# Measure Evaluation Results Template

## TAL 8.3 Real-time information system

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MRT – F level

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# Executive Summary

Providing additional information on the actual status of public transport service in real time is one way of making PT more attractive to users. The measure comprised of objectives to install electronic real time PT information displays at 6 bus stops; to create additional functionality on the website providing real time PT schedule information and to create a mobile application for smartphones providing real time PT schedule information.

The measure was implemented in the following stages:

- **Preliminary studies** (2009–2011) – A study was carried out on technical aspects of real time information systems; high density PT stops were identified; technical consultations about optimal solutions were carried out.

- **Negotiations with providers** (2011-2012) – Negotiations with providers of main technical solutions, displays, additional web page functionalities and mobile applications;

- **Technical design and implementation of the solutions** (2011–2012) – Creation of additional functionalities of the web page, elaboration of software and mobile applications, design and installation of the electronic displays;

- **Measure operation** (2012) – At the time of reporting (November) the measure solutions (displays at PT stops and mobile application) were not operational due to technical problems.

The impact of the measure was evaluated with change in awareness and the general public's acceptance of the plans to introduce the electronic real time information system displays at PT stops. The surveys were carried out in 2009 and 2012. The key results from the evaluation were:

- **Awareness increased by 37%** – The awareness of the plan to introduce electronic real time PT information displays at bus stops increased by 37%;

- **Acceptance increased by 8%** – The acceptance of the necessity for electronic real time PT information displays at bus stops and the possible impact of them with comfort of PT usage increased by 8%.

The most significant **barrier** to the implementation process was related to the decision to implement measures "2.2 PT ticketing system", "2.3 PT communication system" and "8.3 PT real time information system" separately instead of one integrated system. The whole process of implementation was also delayed by the decision of Tallinn to postpone several procurements from 2010 to 2011 due to financial crisis.

The most influential **driver** to the measure was the commitment to implement the real time information system – set by the City Council in the Sustainable development plan, service level standards and investment and financing programme 2004-2010 for Tallinn public transport within the common ticketing system.. This helped to continue with the implementation of the measure despite all the delays and problems.

The most important action taken during the measure was choosing a compatible system for implementation. Due to possible incompatibility issues with the existing systems the same partner was chosen who had provided the previous PT information systems in Tallinn with CIVITAS SMILE project and also the other MIMOSA measures PT IT systems.

**The most important recommendation for replication of the measure is** that the real time information system should, if possible, be part of a complete system from one provider. It is an integral part of the whole PT information system and should therefore be prepared, acquired and implemented in an integrated and consistent way.

**The most important recommendation for process of the measure** is that using one provider for several measures has risks – The same solutions provider was used for other MIMOSA measures and because the other measures had higher implementation priority and the provider company had very limited resources, the current measure implementation was severely delayed due to implementation of these other measures.

# A    Introduction

## A1    Objectives

The measure objectives are:

(A) High level / longer term:

- To increase modal split towards sustainable modes

(B) Strategic level:

- To interrupt further decrease of the share of public transport (PT) by means of improved service level and quality in public transport;

- To turn public transport into a realistic alternative for the more expensive mobility option of car traffic;

- To create a passenger-oriented information system to make public transport more attractive;

- To promote PT usage;

- To promote an attractive and high quality public transport service, with high quality information.

(C) Measure level:

(1) To raise citizens' acceptance of public service and improve the overall image of public transport in the urban area.

(2) To improve passenger satisfaction with PT service.

(3) To provide reliable, up to date PT information.

(4) To improve access to and quality of passenger information (time schedules) at public transport stops, on the internet and on mobile phones.

(5) To provide input (e.g. real-time info) for a planned PT management centre.

(6) To implement real time information system (purchasing and installing equipment and software, creating communication networks, etc.)

## A2    Description

Providing additional information on the actual status of public transport service in real time is one way of making PT more attractive to users. The information is provided on electronic displays installed at PT stops (Figure 1), on the internet (Figure 3) and on mobile phones (Figure 4) with the help of vehicle positioning and real-time information exchange. The measure was aimed at studying the best ways of providing the information, defining the most suitable locations for the information displays, and acquiring and installing the necessary equipment. In order to improve service quality it was necessary to automate the existing system and reduce manpower in editing and forwarding the information. It was important to take into consideration the high density areas of PT.

The measure involved:

- Installing electronic real time PT information displays at 6 bus stops (Figure 2);

- Creating additional functionality to the website providing PT schedule information;

- Creating mobile applications for smart phones using iOS and Android operating systems in order to provide real time PT information.

The electronic displays are based on LED technology and the 6 most suitable locations were selected according to passenger volumes at specific stops, where the stops were servicing by the PT lines belonging to the PT priority system (PT vehicle priority in traffic lights, providing better reliability to the PT lines) and where displays would potentially have the highest effect on passenger satisfaction. The display size varies depending on the number of lines servicing the PT stops. The displays receive the real time information from the central server through radio communication, the update frequency of the real time information is 10 seconds.

The information displayed on PT stop display (Figure 1) is:

- Time;

- PT line number and destination;

- Timetable time of departure time of the next PT vehicle from the stop in a format hh:mm when there is more than 1 hour to the departure or the particular vehicle is not logged in to the system;

- Estimated time of departure time of the next PT vehicle from the stop in minutes when there is less than 1 hour to the arrival and when the particular vehicle is logged in to the system;

- Information on problems with PT.

