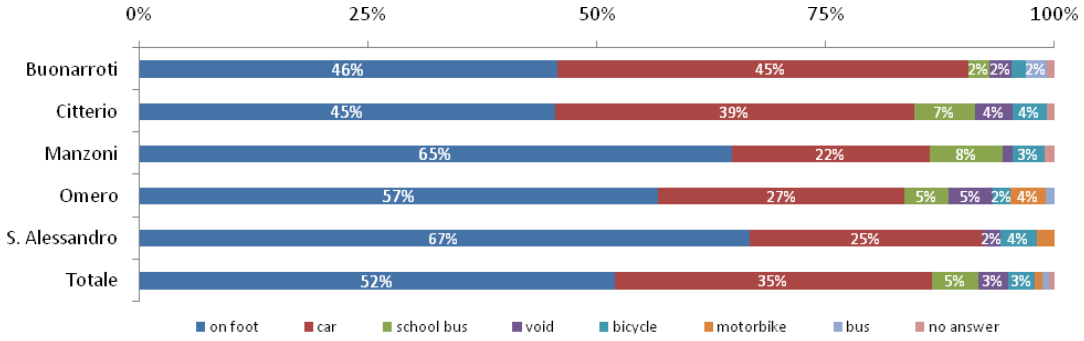
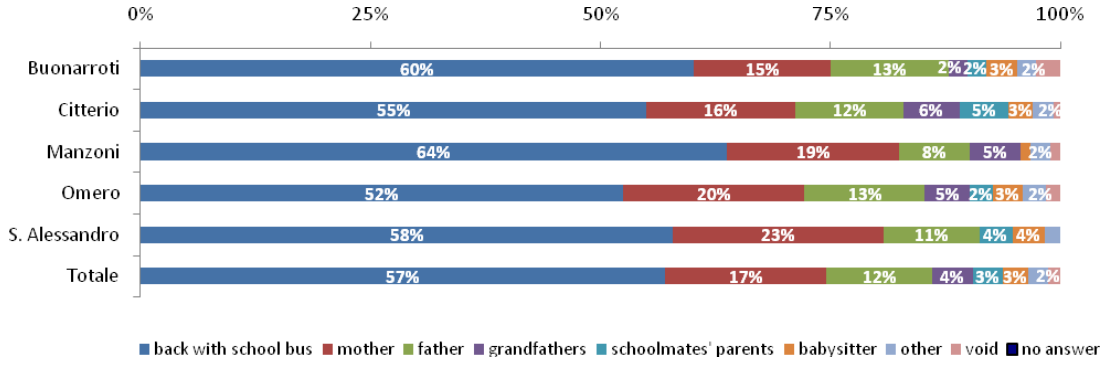
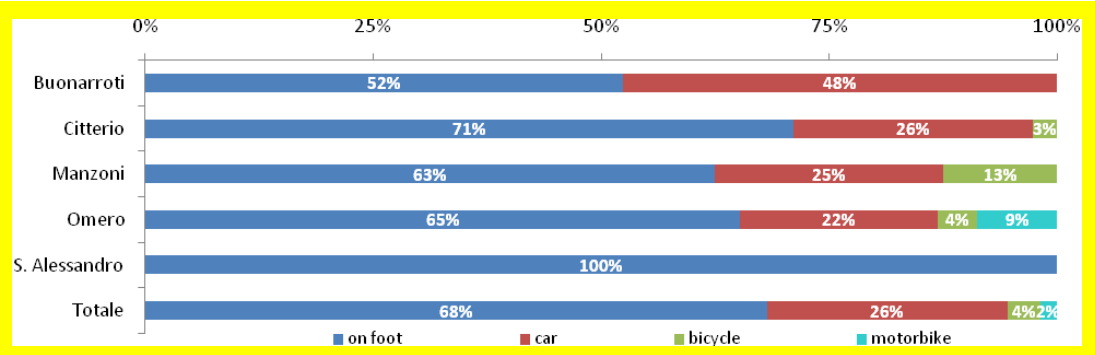
Means used to come home from school



