

**Measure title: Use of real time applications for travellers**

**City: Malmö**

**Project: SMILE**

**Measure number: 12.1**

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## **A Introduction**

Measure 12.1 involves the installation of real time applications for the bus route system in Malmö. Measures 8.1, 8.2, 12.1, 12.3 and 12.7 are, if considered together, all part of the new bus system. The overall goal of a 10% increase in bus travel by the end of 2006 and with 30% by the end of 2010 will be achieved by all of these measures working together.

### **A1 Objectives**

To install a traffic information system with real time information at bus stops to be able to give customers extensive information for their journeys. In this measure about 50 real time signs at bus stops and 11 monitors in shopping centres and other strategic positions have been installed. Existing signs showing planned time have also been upgraded to show real time information.

The measure objectives are:

- **Objective 1** – To increase public transport by 0.5 million more journeys, which is about 2%. The increase is expected when all the signs are installed and working, i.e. from 2007 to the start of 2009, when SMILE ends.
- **Objective 2** - Increased awareness of good public transport of all the inhabitants and visitors of Malmö

### **A2 Description**

In this measure, 61 signs and different monitors were planned to be installed. 50 bus stops now display real time departure times. A large information sign has been installed at the main bus terminal to provide all passengers with a better overview of services and their real time departures. 10 monitors were to be erected in shopping centres and at other strategic positions in order to facilitate public transport use in places with high customer density; the 10 monitors were not installed.

We have, however, also upgraded existing signs previously showing planned time to show real time information. This applies to 34 monitors and 34 LED-signs.

## **B Measure implementation**

### **B1 Innovative aspects**

**Innovative Aspects:**

- New physical infrastructure solutions

The innovative aspects of the measure are:

- **New physical infrastructure, locally** – A complete real time system like this gives unique possibilities for travellers to get updated information at bus stops, internet and through mobile phones; gives better service; and makes it easier to plan a journey with different bus lines. Previously no such complete system, with both real time information and traffic messages, existed in Sweden

## B2 Situation before CIVITAS

In order to accommodate customer demands for increased punctuality and better information, Skånetrafiken was planning to equip the entire city bus network with real time information. It is important that it is easy to use public transport. Traffic information should be easy to understand and easily accessible where people are. It should be current, correct and multifaceted and adapted to different customer groups so neither new nor old customers are disadvantaged.

Public transport must offer new, user-friendly information systems in order to attract new customers. This should allow both young people and adults who are used to IT and different mobile solutions in their everyday environment. Information must also be flexible and adapted to the varying demands of different passengers. It is important that an efficient information system facilitates for passengers to plan their journeys from door to door and incorporate different forms of transport.

Starting in 2004 and completed in 2007 all city buses and some regional buses were equipped with GPS and computers that can communicate with a central server and thereby provide its position and time. This information can for example be shown on bus stop signs and other information signs. In 2004 real time information has been added to the existing traffic information system and some bus stops in Malmö have been equipped with real time signs that show the traffic situation on these routes passing that specific bus stop (the pilot phase).

## B3 Actual implementation of the measure

The measure was implemented in the following stages:

### **Stage 1: Development of Traffic information strategy**

*(2005-02 – 2008-12) – Development of the Traffic information strategy is an ongoing task during most of the time of the measure period.*

### **Stage 2: Installation of real time signs at 10 bus stops**

*(2005-02 – 07) – 10 new real time signs installed at bus stops. Selections of bus stops are made with consideration to where they will have the best effect and reach most travellers.*

### **Stage 3: Tender for 40 real time signs**

*(2006-10 – 2007-01) – Announcing tender for real time signs and selection of supplier.*

### **Stage 4: Installation of real time signs at 40 bus stops**

*(2007-04 – 2007-07) – 40 new real time signs installed at bus stops (Picture B3.1).*

### **Stage 5: Upgrading existing signs to show real time information**

*(2007-04 – 2007-07) – Upgrading of existing equipment to show real time information. This comprised 34 monitors and 34 LED-signs.*

### **Stage 6: Evaluation of customer's views**

*(2007-10 – 2008-02) – A questionnaire was designed to find out travellers attitude to cameras on buses, real time signs and mobile services. During 4 days in October-November 2007 the questionnaire was handed out on selected bus lines to get answers from the travellers.*

### **Stage 7: Installation of one large info sign at the main bus terminal and ten monitors in shopping centres and other strategic places**

*(2008-09-17: Installation of one large info sign at the main bus terminal was complete, see picture B3.2. The ten monitors in shopping centres and other strategic places were not installed due to problems finding monitors that fulfil the required specifications.*

