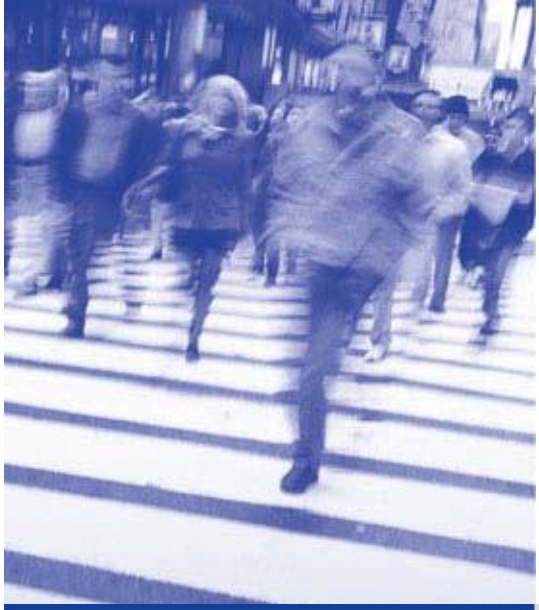

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Measure Evaluation Results

TAL 2.3 PT Communication System

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Executive Summary

The measure 'Communication System' was aimed at installing a modern communication system on 145 buses from the Tallinn Bus Company (TBC). The new system comprises of driver communication units and operator workstations and is based on the 3G mobile communication standard. The objectives of the measure were to ensure better information sharing and faster communication between drivers and traffic operators which would contribute to improving the overall traffic flow management as well as to increasing road safety by avoiding the use by drivers of mobile phones while driving.

The measure was implemented in the following stages:

Stage 1: Preparation of tender procedure (November 2010 – April 2011) It was decided to launch a restricted tender for the installation of the communication system on 145 buses of the 350 buses in service in Tallinn. The drafting of the terms of references and the selection of the participants for the restricted tender were based on the result of the RTD activities conducted between August 2010 and October 2010 by Tallinn University of Technology.

Stage 2: Contest for acquiring the communication systems (April 2011 – May 2011) Proposal offers were received from three participating companies. After evaluation of the proposals, the subcontractor responsible for the elaboration of the concept, the implementation and the maintenance of the communication system was officially selected in July 2011.

Stage 3: Installation of the communication systems (November 2011 – December 2011) The subcontractor installed the required hardware on 145 buses and made technical preparations for installing 10 operator workstations, three of which were created in the TBC headquarters.

Stage 4: System testing (January 2012 – June 2012) The new communication system was tested before declaring it operational.

An impact and process evaluation was conducted. The survey conducted after the implementation allowed measuring acceptance among bus drivers and managers/operators on the system as well as the impact of the measure regarding road safety based on the drivers and operators perceptions.

The first **key result** from the impact evaluation was a positive acceptance from bus drivers and managers/operators: 84% of bus drivers and 90% of managers/operators considered that the new communication system has positively affected their working conditions i.e. increased comfort of working and a modern working environment; 92% of bus drivers and 90% of managers/operators considered that the new communication system has improved working arrangements i.e. effectiveness of operations. A second key-result extracted from the evaluation was the identification of traffic safety improvements: 90% of both drivers and managers/operators considered that the new communication system has improved traffic safety.

The most important barrier identified by the process evaluation was a planning issue. It was decided to take into consideration all improvement activities in the public transport information and communication system in three different MIMOSA measures (TAL 2.2 'PT Ticketing', TAL 2.3 'PT communication system', TAL 8.3 'PT real time information system'). Strong coordination was required between the many responsive teams for the three MIMOSA measures which were both time and energy consuming. Furthermore, technical interdependency of the communication system with the other MIMOSA measures made the

process of finding a suitable solution difficult and caused a delay in the installation of the equipment into the PT vehicles.

The first main driver was the world-wide current technological advancement on communication systems. The 3G standard mobile communication technology was used in the context of the measure. **The second main driver** was the active and objective-oriented engagement from all partners involved in the measure. This contributed to establishing good cooperation and to achieving the objectives during the entire process.

From Tallinn´s experiences, **some recommendations** can be made for measure replication. Firstly, it is important to equip the entire fleet of a PT company with the same communication system. Partially equipped fleets give only a limited effect. Secondly, consideration should be given to implementing PT information and communication systems as one integrated solution. The implementation of the system in different parts separately and by different providers can generate some disadvantages such as a high demand on resources to coordinate the implementation, potential problems with compatibility between different equipment, etc.

A Introduction

A1 Objectives

The measure objectives are:

(A) High level / longer term:

- Reduction of transport related pollution;
- Increase of modal split towards sustainable modes;
- Improvement of traffic safety;

(B) Strategic level:

- Implement and test modern communication solution for public transport fleet and traffic management unit of public transport;
- Improve quality of public transport traffic management with modern communication solution for public transport in the city;
- Improve public transport service quality.