Who's in charge of taking children from school



Mobility modes for grandparents accompanying grandchildren at home



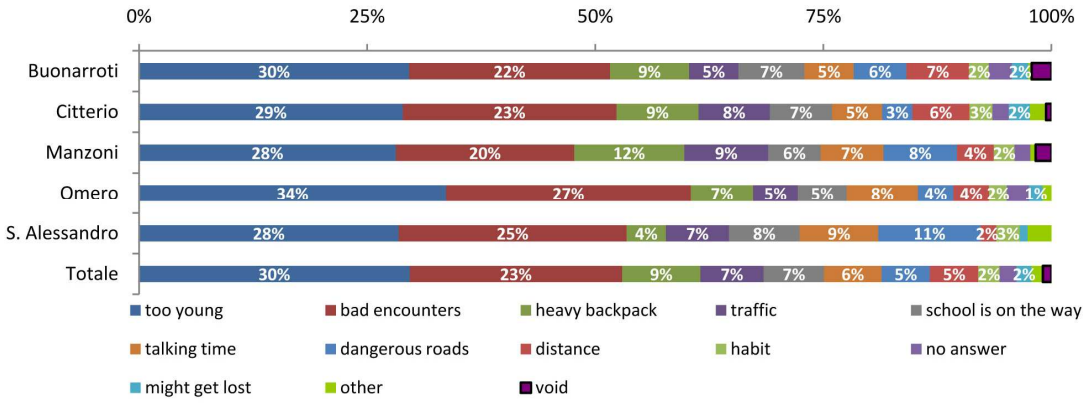
Some questions concerning knowledge of the Walking Bus experience and of its positive/negative aspects have been asked. Data showed that there are very few children going to school by themselves whilst most of them are usually accompanied by parents or grandparents. Among the reasons why children do not go to school independently identified by the parents interviewed, there are:

- the perception that children are too young to make the trip alone (30%);
- the fear that they can have bad meetings (23%);
- too heavy rucksacks to carry (9%);
- the presence of heavy traffic routes (7%);
- home-school distance and dangerous roads (5%).

There are only 7% of the families who say they accompany their children to school for convenience during the trip to go to work or other destinations.

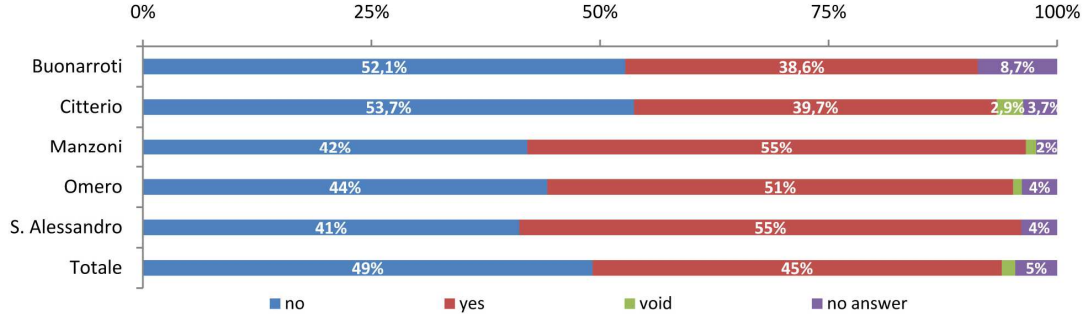
6% of parents of the families surveyed see accompaniment as a moment of dialogue and relationship with their children and only 2% accompany their children to school because they might get lost along the route.

Reasons to accompany children to school



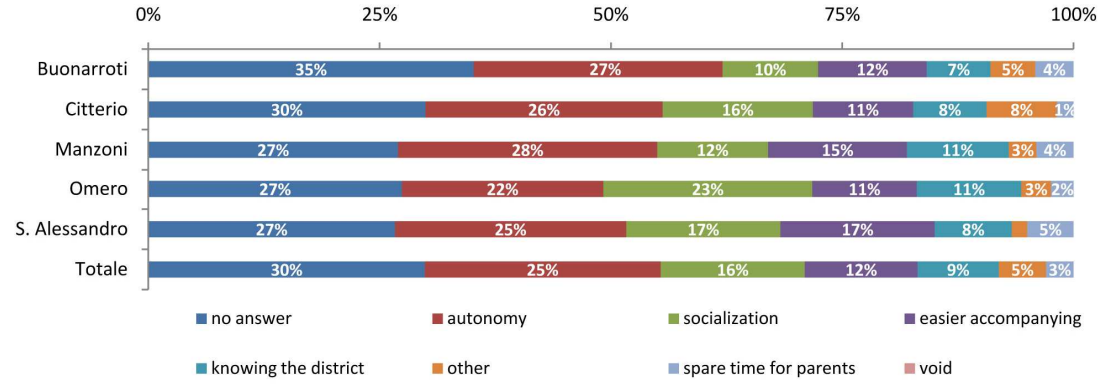
With a specific question it has been investigated the willingness of parents to participate in initiatives like Walking Bus or carpooling. The scenario that has emerged is that of splitted up opinions: 45% of survey participants advocates the possibility of experiencing a new arrangement for the journeys from school to home and from home to school. But 49% seems not interested in the initiative, and the remaining 5% is not responding.