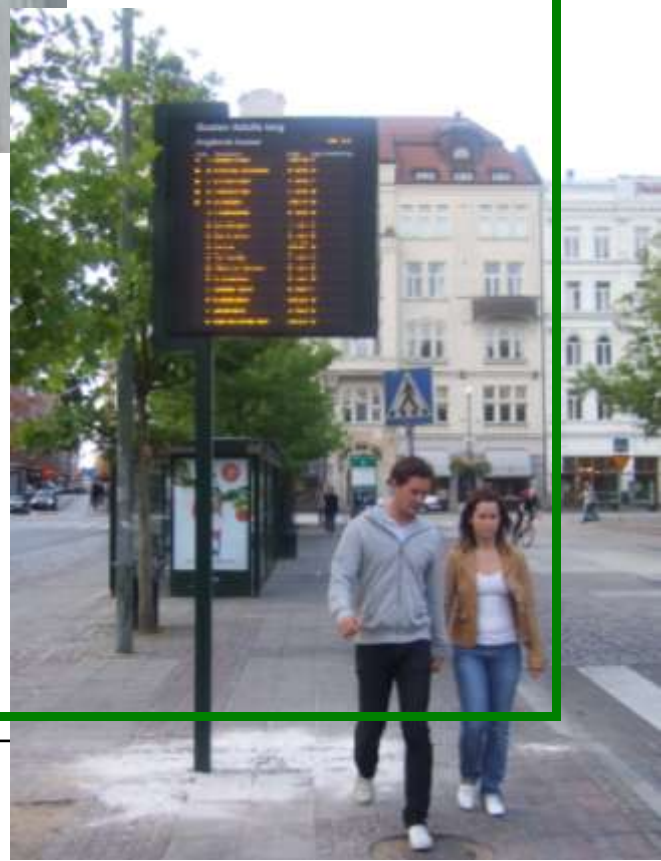


**Picture B3.1**

*Real time signs installed at bus stops*

**Picture B3.2.**

*Large info sign at the main bus terminal in Malmö*



## B4 Deviations from the original plan

The deviations from the original plan comprised:

- The ten monitors in shopping centres and other strategic places were not installed due to problems finding monitors that fulfil the required specifications.
- **Wider application** – Stage 5 described above, Upgrading existing signs to show real time information, was not in the original plan. By doing this, the information provided at bus stops to passengers is coherent and the same at all bus stops with information signs in the city. It is easier for passengers to understand and use the information. This was made possible by transferring unused budget from measure 8.1

## B5 Inter-relationships with other measures

The measure is related to other measures as follows:

- **Measure 12.3** – Mobile internet services in connection to bus information
- **Measure 12.7** – Bus priority system
- **Measure 8.1** – Marketing of new bus route system
- **Measure 8.2** – Improved security/safety on buses

In the original application to CIVITAS II 12.1 is related to other measures as follows:

- **Measures 8.1 (marketing of new bus routes), Measure 8.2 – (Improved security/safety on buses), 12.3 (Mobile internet services in connection to bus information in Malmö) & 12.7 (Bus priority system in Malmö)** – these are all part of the new bus route system and the goal of a 10% increase in travels by the end of 2006 and with 30% until end of 2010 are a result of all these measures working together.
  - Therefore for the overall goal of increased patronage by 2010 (outside the SMILE framework) it will be difficult to establish which part of the increase that is a result of which measure since for the traveller, all the measures together form the new travel opportunity.
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## C Evaluation – methodology and results

### C1 Measurement methodology

#### C1.1 Impacts and Indicators

Table of Indicators.

Nr.	Category	Relates to GUARD Nr.	INDICATOR Name	Possible DESCRIPTION	DATA /UNITS
13	Society		Awareness level	Degree to which the general public awareness has changed	Survey
14	Society		Acceptance level	Survey of opinions on part of general public	Survey
19	Transport		Quality of PT service	Perception of quality of PT services	Survey/interviews
	Transport		Number of passengers	The number of passengers on buses based on on-going ticket registration.	Persons, for different routes over time
MSE12	Economy	14	The value of real time information to customers	What is a customer prepared to pay for actual bus departure information?	Stated preferences

Detailed description of the indicator methodologies:

- **Indicator 13** (*Awareness level*) – Questions about the use of public transport and the experience of the real time signs and how they affect travel habits were asked in the main survey conducted after implementation. This corresponds to **objective 2**
- **Indicator 14** (*Acceptance level*) – The same methodology as for indicator 13 will show the acceptance level and corresponds to **objective 2**.
- **Indicator 19** (*Quality of PT service*) - The same methodology as for indicator 13, with specific questions about real time signs and the affect on travel habits and perception about quality of the journey. This corresponds to **objective 2**
- **Local Indicator** (*Number of passengers*) – All measures concerning public transport have as a common goal to generate an increase in travel. The number of passengers is one indicator that measures this. To see a change in number of passengers as a result of this specific measure (real time signs at bus stops) and to be able to distinguish this from the new bus routes as is, is difficult. Therefore this indicator will be calculated once to assess the impact of all measures about public transport, (8.1, 8.2, 12.1, 12.3 and 12.7) but not for this measure specific. The base for this indicator is on-going ticket counts done by Skånetrafiken. This indicator corresponds to **objective 1**.
- **Indicator MSE12** (*The value to customer*) – A Stated Preference study was conducted after implementation to estimate the “willingness to pay” for the real time signs. This corresponds to **objective 2**.

#### C1.2 Establishing a baseline

In Malmö, 34 real time signs and a few monitors were running well before SMILE. During 2005, 10 new real time signs were installed at bus stops in Malmö as a pilot phase, before SMILE started. During 2007 another 40 signs and 10 monitors were installed along with an upgrade of the 34 existing real time signs and monitors. This shows that when SMILE started, quite a number of bus stops already had real time signs. That makes the question about a baseline quite difficult. The proper baseline for an evaluation with the ambition to evaluate real time signs or not would be the situation with no real time signs in Malmö. That situation is well outside the SMILE timescale.