Visually impaired persons can also receive audio information from the display with their compatible wireless devices.



**Figure 1 Picture from LED display testing in "Freedom Square" PT stop (central square of Tallinn)**
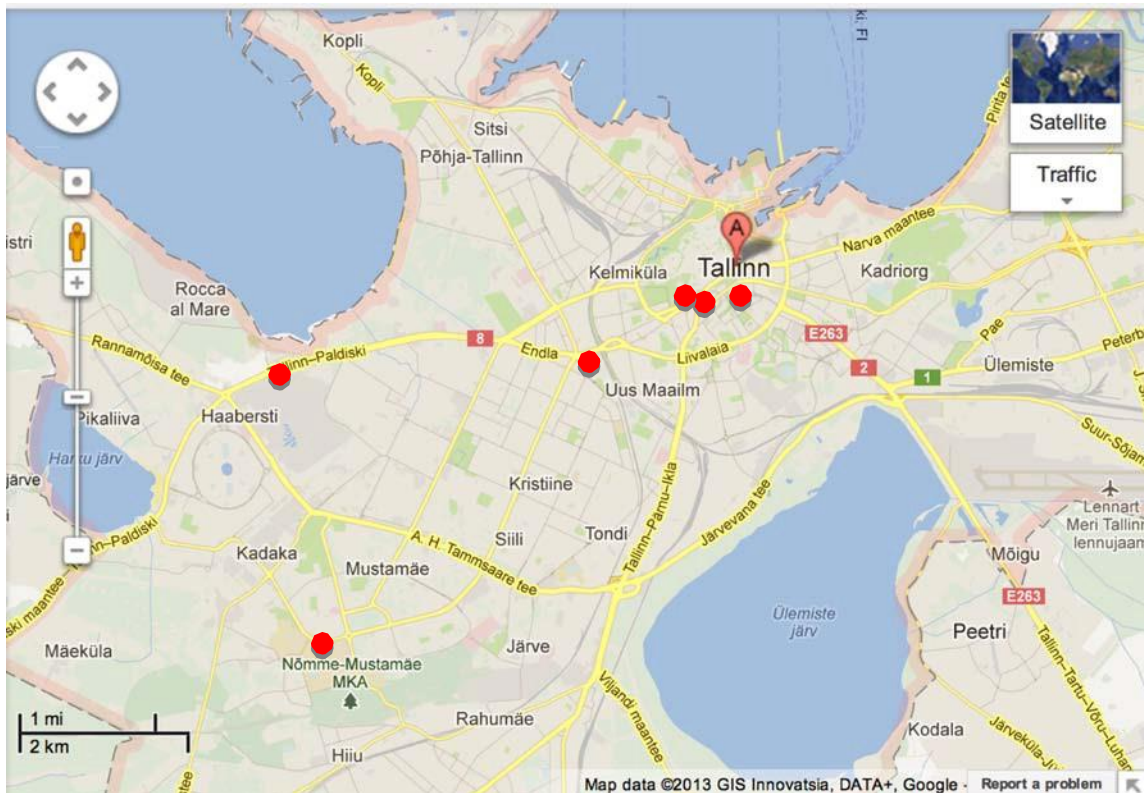
**Figure 2 Locations of the real time displays in PT stops**

The webpage for PT schedules (Figure 3) is located at http://soiduplaan.tallinn.ee/. The page provides information on PT lines, schedules, stops, vehicle locations, predicted arrival times at PT stops, trip planning and ticket information. The data update frequency is currently (January 2013) up tu 30 seconds but it is planned to be reduced.



**Figure 3 Screenshot from the web page http://soiduplaan.tallinn.ee/**

The mobile application (Figure 4) will have (estimated to the end of March 2013 in January 2013) basically the same functionality as the web page: information on PT schedules, stops, vehicle locations, predicted arrival times at PT stops, trip planning and ticket information. It is available for users of iOS (iPhone) and Android operating system based smartphones.
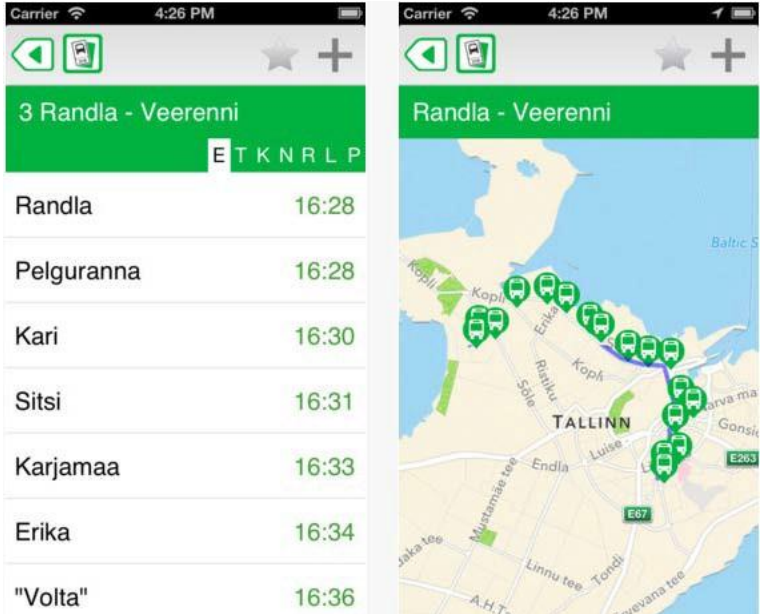


**Figure 4 Screenshots from the iOS test application**

The real time information used in all three applications is based on GPS-positioning information from PT vehicles. The information is sent from PT vehicles to the central server through radio communication and it can be used for a variety of applications and services (Figure 5). In addition to the provision of information on electronic displays, webpage and mobile applications, the data is also available to third parties for creating additional web pages and mobile applications.