(C) Measure level:

(1) Procurement of modern communication solution for Tallinn public transport (approximately for 180 buses);

(2) Create smooth information flow and contribute to solving everyday operative problems and reduce risk of interruptions while serving PT users;

(3) Improvement of receiving information on traffic conditions (according to time, special arrangements or meteorological conditions) allowing to choose the best solution to reach the optimal traffic flow in every situation;

(4) Support the communication process allowing traffic management unit to promptly react to unexpected congestion and help to better plan traffic modifications;

(5) Create new tool with ability to collect the detailed PT statistics.

(6) Providing input (e.g. operative PT traffic situation info) for planned PT management centre;

(7) Improvement of traffic safety through reduction of mobile phone usage by PT drivers;

(8) Improvement of safety in PT through providing fast emergency information tools and service to PT drivers.

A2 Description

The measure was about installing modern communication system on-board units to 145 of Tallinn Bus Company's (TBC) 350 buses and creating technical readiness for 10 operator stations in TBC headquarters. The new system enables better information sharing possibilities, quicker communication and eliminates the bus drivers' need for communicating with mobile phones while driving. Communication is especially important for solving quickly any upcoming problems and thus improving the PT service.

The new system comprises of driver communication units (**figure 1Fehler! Verweisquelle konnte nicht gefunden werden.**) and operator workstations (**Figure 2**). The system has

possibilities for verbal communication, text messages and sharing of exact bus location based on GPS location.

Figure 1 Driver communication unit

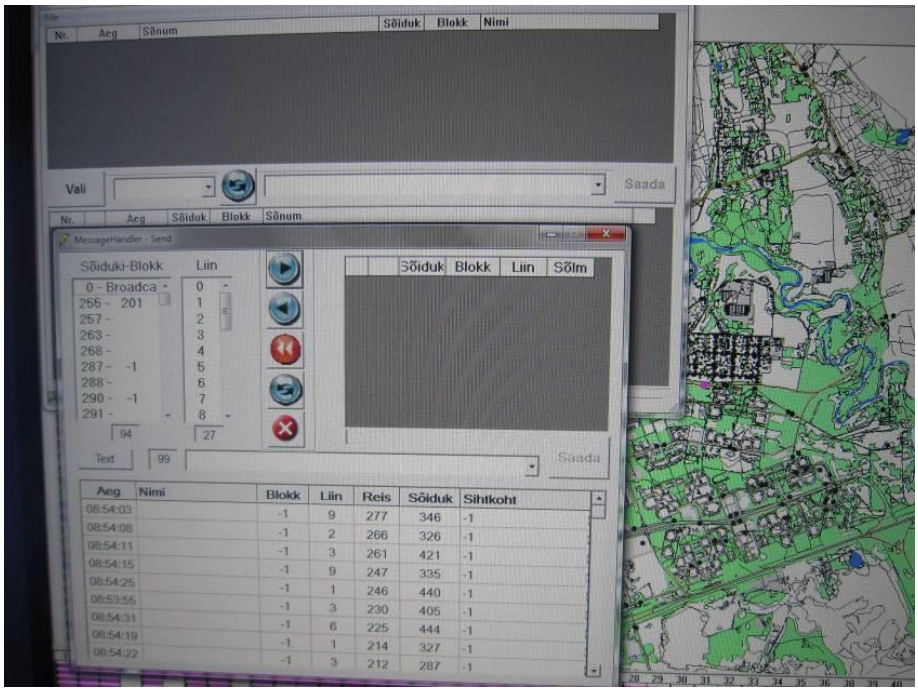
The **driver communication unit** comprises of an onboard computer Thoreb C74, (display with navigation buttons) and a VoIP (Voice over Internet Protocol) module C50. The display is continuously showing a city map with bus line navigation guide and monitors the buses position's accordance to the timetable. Since the system's onboard computers were also used for the MIMOSA measures "2.2 Ticketing" and "8.3 Real time information", the computers were upgraded in the scope of the measure "2.3 Communication system". Newer buses were selected for installation to avoid the need to reinstall the equipment in case old buses are written off.

The **operator workstation** comprises of a computer workstation with special communication software allowing contacting bus drivers separately or as groups verbally or with text messages. A technical readiness for 10 operator stations was created in the TBC headquarters in the scope of the measure. There were several reasons for not fully implementing all operator stations. Not all buses were equipped with the communication technology and there were plans of merging the TBC and Tallinn Tram and Trolleybus Company into one. The merging was done in August 2012 and the new company (Tallinn City Transport Company, TCTC) is planned to have a new operating centre, thus needing all the operator stations in near future.

The text messages can be chosen from existing templates or created according to needs. Communication is possible between driver and operator, between driver groups and operator, between drivers and driver groups. The pre-existing message templates are for breakdown, fire, emergency and SOS situations. Sending of this kind of message together with actual location to the operator is very quick compared to usage of mobile phone or verbal communication where explaining of a location alone takes time and can create mistakes or confusions.