The situation with 34 existing signs and 10 relatively new real time signs has been used as the baseline for indicator 13 and 14, awareness and acceptance of the real time signs as well as for indicator 19, the perception of public transport quality. This situation represents the situation before SMILE but not before the installation of the first 34 real time signs and the pilot phase. This approach was taken because there was a possibility to measure the changes in opinion between the situation with 34+10 real time signs and the final situation with another 40 signs and 10 monitors installed.

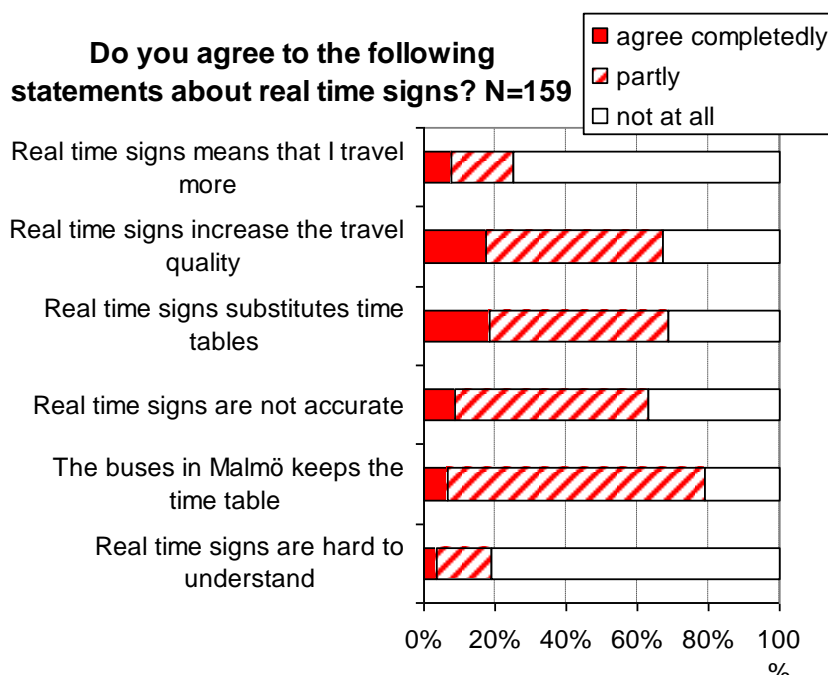
A pilot survey was conducted before the implementation of the measure and therefore could be considered as pre-study (table C1.2.1). The pre-study were conducted on-board the buses in Malmö, the respondents were all passengers. This survey was conducted as a pilot study to test the method and the questions for the main survey and the number of responses (159) is fairly low.

<b>Time for the study</b>	April and May 2007
Sample size	159
Respondents	Bus travellers on board route 32, 4 and 5
Method	Survey onboard the buses
Aim	Pilot study used as a baseline for indicator 13, 14 and 19.
Comments:	The pilot was used to test the method and the questions for the main survey but can be used as a pre-study. When this survey was done, 34 real time signs already existed and 10 new ones were installed.

**Table C1.2.1** Data about the pre-study conducted for measure 12.1

When asked if there were real time signs present at “their” bus stops, 20% answered that most of the stops had real time signs, 44% that some of the stops had signs and 36% said that none of their stops had real time signs.

In the survey the respondents were presented with six statements about real time signs to which they could agree completely, agree partly or not agree at all. The results are shown in figure C1.2.2



**Figure C1.2.2** Results from the onboard survey made in May and April 2007 with a sample of 159 passengers.

Serves as a baseline for awareness and acceptance of real time signs in Malmö as well as the baseline for the perception of quality of public transport.

Since some (34+10) bus stops have been equipped with real time signs for some time before SMILE the majority (64%) of passengers in this study had signs on some of their bus stops at

least. The acceptance level for the real time signs was high on many grounds, but not in every way. Only 20 % says that they are hard to understand but as many as 63% found them to be inaccurate, at least to some extent. 20% of the respondents thought that the buses do not keep to the timetables at all.

Around 70% of respondents agreed completely or partly that the real time signs increased the quality of the travel and substitutes for the need to carry timetables as well - only 18% of respondents carried a timetable. Finally, 25% said that real time signs made them travel more.

All this makes a good baseline for the perception of the quality of travel as well as awareness and acceptance of the measure. In table C1.2.3 presents the baseline for these three indicators.

Since the overall goal for all the measures mentioned under B5 is a travel increase, the numbers of passengers before and after the full scale introduction of the real time signs are important. But since there are a cluster of measures working together, it is difficult to state which part of the travel increase that is an effect of this individual measure. That is a problem that will be further addressed in section C1.3.

The objective for this indicator is an increase of 0.5 million journeys as a result of the extra real time signs from 2007 to the start of 2009, when SMILE ends. The 40 new signs were installed between April and August 2007. The effect of this measure is not immediate but will start to affect the number of travels during 2007 and continue during 2008 as well. Therefore the base year for this measure is 2007 and the baseline for the local indicator “number of journeys” will be the total number of journeys for the year 2007, table C1.2.3.