**Figure 5 General communication principles between PT vehicle,
central server and passenger information systems**

# B Measure implementation

## B1 Innovative aspects

The innovative aspects of the measure are:

- **Use of new technology/ITS -** Real-time PT information based on vehicle positioning data has not been used in Tallinn before. Real time PT information at PT stops, on the internet and on mobile phones is based on latest technologies and developments.

## B2 Research and Technology Development

At the initial stage of the RTD activity a study was carried out giving an overview of real time information systems operable in other cities. The study concentrated on systems which are similar to the hardware solutions installed into PT vehicles in Tallinn. It was important to have compatibility with the existing systems to avoid high cost and implementation problems. The study also gave recommendations for the procurement process: to avoid parallel doubled sections in the whole vehicle data system while adding new components, to ensure easy and affordable access of third parties to the real time data while leaving possibilities open for possible new mobile applications and services, to prepare communication systems with higher data transfer speed, etc.

At the second stage of the RTD analysis was conducted to determine at which PT stops to install the electronic displays. The PT stops were selected according to passenger volumes at specific stops and where the displays would potentially have the highest effect on passenger satisfaction.

The third stage of RTD activity consisted of technical consultation of optimal solutions with the suppliers of different parts of the system.

## B3 Situation before CIVITAS

At the start of CIVITAS MIMOSA timetables at approximately 900 stops in Tallinn were printed on paper and their replacement was rather time and resource-consuming. There was no real time information on PT available on any channel. Additionally, passenger information was practically unavailable in the case of extraordinary changes and delays in PT time schedules (extreme weather conditions, extraordinary reconstruction works, vehicles out of order, etc.). Information about planned rerouting and construction works was available as static information on the Tallinn City website but there was no information on the operative situation and actual status of PT service availability even on the website. Furthermore, the usage of smart phones and phones with internet connection was not widespread among population for accessing web based information while waiting at the stop. The only electronic displays providing schedule information were located in the Viru city bus terminal. Unfortunately, the information provided on these displays was also static, not in real time and was based only on schedule information for lines starting from the terminal.

## B4  Actual implementation of the measure

The measure was implemented in the following stages:

**Stage 1: Preliminary studies** (January 2009 – April 2011) – A study on real time information systems, optimal technical solutions for real time information system in Tallinn, definition of the high density PT stops;

**Stage 2: Negotiations with providers** (March 2011 – July 2012) – Negotiations with providers of main technical solutions, displays, additional web page functionalities and mobile applications;

**Stage 3: Technical design and implementation of the solutions** (December 2011 – October 2012) – Creation of additional functionalities of the web page, elaboration of software and mobile applications, design and installation of the electronic displays;

**Stage 4: Measure operational** (December 2012) – The displays in PT stops became fully functional. The web page map with real time PT locations became operational in January 2013. As of January 2013 the introduction of Mobile application was planned to the end of March 2013.

## B5  Inter-relationships with other measures

This measure is related to other measures as follows:

• **MIMOSA 2.2 PT Ticketing System** - The systems of these measures share common hardware and software from the same provider, real time information mobile applications were created by the new ticketing system provider.

**MIMOSA 2.3 PT Communication System** – The systems of these measures share common hardware and software from the same provider. Depending on future decisions, the real time system can be integrated together with the communication system into the PT traffic management centre.

• **MIMOSA 4.1 Mobility Management and marketing activities** – the information system is part of Mobility Management and marketing. Marketing also helps to introduce the information system to PT users.

• **Real time passenger information system of Estonian Railways** – real time information system for national railways was launched in 2011.

• **National real time information system being developed by Estonian Road Administration** – The system called ÜTRIS is currently (2012) being tested in several counties of Estonia.

# C      Impact Evaluation Findings

## C1      Measurement methodology

### C1.1   Impacts and Indicators

The only realistic impacts that could be evaluated were the awareness and acceptance of the general public. All the other possibilities (see Table C1.2) were effectively eliminated with late implementation of the measure.

**Table C1.1: Indicators**

| NO. | EVALUATION | EVALUATION SUB-CATEGORY | IMPACT | INDICATOR | DESCRIPTION | DATA /UNITS |
|---|---|---|---|---|---|---|
| 15* | **Society** | Awareness | Public Awareness of the implemented real time system | Awareness level | Degree to which the awareness of PT users has changed | Index, qualitative, collected, survey |
| 16* | **Society** | Acceptance | Public Acceptance of the implemented real time system | Acceptance level | Attitude survey of current acceptance of PT users | Index, qualitative, collected, survey |

Detailed description of the indicator methodologies:

- **Indicators 15 and 16, awareness and acceptance** – the evaluation of change in awareness and acceptance on the PT real time system was based on the general MIMOSA before-phone survey in November 2009 and a separate combined source after-survey in September 2012.

  The **general MIMOSA survey** was planned and carried out by a professional market research company OÜ Klaster. Sufficient sample for different MIMOSA measures purposes was calculated to be between 600-800 persons.