Interest for the Pedibus service



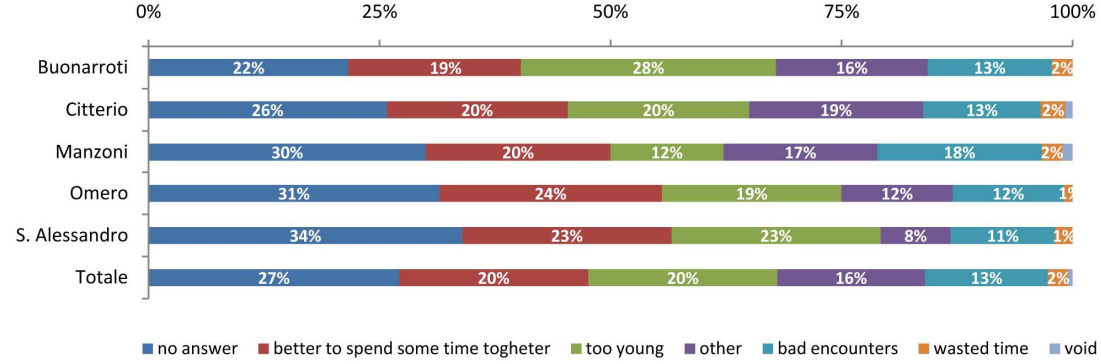
The Walking Bus may be an important service, since 25% of households interviewed think that the children can become more autonomous, that this experience will allow them to socialize with other children (16%) and to explore the neighborhood and the environment in which they live (9%). In addition to this, 12% of families believe Walking Bus could be a valuable aid for the family organization, facilitating the task of accompaniment of the children to school.

Positive aspects of Pedibus



Among the issues reported by parents on such a project, 20% claimed that their children are too young for Walking Bus, preferring instead to share with them the time to make the journey home-school, 16% said that children could face bad encounters during the journey and about 27% did not answer.

Problematic aspects of Pedibus



SUMMARY OF RESULTS OF THE SURVEY

A general profile of the families interviewed shows them mostly composed of both parents and with the presence of two children, predominantly attending primary school. A thorough analysis regarding parents showed a nearly full employment of the fathers, while nearly 20% of mothers are housewives. Still about 70% families have both parents working, who often choose to use private car to make the journey home-school, even though likely to provoke heavy traffic near schools and traffic jams that can lead to unsafe situations for students and all citizens who are walking around school during the entry or exit time.

With respect to working time, fathers are employed mostly in jobs with a scheduled break (41%) and full time (23%), while working mothers usually have part-time jobs (35%). Moreover, about half of mothers who answered to the questionnaire say they work in the same municipality of residence while fathers primarily work in the province of Milan. The car is the most used mean of transport to get to the workplace. It is clear that mothers are more likely to use alternative means of private means, for example by choosing public transports, cycling or simply to make journeys on foot. The results highlight a greater dedication of time by mothers to take care of accompaniment of the children at school and of their return, compared to fathers commitment.

Regarding more specifically the home-school route, the majority of families declare to leave home between 8.00-8.15 am and 34% even after the 8.15. This figure is closely related to home-school distance perceived by parents, including for 43% of those surveyed between 400m-1Km and for 29% less than 400 meters. The people interviewed are divided according to how accompany a school: 45% prefers to move on foot while 41% by car. Mothers are the most involved in accompaniment, followed up by fathers and grandfathers. The research has highlighted the reasons behind the choice of accompanying their children to school: 30% of parents said they consider their children too young to go to school by themselves, 23% think that they can face bad encounters, while only a few parents think that the backpack is too

heavy or that the roads do not present the safety features necessary to ensure the usability to pedestrians.

With respect to the inclination toward changing mode of accompaniment, for example advocating pedestrian mobility, the parents interviewed reported that Walking Bus could provide an important service to develop the autonomy of their children, allowing an improvement of socialization with other children and a consolidation of skills and knowledge linked to the territory of the district where they live.

The interest in experimenting with this activity was high: 45% of surveyed families were favorable to the possibility of testing this alternative mobility mode and rearranging the organization of home-school routes. Such a result expose a situation of potentially positive attitude to the activation of actions planned within the framework of activities prospected by ARCHIMEDES project.