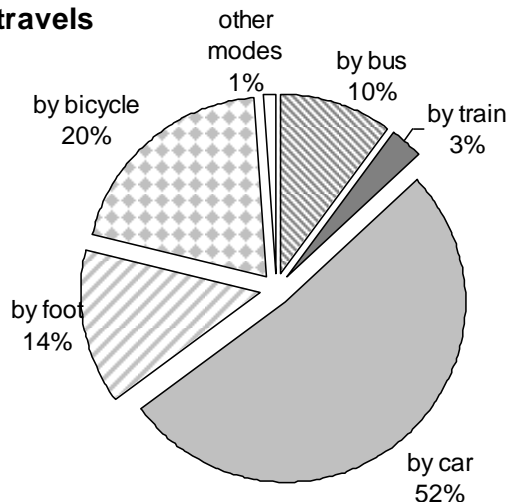
Indicator	Awareness	Acceptance	Perception of quality	Number of passengers
Percentage that stated real time signs makes them travel more		25		
Percentage with real time signs at some of their bus stops	64			
Percentage that stated real time signs substitutes time tables			71	
Percentage that stated real time signs increase the travel quality			67	
Percentage that stated real time signs are hard to understand		19		
Number of journeys for year 2007				29 163 239

**Table C1.2.3** Baseline for indicators in numerical values.

For indicator MSE12, the value of real time information to customers, there is no point in having a baseline. This is something that will be estimated when the travellers have seen and used this service and have a picture of the value of it for themselves.

The modal split before SMILE and this measure could be relevant information for a baseline, even though no indicators are based on this information. During autumn 2003, a survey was made where 10 000 residents between 18-75 years of age were asked to fill in a travel diary. 5181 travel diaries returned .The modal split in Malmö 2003 based on these travel diaries are shown in figure C1.2.4. The survey was conducted during October and November 2003.

### Modal split in Malmö 2003, N=12825 travels



### Figure C1.2.4

Results from the travel diary made in October and November 2003 with a sample of 5081 travel diaries.

The respondents are between 18 and 75 years of age and living in the city of Malmö. They have stated the main travel mode for each trip they have made during one day.

## C1.3 Building the business-as-usual scenario

As discussed in section B5 and C1, the overall goal for all public transport measures, including this one, is to increase the number of passengers by 10% by the end of 2006 and by 30 percent by the end of 2010. This goal was formulated in the beginning of SMILE when most of the measures related to 12.1 were planned to be implemented before the end of 2006. In practice, only measure 8.1 was in fact **completely** implemented during 2006. Therefore the goal of 10% increase in passengers was no longer valid at the end of 2006.

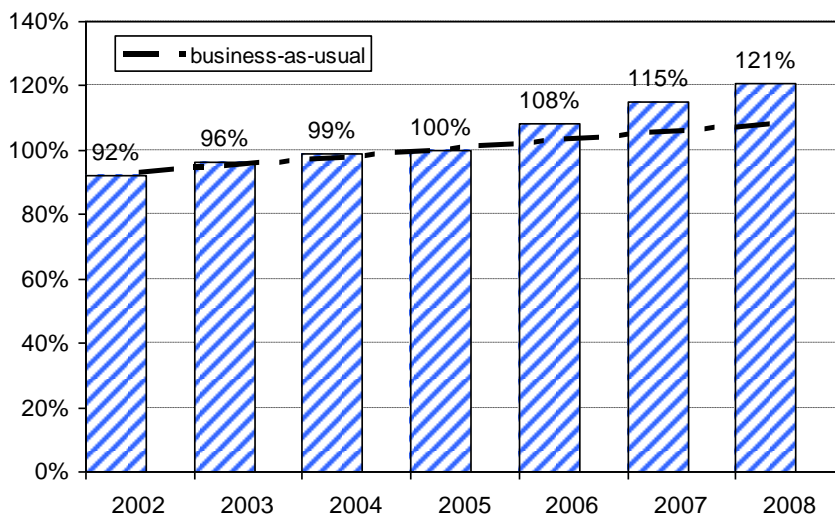
To establish a “business as usual” scenario for this measure is difficult, not only because all measures related to public transport are working together but also due to the fact that Skånetrafiken changed to a new bus route system at the same time, and this of course has a great impact on the number of passengers and is, in itself, not a part of SMILE. Without a thorough investigation of the effect of the route change **alone** it is difficult to build a business as usual-scenario that separates the new bus routes from the effect of other SMILE measures like installing cameras on the buses.

The “business-as usual” scenario that would work for all measures related together would be the trend in passengers without the new bus route system and without any of the SMILE measures in place.

Figure C1.3.1 shows the change in number of passengers as totals per year. Year 2005 is the base year since it is the start period for SMILE. The route change (not a part of SMILE but included in the overall goal of increased travel) took place in June 2005. Measure 8.1 was running for around 6 month after the change. During 2007 measure 12.1 as well as 12.3 were fully installed/implemented. Figure C1.3.1 shows the development in the number of passengers for this period. A trend line based on the yearly totals before SMILE and before the change of route system represents “business as usual”.



**Change in number of passengers on a yearly basis for Malmö Bus Routes with year 2005 as a base.**



**Figure C1.3.1**

*Number of passengers on Malmö Bus Routes on a yearly basis shown in relation to year 2005, the base year for SMILE. The trend line “business as usual” is based on the situation before SMILE. The new bus route system was implemented in June 2005 and all real time signs were installed in August 2007. (Skånetrafiken)*

You could clearly see an increase in travel after 2005 that is greater than for the period before 2005. This increase is a result of the new bus routes as well as all SMILE-measures and a part of this is a result of just this individual measure.