  The **general MIMOSA before-survey** was carried out in November 2009 and had a random sample of 1014 persons aged between 14 to 75. The survey was based on landline phone interviews and was carried out in Estonian (native language for 53% of the Tallinn population) and Russian (42%) languages. 25% of the sample was reached by mobile phones to be representative, because the use of land line phones has decreased in the past decade. The sample was based on the population registry data and was gathered from all 8 city districts of Tallinn. The quotas for age and gender were calculated within districts. The quotas for 2 of the smaller of the 8 districts were above proportion because a minimum of 100 respondents were planned in every district. This was compensated with using different weights for different districts when calculating overall city results. The questionnaire was programmed to CATI (Computer Assisted Telephone Interviewing) and all interviews were performed using the system. The data gathered was checked in three stages: Structural Control – the CATI directed the interview to the correct section with the help of filter questions; Formal Control – after the survey the errors in open text and numerical answers were corrected; Cleaning the Data – incomplete answers and interrupted interviews were removed.

The social profile of a respondent was based on gender, age, nationality, district of residence, car ownership and transportation mode use.

The general phone survey had 4 questions about the real time information system:

1. Are you aware of the plan to install electronic displays at PT stops, so that it is possible to see how many minutes before the next PT vehicle is due to arrive?

2. How necessary do you think it is to create such a system?

3. Where should such systems be installed? (types of PT stops: all, only major stops, only minor stops)

4. Do the electronic displays make travelling by PT more comfortable?

Question 1 was used for evaluating awareness and Questions 2 and 4 for the acceptance of the real time system.

The after-survey was carried out in September 2012 and it had a random sample of 1000 persons selected according to the same principles described above. The questions in the after-survey were the same as in the before-survey although the measure also included additional functionality on the webpage of PT schedules and a mobile application. The reason for not asking about other solutions was that they became operational after the end of the evaluation period and the public were not aware of the details of different solutions at the time of the survey.

**Table C1.2: List of potential effects that were not assessed**

| Impacts category | Indicator | How does it impact | Why it was not accessed |
|---|---|---|---|
| Transport | Quality of Service | The additional information on the actual arrival of the next PT vehicle affects the perception of PT service quality | The measure became operational after the evaluation period ended. |
| Society | Awareness and acceptance on other solutions besides electronic displays | The additional possibilities for getting the real time information on any PT stop affect the perception of PT service quality | The measure became operational after the evaluation period ended. While the electronic display is easy to understand even without seeing it, no details were disseminated on the mobile application or web page. Thus without seeing and testing the functionality there was no reason to measure awareness and acceptance on them. |
| Transport | Usage of web page and download of mobile application | The number of visits to the page and number of downloads of the mobile application is dependent on dissemination and quality of the solutions. | The measure became operational after the evaluation period ended. |
| Transport | Modal share | The increase of quality and comfort of PT service affects modal share | There were several other contributors to the modal share, especially in 2012 so even in case of accurate modal share studies it would not have been realistically possible to separate the impact of the current measure from the results. Also, the measure became operational after the end of the evaluation period. |

## C1.2  Establishing a Baseline

The baseline for both indicators was created from the results of the 2009 survey.

## C1.3  Building the Business-as-Usual scenario

The BAU scenario was based on the assumption that without the measure, awareness and acceptance of the real time information system would have remained the same. This approach however is critical since due to introduction of the idea of fare free PT (commencing 2013) in Tallinn in January 2012 and large scale widening of PT priority lanes in July 2012, the topic of public transport, its quality and needs, have been under wide public discussion in society. It is certain that the discussions have actually had impact on both awareness and acceptance. Since there is no possibility of estimating this impact, the BAU scenario was considered to have constant values of awareness and acceptance.

# C2    Measure results

## C2.5   Society

The impact of the measure was evaluated with change in awareness and acceptance of the implemented solutions. However, since the measure became operational after the evaluation period ended, the awareness and acceptance were affected only by dissemination activities: newspaper articles, TV interviews, etc. The displays at PT stops and the mobile application became operational at the end of 2012 (delayed as of November 2012), months after the second survey. The results on awareness from both surveys are presented in Figure 6 and Figure 7.
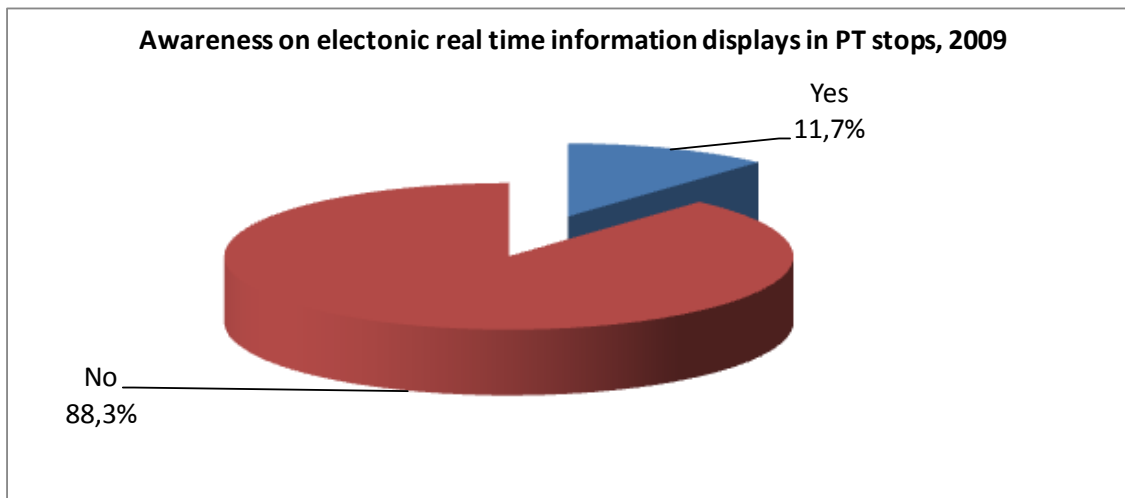