## C2 Measure results

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

### C2.1 Economy

**Objective 2** - Increased awareness of good public transport

Measured by indicator MSE12 - The value to customer

In April 2008, 256 Stated Preference interviews were conducted among the travellers in Malmö (Table C2.1.1). The aim of this is to establish the “willingness-to-pay” for real time signs at all bus stops. In total, 256 interviews were made with travellers, or people with some experience from buses in Malmö, were they had to choose between two combinations of fare price, travel time and real time signs (and some other choices connected with measures 8.2 and 12.3). For the real time signs, three situations were presented: No real time signs at all, real time signs as today (that means 34 upgraded signs, 50 new ones and 10 monitors) or real time signs on every bus stop. (More information is available about this study in Appendix 12.1 SP-study - in Swedish.)

Time for study	April 2008
Sample size	256
Method	Stated Preference-interview
Aim	To estimate the “willingness-to-pay” for real time signs at the bus stops
Comments	Travellers (or people with some experience of buses in Malmö) were interviewed at three major bus stations.

**Table C2.1.1** Data about the Stated Preference-study conducted for the “economy” category for measure 12.1

Among those who answered were 58% women and 42% men. 47% of respondents were under 30 years old and 21% over 60 years old. The age group between 30 and 60 years comprised 32% of the sample. This is similar to the main survey presented in table C2.5.1 but with more people over 60. Maybe this group had more time to spend on an interview than the busy “middle aged”.

Most of these people (58%) travelled by bus every day. The travel time varied between 5 and 90 minutes with mean: 23 minutes for a normal trip with the bus. The “willingness to pay” with a longer travel time should be related to this time.

49% had paid for their journey with a single ticket (in Malmö City the price for this is 16 SEK) or with a discount card that gives you 20% off this price. The rest of the travellers used some kind of monthly card or school card and paid between 380 and 1000 SEK with a mean price of 560 SEK. The “willingness to pay” a higher fare should be related to this price.

The results of this study are presented in table C2.1.2.

The confidence intervals are wide and that indicates that the estimates are weak. For the group of travellers that compared the price for a single ticket to this service, the results were too weak to be presented. But for the other groups the results indicate that this service is valued by the travellers and it is obvious that the travellers are willing to pay for this.

A similar study were made in Stockholm (Widlert et al.1989) and the results showed that real time signs traded off as equal to about 12-16% lower fares or 6-8% shorter travel time. In a doctoral thesis from KTH (Dziekan, 2008) several studies of the willingness to pay for real time signs are presented and “the value for real time information systems at stops and stations seems to lie in an interval between 5-20% of the ticket price for the trip”.

Compared to these results, the results in table C2.1.2 seems reasonable even though the confidence intervals are quite wide when it comes to travel time.

The value of real time information at bus stops	SEK/month	SEK/single price	Minutes travel time
Reference value (mean)	560	16	23
Signs at every bus stop compared with as today	<b>17</b>	No significance	<b>6</b>
90% confidential interval	-1 – 36		2 – 11
% of reference value (interval)	(0-6)%		(9-48)%
Signs at every bus stop compared with no signs at all	<b>42</b>	No significance	<b>7</b>
90% confidential interval	14 – 69		3 – 12
% of reference value (interval)	(3-12)%		(13-52)%
Signs as today compared with no signs at all	<b>25</b>	No significance	No significance
90% confidential interval	-3 – 52		
% of reference value (interval)	(-1 -9)%		
Sample size	270		397

**Table C2.1.2** The result from the Stated Preference-study that shows the estimates for the travellers “willingness to pay” for real time signs at every bus stop, as today (that is with 34 upgraded and 50 new signs and 10 monitors) in Malmö when compared to no signs at all.

In comparison with the choice of “cameras on buses”, the willingness to pay for real time signs as today compared to no signs at all (the result of SMILE) was lower than the willingness to pay for cameras on-board all buses compared to no cameras at all (also the result of SMILE), 25 SEK for the signs compared to 69 SEK for the cameras. The willingness to pay for mobile internet services could not be estimated in terms of SEK/months.

If travel times were compared instead, the signs were worth 6 or 7 minutes, the cameras were worth 6 minutes and the mobile internet services were worth 3 minutes. The alternatives are not completely comparable with the SMILE situation but can serve as a ranking method. The willingness to pay is highest for cameras on all buses and lowest for mobile internet services.

## C2.2 Energy

No indicator under the indicator category Energy is associated with this measure. The modal shift described under C2.3 from car to other modes leads to less energy consumption, but the modal shift is not mainly a result of this measure.

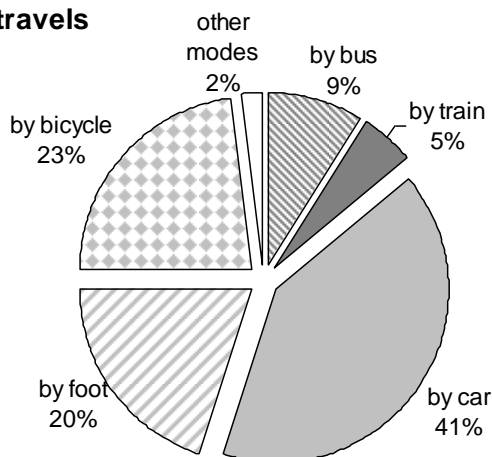
## C 2.3 Environment

No indicator under the indicator category Environment is associated with this measure.

During autumn 2008, a survey was made of the same design and magnitude as the in 2003.

The modal split in Malmö 2008 based on these travel diaries is shown in figure C2.3.1. The survey was conducted during October and November 2008.

**Modal split in Malmö 2008, N=11462 travels**



**Figure C2.3.1**

*Results from the travel diary made in October and November 2008 with a sample of 5081 travel diaries.*

*The respondents are between 18 and 75 years of age and living in the city of Malmö. They have stated the main travel mode for each trip they have made during one day.*

The result of the survey 2003 and 2008 shows a change in modal split towards more walking and train travelling and less use of car as travel mode. The percentage that uses bus as the main travel mode has not changed significantly compared to the survey 2003. The small change from 10% 2003 to 9% 2008 is not statistically significant. The shift from car to other modes with less environmental impact will have implications for the environment but not mainly as a result of this measure.

Still, there has been an increase in passengers on board the buses in Malmö by around 25% (figure C1.3.1). This could be a result of

- The population of Malmö has increased by 6% during this period,
- The number of travellers (or boardings) has increased as a result of more regional commuting, passengers arrive to Malmö with regional buses or train and changes to the city buses and these travellers are not represented in the survey since they do not live in Malmö.
- Public transport users are often using cycling and walking as other travel modes when the weather allows, for shorter journeys. During the summer season, the number of passengers is always lower (figure C1.3.1) than during the winter season as a result of that. Both surveys

were conducted during October and November but the weather conditions could be rather different in autumn 2003 compared to 2008. The autumn of 2008 was mild with not so much rain and this could postpone the shift from walking and cycling to bus some weeks. This will affect the local journeys more than the longer journeys made by commuters and therefore have a greater impact on the local (city of Malmö) survey than the statistics showing number of passengers.

## **C2.4 Transport**

**Objective 1** - 0.5 million more journeys from 2007 to the start of 2009, when SMILE ends.

Measured by local indicator – number of travels

The objective of 500,000 more journeys roughly corresponds to an increase of 1.7% from one year to another. Figure C1.3.1 shows an increase of 5% from year 2007 to year 2008. This increase is in theory a combination of various factors including this particular measure (that was completely implemented in autumn 2007) as well as measures 8.2, 12.3, the overall trend in passenger numbers in the Skåne region (i.e. shown in the “business as usual” scenario) and the effect of the new bus routes.

Though it is difficult to state the proportion due to the real time signs, the willingness to pay can offer some guidance. The willingness to pay for real time signs was roughly half of the willingness to pay for cameras. The willingness to pay for mobile internet was lower.

Figure C2.5.3 shows that 9% of respondents agree completely and 18% agree partly with the statement: “real time signs result in me travelling more”. This indicates that this measure has an effect on the number of journeys.

**Objective 2** - Increased awareness of good public transport

Measured by indicator 19 – quality of public transport service

This indicator was evaluated together with the social indicators described in section C2.5 below. See the details about method and results there.

A study made in Hague, the Netherlands, of newly implemented travel information showed that the perceived wait time among the travellers decreased significantly by 20% when real time information were installed. (Dziekan, 2008)

This is not evaluated in Malmö, but can very well add to the perceived quality of public transport service.

## **C2.5 Society**

**Objective 2** - Increased awareness of good public transport

Measured by indicator 13, awareness level and indicator 14, acceptance level.

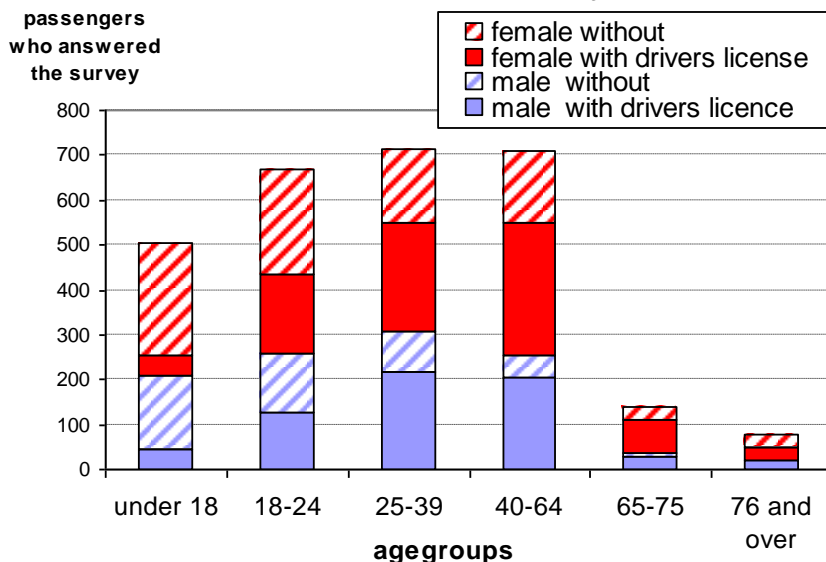
The objective is to see how the real time signs are assessed by the public transport users and if they increase the quality of the journey. This was evaluated by a survey described in table C2.5.1

Time for the study	Oct/Nov 2007
Sample size	3313
Method	Main survey done onboard the buses
Aim	To collect information from the bus travellers for indicator 13, 14 and 17 and change in travel behaviour.
Comments	Distributed and collected at the same time on 11 routes in Malmö, with opportunity to post the surveys if the time was not sufficient.