**Awareness on electonic real time information displays in PT stops, 2009**

Yes
11,7%

No
88,3%

**Figure 6 Awareness of electonic real time information displays at PT stops, November 2009**



**Awareness on electonic real time information displays in PT stops, 2012**
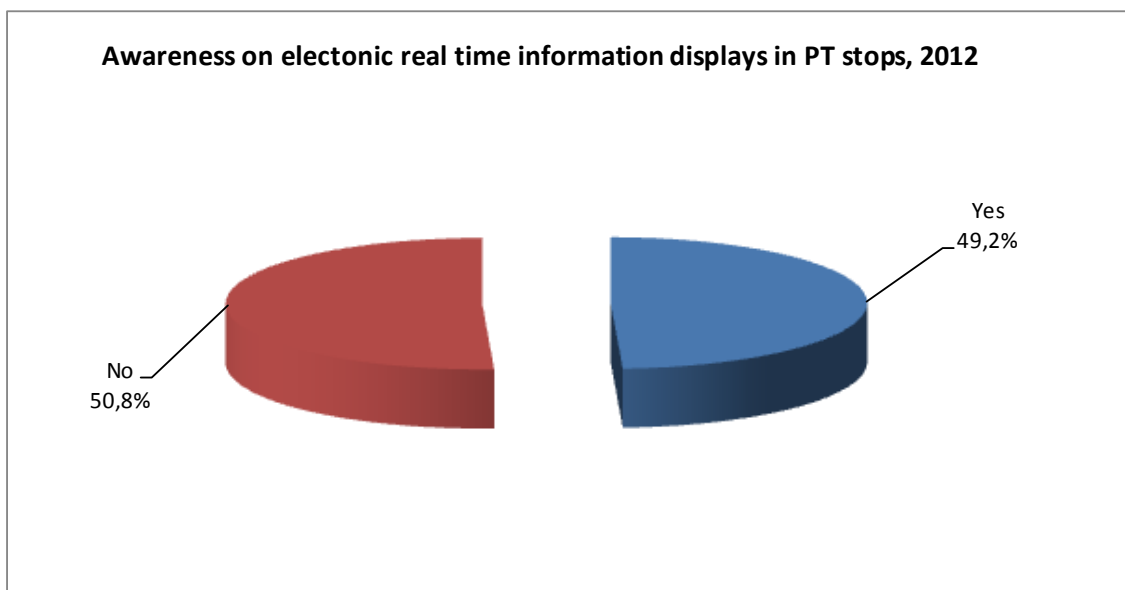
Yes
49,2%

No
50,8%

**Figure 7 Awareness of electonic real time information displays at PT stops, September 2012**

The change of acceptance was calculated as an average from the positive answers to the questions: "How necessary do you think it is to create such a system?" and "Do the electronic displays make travelling by PT more comfortable?" The answers "Very necessary", "Rather necessary", "Yes" and "Rather yes" were considered as positive. The separate and detailed results from the survey are presented in Figure 8 to Figure 11.
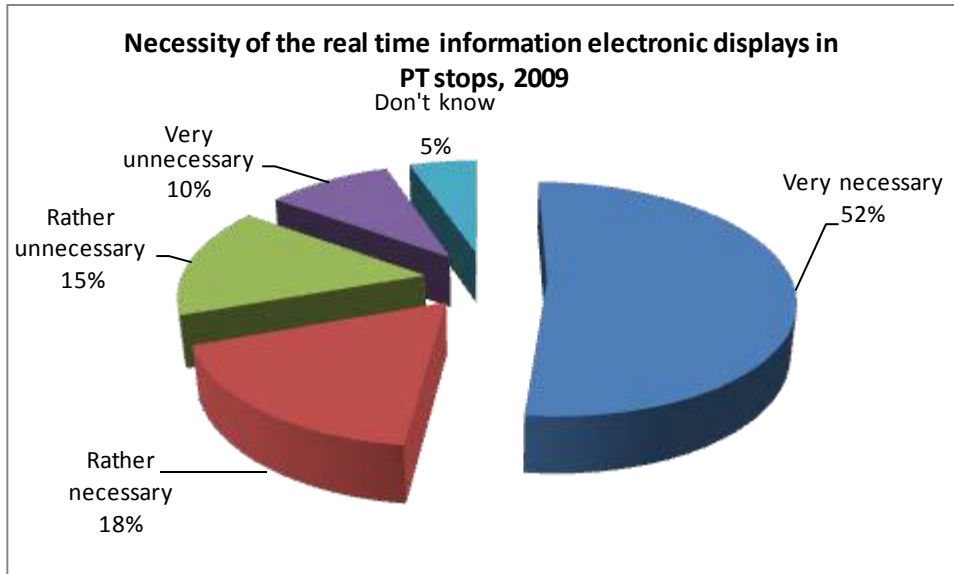


**Figure 8 Necessity of the real time information electronic displays at PT stops, 2009**
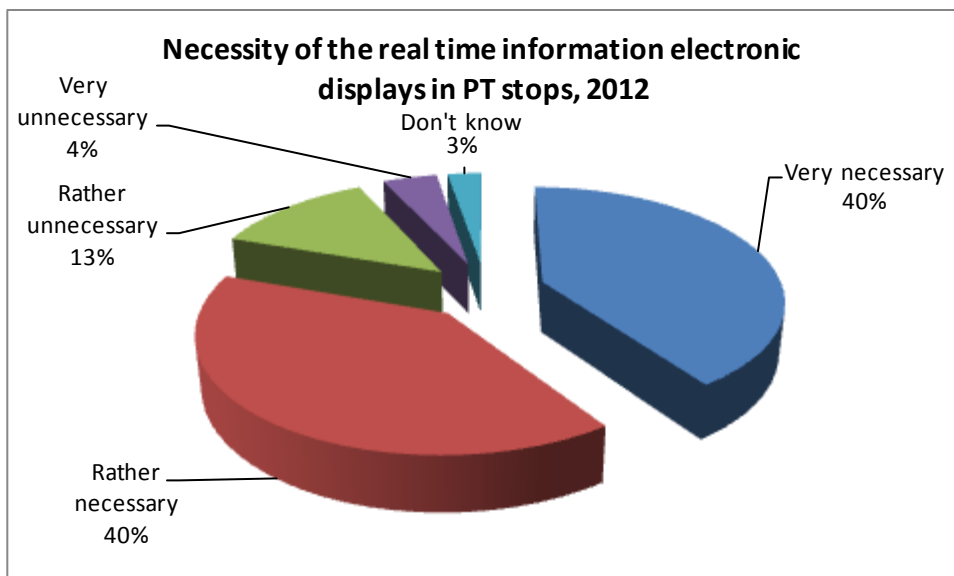


**Figure 9 Necessity of the real time information electronic displays at PT stops, 2012**

The results from the answers to the necessity of the new real time PT information system show that while the positive acceptance on the new system increased from 70% to 80%, the very positive acceptance decreased considerably, more towards realistic understanding of the necessity. The more realistic approach (reduced share of "very necessary" answer) is probably the result of wide public discussion in society on PT during 2012, its quality and needs due to introduction of fare free PT and PT lanes in large scale (explained in the chapter C1.3).
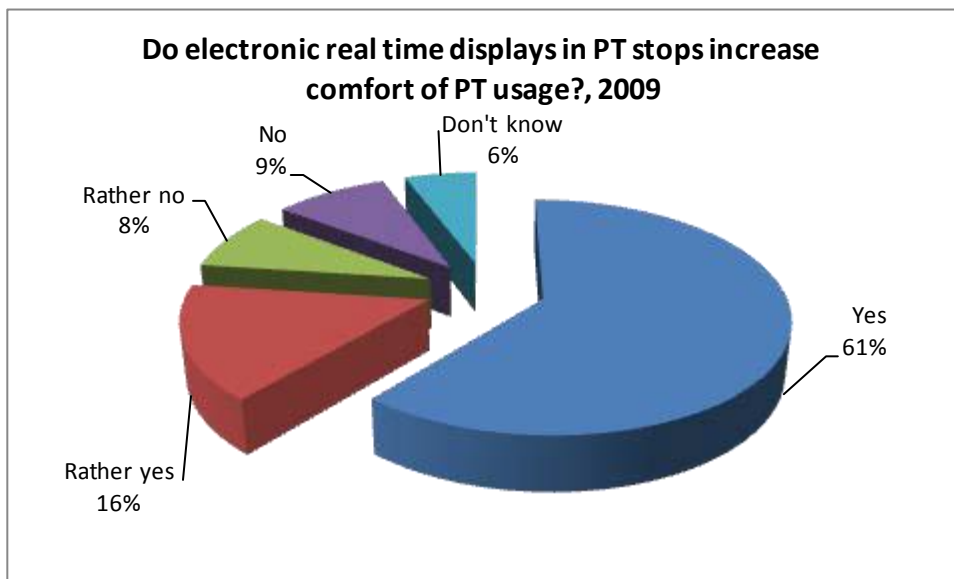
**Figure 10 Impact of the real time information electronic displays at PT stops on the comfort of using PT, 2009**
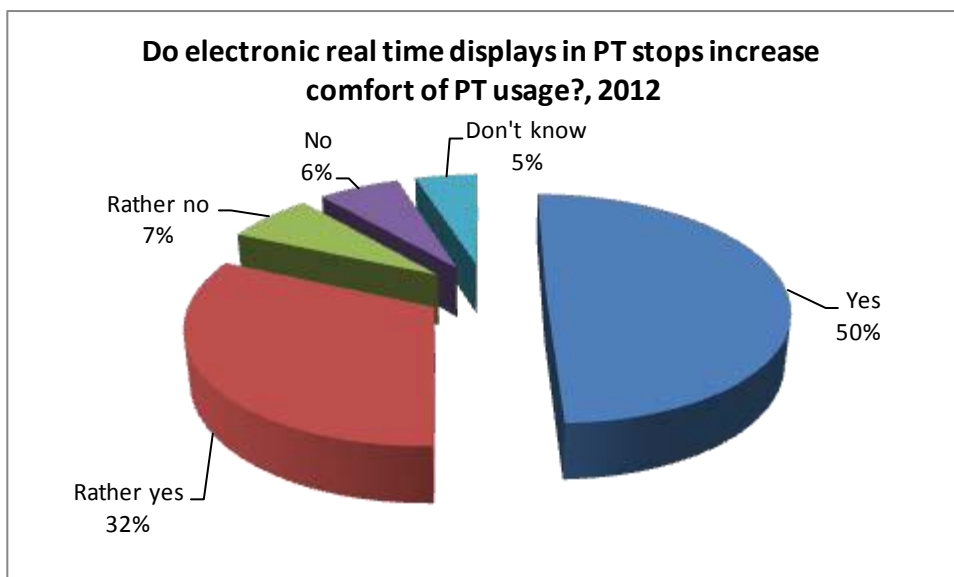
**Figure 11 Impact of the real time information electronic displays at PT stops on the comfort of using PT, 2012**