**Table C2.5.1** Data about the survey conducted for the “society” category and indicator 19, “transport” category for measure 12.1

The main survey onboard the buses was conducted over a period of two weeks, one in October and one in November 2007. It was based on basically the same questions as in the pilot, with some small changes. (Appendix 12.1.Questionnaire) The respondents are described in figure C2.5.2.

**Age, sex and access to drivers licences for those who answered the survey N=2882**



**Figure C2.5.2**

The respondents of the survey and their distribution of sex, age and access to drivers licence.

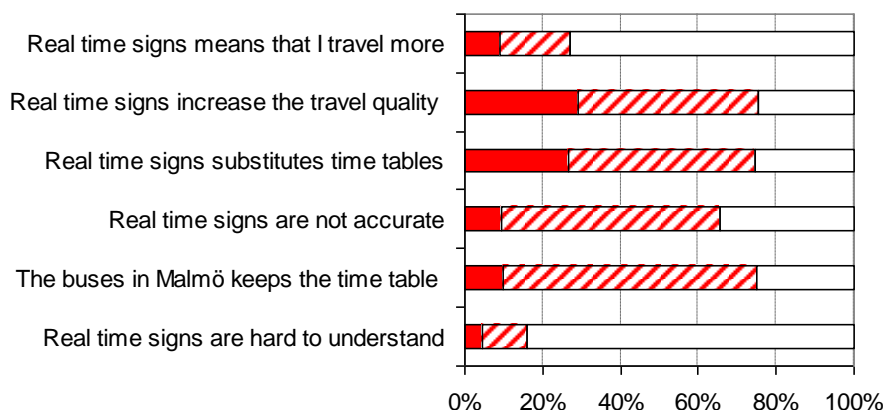
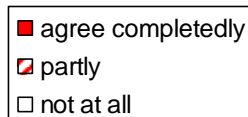
In total, 61% are female and 39% are male. 18% of all respondents are under 18 years, 74% are between 18 and 65 years of age. The respondents over 65 years are only 8%.

In comparison to the travel survey conducted in 2003 in Malmö with a sample of 5451 residents between 18 and 75 years of age, this survey shows about the same distribution of men and women among bus travellers if you take into consideration the difference in age groups. When you distribute a survey on-board you will get persons under the age of 18 and this group shows the most even split between men and women.

The majority of the most important bus stops had been equipped with real time signs during 2007. When asked, 28% of the sample population said that most of their bus stops had real time signs, 49% said that some of them had signs and 23 % answered that none of the bus stops they normally used had real time signs.

To get a picture of how the travellers valued real time signs, the respondents had to agree with six statements about real time signs (figure C2.5.3). The two statements that most respondents agreed to were “real time signs increase the travel quality” and “real time signs substitute for timetables”. For these statements close to 75% agreed completely or partly. Only 16% of the travellers had brought a time table.

**Do you agree to the following statements about real time signs?**



**Figure C2.5.3**  
Results from the onboard survey made in October and November 2008 with a sample of 3313 passengers.

Since the questions in figure C2.5.3 are the same as in the “pre-study” presented in figure C1.2.2 and asked to the same group of people in the same way (the only difference is the sample size and the time of the studies) there is a possibility to statistically test if there is a difference in these results. For two of the statements presented, the difference in mean values between the pre-study and the main study showed some significance. These are marked with one or two asterisk in table C2.5.4, meaning a significance level of 90% (\*) or 95% (\*\*). The other differences were all weaker.

Indicator	Awareness After (Baseline)	Acceptance After (Baseline)	Perception of quality After (Baseline)
Percentage that means real time signs makes them travel more		27 (25)	
Percentage with real time signs at some of their bus stops	77 (64)		
Percentage that means real time signs substitutes time tables			74 (71) *
Percentage that means real time signs increase the travel quality			75 (67) **
Percentage that means real time signs are hard to understand		16 (19)	

**Table C2.5.4** The results for the social indicators in numerical values. The base line figures are in brackets, e.g After (Baseline). The differences for some indicators are tested to be significant with the level of 90% (\*) or 95% (\*\*).

All indicators in table C2.5.4 show a change towards an increase in awareness and acceptance as well as an increase of perception of quality for public transport. The changes for the questions chosen to measure the perception of quality for public transport all showed significant increases. The changes are not dramatic when compared to the baseline figures (in brackets) but the results refer to a situation with 50 new real time signs in addition to the 44 (34+10) that existed at the point of the pre-study. The concept of real time signs was already well known to the passengers when this study were made but the number of signs nearly doubled when all signs were installed and that clearly affected the perception of quality more than the awareness and acceptance of the signs. The number of signs tends to offer another way of travelling without time tables.

### C3 Achievement of quantifiable targets

No.	Target	Rating
1	0.5 million more journeys from 2007 to the start of 2009, when SMILE ends	**
2	Increased awareness of good public transport	**
3		
4		
NA = Not Assessed    0 = Not achieved    * = Substantially achieved (> 50%) ** = Achieved in full                    *** = Exceeded		

### C4 Up-scaling of results

The way to make this a full scale measure is to install real time signs for every bus stop in Malmö. This would be technically and practically possible, but not economically possible and would probably increase the number of journeys as well as perception of quality a bit further. In the stated preference study this was one of the scenarios the customers could choose, real time signs at all bus stops in Malmö, see table C2.1.2. The willingness to pay for signs at every bus stop was worth another 17 SEK per month.

### C5 Appraisal of evaluation approach

Overall we feel this was a good evaluation. A better design of the stated preference study would have been preferable with sample sizes more comparable for the different groups. It would also have been better to use computers for the stated preference study to enable a situation where the different stages in price and time were directly related to the price paid and the actual travel time for each individual. This would probably have given stronger estimates. A pre-study with a greater sample size would have made the statistical tests stronger.

### C6 Summary of evaluation results

The key results are as follows:

- **Key result 1** – Real time signs on bus stops have an impact on the perception of quality for public transport in many ways. They make travelling without time tables possible and this is dependant on the number of signs installed. When the number of bus stops with signs increased from 44 to 84, the percentage of travellers that considered real time signs a substitute for the time table showed a significant increase, from 71% to 74%.
- **Key result 2** – When asked to rate different statements about real time signs before and after the final installation of signs, the percentage that agreed completely or partly changed for the following statements: “real time signs are hard to understand “ (from 20 to 16%) and “ the buses in Malmö keeps the time table”(from 79 to 75%). This shows that real time signs are easy to understand and showing the right kind of information to the travellers. The accuracy of the buses has nothing to do with the signs but maybe they help to point out the delays.
- **Key result 3** - Real time signs increase the number of journeys. With 44 signs installed, 25 % said that they travelled more and with 84 signs this number was 27%.

The objective of 500,000 (1.7%) more journeys on the buses in Malmö as a result of the real times signs was achieved. In fact, the total increase was 5% but not as a result of this measure alone. Though it is difficult to state the proportion due to the real times signs, the willingness to pay can offer some guidance. The willingness to pay for real time signs was roughly half of the willingness to pay for cameras. The willingness to pay for mobile internet was lower.

- **Key result 4** - the “willingness to pay” for real time signs on the bus stops are high when estimated in a Stated Preference study. The 90%-confidence interval shows a positive value for signs at the bus stops for fare price as well as travel time. The best estimate shows a value of 4% of the price for a monthly ticket and 4% of the travel time for this measure with signs at 84 bus stops compared to no signs at all.

## D Lessons learned

### D1 Barriers and drivers

#### D1.1 Barriers

- **Barrier 1** – Investments in technology require significant financial investment, in this case on the part of a regional transport authority. Justification of such investment requires some form of justification, in this case linked to how the objectives are met as shown by the evaluation.
- **Barrier 2** – Requirements for staff time to support implementation present a barrier in organisations which may be short of staff resources.
- **Barrier 3** – IT projects offer the potential to provide technical barriers and in this case some difficulties with radio transmission for sending information to the new signs. With 40 new signs the workload had to be divided over two ports to the Sign Information Server, with a new transmitter on the second port. The new transmitter is situated in another part of the city compared to the first one, and does not work properly. Some of the signs fall out from time to time. They are considering moving the transmitter to a new location for a better result.
- **Barrier 4** – As is common with tendering delays were experienced, although they did not prove to be serious.

#### D1.2 Drivers

- **Driver 1** – Development of a wider traffic information strategy divided into five areas with documents containing guiding principles covering
  1. Printed traffic information
  2. Dynamic traffic information on board trains and buses and at train and bus stops
  3. Web based traffic information
  4. Web and SMS services in mobile phones
  5. IVR (Interactive Voice Response) service in telephone for travel information

Which confirms commitment to traveller information within the regional transport strategy.

### D2 Participation of stakeholders

- **Stakeholder 1** – Skånetrafiken, the regional transport authority, has taken the lead as part of its strategic role in determining the specifications for public transport.
- **Stakeholder 2** – City of Malmö Environmental and Traffic/street departments.
- **Stakeholder 3** – Contracted equipment suppliers selected through open tender procedures.



### **D3 Recommendations**

- **Recommendation 1** – The measure has demonstrated a direct passenger benefit both from the attitudinal survey and in terms of results from the stated preference study. There has been an overall increase in bus use in Malmö and this measure has undoubtedly contributed to that increase. On this basis we would recommend the installation of real time bus information systems to other cities as part of a package of bus service improvements.
- **Recommendation 2** – Incorporate the installation of the real time information system with a wider transport information strategy.
- **Recommendation 3** – Understand the project objectives and how they will be delivered by what is implemented.
- **Recommendation 4** – Incorporate a sound evaluation methodology that will enable you to establish if the objectives have been met.
- **Recommendation 5** – Ensure that the tender includes adequate technical back-up to ensure long term operation of the system.

### **D4 Future activities relating to the measure**

There is the potential to install real time signs at every bus stop in Malmö. This would be technically and practically possible and would probably increase the number of journeys as well as perception of quality a bit further, but would probably not be economically viable due to the law of diminishing returns as the number of passengers at some of the lesser used stops would not provide enough benefit to society.