The results from the question regarding the impact of real time information electronic displays at PT stops on the comfort of PT are similar to the results to the question on the necessity of the system. The very positive opinion has decreased while the overall positive opinion has increased from 77% to 82%. Similarly to the acceptance results this indicates more realistic approach to the effect of the real time information to the comfort of PT usage and is caused by wide public discussions during 2012. Also, the increase of acceptance is probably connected to the increase awareness – the respondents actually had some kind of general idea of what the measure is about, the understanding was clearly lower in the before-survey.

**Table C2.5.1: Awareness and acceptance on the measure**

| Indicator | Before (date) | B-a-U (date) | After (date) | Difference: After –Before | Difference: After – B-a-U |
|-----------|---------------|--------------|--------------|---------------------------|---------------------------|
| Awareness | 12% <br><br> 11.2009 | 12% <br><br> 09.2012 | 49% <br><br> 09.2012 | 37% | 37% |
| Acceptance | 73% <br><br> 11.2009 | 73% <br><br> 09.2012 | 81% <br><br> 09.2012 | 8% | 8% |

The results from the evaluation of change in awareness show a significant increase whereas the change in acceptance is moderate. However, the results are only for awareness and acceptance of the plans to implement the real time information system, the system was not operational at the time of the second survey.

## C4    Up-scaling of results

The results could be up-scaled in several different ways:
- Widening of the electronic real time information display network to other PT stops in Tallinn;
- Widening of the real time information system to regional buses;
- Widening of the electronic real time information display network in shopping centres;

## C5    Appraisal of evaluation approach

In the final version the evaluation was based on measuring the change in awareness and acceptance without people actually seeing any parts of the system working in reality. The main reason was that the measure became operational after the evaluation period ended. In addition, the awareness and acceptance were almost certainly influenced by the wide scale public discussions on PT in Tallinn mainly due to the introduction of the fare free PT idea in January 2012 and other activities. However, the influence of the other activities could not be realistically separated for the BAU scenario. Thus the impact of the measure was evaluated only on the level of general awareness and acceptance.

## C6    Summary of evaluation results

The key results are as follows:

- **Awareness increased by 37%** – The awareness of the plan to introduce electronic real time PT information displays in bus stops was increased by 37% between the surveys in November 2009 and September 2012;

- **Acceptance increased by 8%** – The acceptance in the form of the necessity of the electronic real time PT information displays at bus stops and the possible impact of them on comfort with PT usage increased by 8% between the surveys in November 2009 and September 2012.

## C7    Future activities relating to the measure

There are no precise and agreed future activities relating to the measure at the current moment (October 2012). However, there have been discussions on creating a PT management centre in Tallinn, creating a real time PT information mobile application for a Windows Phone operating system and to

proceed with negotiations with shopping centres in order to display PT real time information on their electronic displays.

# D     Process Evaluation Findings

## D.1     Deviations from the original plan

The deviations from the original plan comprised:

- **Delays in preparing the procurement process** – There were serious deviations from the original plan due to delays regarding preparing the procurement process. One reason for the delays was that due to financial crisis Tallinn decided to postpone several transport-related public procurements from 2010 to 2011.

- **Addition of mobile application to the scope of the measure** – Originally it was planned to install electronic displays at PT stops, provide additional functionality on the PT schedules web page and provide SMS-service to PT users. The latter was replaced with a more innovative smart phone application and a mobile phone friendly view of the real time information system for regular mobile phones.

## D.2     Barriers and drivers

## D.2.1  Barriers

### Overall barriers

- **Dependency on existing PT priority, information and communication system** – The existing system was relatively new and modern and also closed for other possible providers. This made negotiations and planning difficult throughout the entire preparation and implementation process, because removing the existing system from all PT vehicles in case of new providers would not have been rational.

### Preparation phase

- **The decision to implement measures separately** – During the preparation phase a possible joint implementation of the measures "2.2 PT ticketing system", "2.3 PT communication system" and "8.3 PT real time information system" as one integrated system was discussed. Despite the fact that it was decided to prepare and implement the systems separately, all the measures are still connected to one provider. Thus a lot of resources were wasted on separate preparations and implementation.

- **Postponing the public procurement -** due to financial crisis Tallinn decided to postpone several transport-related public procurements from 2010 to 2011, including the current measure. This caused a serious delay in implementing the measure.

- **Lack of expertise and objective information in Estonia** – Independent expertise (from actual providers of the systems), information and examples will be available in 2012. However, this was not the case during the preparation phase – 2009 and 2010. Therefore the study on real time information systems was delayed.

- **Possibility for incompatibility issues** – Choosing a suitable technical solution was problematic because of potential incompatibility with the existing PT information systems.

**Implementation phase**

- **Limited manpower of the provider of the system** – The provider of the system was occupied with measures "2.2 PT ticketing system" and "2.3 PT communication system" and had therefore an insufficient amount of resources available for preparation and launch of the current measure. Thus the process was delayed.

**Operation phase**

- **Very late operation phase** – the late commencement of the operational phase cancelled the possibility of evaluating the impact of the measure properly

## D.2.2 Drivers

**Overall Drivers**

- **The commitment to implement a real-time information -** the commitment was set by the City Council in the Sustainable development plan, service level standards and investment and financing program 2004-2010 for Tallinn public transport within the common ticketing system. This helped to continue with the implementation of the measure despite all delays and problems.

## D.2.3 Activities

- **Choosing a compatible system** - Because of possible incompatibility issues with the existing systems the same partner was chosen who had provided the previous PT information systems in Tallinn with CIVITAS SMILE project and also the other MIMOSA measures PT IT systems.

## D.3 Participation

## D.3.1. Measure Partners

• **Tallinn City Government –** Leading role in the measure organized by Tallinn Transport Department

• **Tallinn University of Technology** – A principal partner, responsible for preliminary studies and evaluation of the measure

• **AB Thoreb–** A principal partner, provider of the real time information system and displays

• **Merakas Ltd** – A principal partner, provider of the web page solution

• **United Tickets Ltd** – A principal partner, provider of mobile applications

## D.3.2 Stakeholders

• **Citizens of Tallinn** – The change towards sustainable transport modes is useful for all citizens of Tallinn

• **PT users** – The increase of PT service quality and comfort is useful for PT users

• **Car drivers** – The displays in public places are also a showcase for car drivers on improvement and comfort of PT

• **Visitors to Tallinn** – PT real time information displays at stops are especially beneficial for users who are not familiar with the local PT system

• **Local businesses** - all the local businesses now have the opportunity to use PT real time information and to display it in shopping centres or other locations, and also to create web pages and mobile applications using the real time PT information.

## D.4    Recommendations

## D.4.1 Recommendations: measure replication

**PT real time information system should be part of a complete information system from one provider, if possible –** According to the opinions of several measure leaders and managers in Tallinn Bus Company a considerable amount of resources were wasted while trying to implement the measures "2.2 PT ticketing system", "2.3 PT communication system" and "8.3 PT real time information system" separately. Real time information system is an integral part of the whole PT information system and should therefore be tried to be prepared, acquired and implemented in an integrated and consistent way.

## D.4.2 Recommendations: process

**Having one small scale contractor for several measures creates risks** – The same solutions provider was contracted for the MIMOSA measures "2.2 PT ticketing system", "2.3 PT communication system" and "8.3 PT real time information system". Since the other measures had higher implementation priority and the company had very limited resources, the current measure implementation was severely delayed due to implementation of other measures. Thus there is a good reason to ask bidding contractors to provide proof of sufficient resources to complete measure tasks in time.

## Real-time information system

| Reference Measure | TAL 8.3<br>Real-time information system |
|---|---|
| Date of Submission | 05/2012 |
| Date of Review (ISIS) | 07/2012 |
| Date of Approval | 07/2012 |
| Author(s) | Marek Rannala |
| Editor(s) | Loredana Marmora (by ISIS) |

## Context and Purpose

For making PT more attractive for users an additional information on PT schedule is one way of achieving it. The additional information is real-time status of PT schedule and arrival times. The information is provided on electronic displays installed in PT stops, on the internet and on mobile phones with help of vehicle positioning and real-time information exchange. The measure aims at studying ways of providing the information, defining the most beneficial locations for the information displays, aquisition and installing of the necessary equipment.

For preparing for acquirement processes of equipment and software a study was needed on possible solutions today and examples of different implemented systems in use.

## Description of RTD Activity

The first stage of RTD activity was creation of overview of systems in use worldwide with concentration on closest systems which are based on the same hardware solutions that Tallinn has in public transport vehicles. The study gave also recommendations for procurement process.

The second stage was technical consulting with the supplier that was chosen based on procurement with negotiations for finding optimal solutions and number of displays to public transport stops.

## Outputs and Results

The study gave selected overview of available systems with their advantages and disadvantages. The study gave also technical recommendations for procurement process.

## Resulting Decision-making

Based on recommendations and negotiations a supplier was chosen that has supplied information systems to Tallinn public transport in CIVITAS SMILE project. Also a different supplier was chosen for creating real time information website and mobile applications. All of the mentioned solutions are being implemented as of January 2012.

## Lessons Learnt

It is difficult to treat all possible suppliers equal when one of them has already advantage by having supplied whole information systems to all public transport vehicles. Creating a parallel system existing one would cost more and add devices to cabins of vehicles where it is tight with space already.

## Cost-effectiveness

The study gave overview to the deciders for negotiating with different possible suppliers and

making decisions.

## Dissemination and Exploitation
The study was used only for preparing the measure implementation. Because technology in this field is developing fast, the study is not very useful source of information in few years. The results from impact evaluation will be available for all interested parties.