Communication between all on-board units and operating workstations is based on a 3G mobile communication standard. The system became fully operational in June 2012 after 6 months testing and troubleshooting of connection problems (see section D 2.1).

Figure 2 Operator workstation screenshot



B Measure Implementation

B1 Innovative Aspects

The innovative aspects of the measure are:

- **Usage of new technology** – the whole communication system with possibilities of verbal and text messaging is locally new level of technology in use for PT. Usage of 3G mobile communication standard for this purpose is innovative even in wider sense.

B2 Research and Technology Development

The research activity was aimed at finding an optimal technical solution for the communication in the Tallinn Bus Company. Research was carried out by the Tallinn University of Technology in October 2010 to consider technical possibilities of GSM mobile (including 3G) and radio (including TETRA standard) based systems. Different examples and experiences of cities were brought out. As a result of the research conclusions were made:

- Technical possibilities of mobile and radio based systems are very similar;
- Public transport is considered as a vital service by the Estonian Emergency Situation Law and thus can be included to the TETRA network which is used only by legal persons for operational and public correspondence traffic;
- Considering possible systems devices in PT vehicle: priority system, ticket system, PT stop information system and communication system – latter of which is most suited to work as autonomous independent system, especially in case of TETRA communication due to low speed of data transfer.
- Older radio based communication systems are not feasible to start with today;
- The choice between TETRA and GSM (or 3G) standards depends primarily on costs.

Several workshops from November 2010 to December 2010 were organized together with potential suppliers of communication systems to select candidates for tendering.

B3 Situation before CIVITAS

Before the CIVITAS MIMOSA project the coordination of work between the Tallinn Bus Company bus drivers and the traffic management operators was not supported by a specialized communication system, it was organized by usage of drivers' personal mobile phones. This resulted in regular violation of the Traffic Code, according to which the usage of mobile phone without hands-free systems while driving in towns was prohibited already since 2001, thus affected also traffic safety level. The absence of a proper communication system resulted also in situations where drivers without personal mobile phones were unable to communicate with traffic management operators in case of problems and emergencies which in turn resulted in longer reacting time to the problems and more cancelled trips without a replacement bus.

B4 Actual Implementation of the Measure

The measure was implemented in the following stages:

Stage 1: Preparation for contest (November 2010 – April 2011) – Instead of public procurement a contest with negotiations and chosen participants was prepared based on the RTD activities.

Stage 2: Contest for acquiring the communication systems (April 2011 – May 2011) – Offers were received from three participating companies.

Stage 3: Installation of the communication systems (November 2011 – December 2011) – Hardware was installed on buses and operator workstations were created in the TBC headquarters.

Stage 4: System testing (January 2012 – June 2012) – The new communication system was tested before declaring it to be operational.

B5 Inter-Relationships with Other Measures

The measure is related to other measures as follows:

- **2.1 - Developing of P&R and school bus systems** – the set of fleet which will have new communication system is partially same as the fleet set servicing P&R and school buses.
- **2.2 - PT Ticketing system** – the systems share same hardware on the buses: GPS, onboard computer and data communication system.
- **8.3 - PT Ticketing system** – the systems share same hardware on the buses: GPS, onboard computer and data communication system.
- **CIVITAS SMILE** - this measure is also interrelated with measures introduced at the previous CIVITAS SMILE project, where special bus priority and information systems hardware was installed on buses.

C Impact Evaluation Findings

C1 Measurement Methodology

C1.1 Impacts and Indicators

Evaluation of the measure was based on indicators that were realistically obtainable. There are several expected impacts from the new PT communication system: time for communicating and solving upcoming problems is potentially reduced, traffic safety is improved due to eliminated need to use mobile phone while driving, security level in PT is increased because of quick possibility to contact rescue, ambulance and police services. Also, running communication costs for TAK could be reduced compared to previous use of private mobile phones but while considering also the investment into the communication equipment it is doubtful. There is also no point in interviewing PT users about PT communication system - they don't have any connection to it.

The problem with evaluation of these important impacts was that the data was either not available or not suitable for analyses. Also, with every effect there was a need to consider that only less than half of the TBC fleet was equipped with the new communication system and therefore the use of "global" TBC statistics for events of random occurrence could not be used. There is no detailed vehicle-based statistics available from TBC, the statistics is mostly available for the whole TBC fleet or working groups within TBC.

The time for communicating and solving upcoming problems has not been evaluated in TBC and it would have been virtually impossible to evaluate by outsiders. Thus the TBC operators and drivers would have had additional task to do for several years (record events) when they have busiest moments – solving urgent problems. Evaluators cannot put such task to the company and the time difference compared to usage of drivers private mobile phones is probably not remarkable.

It is always difficult to prove that any of traffic accident is caused by using mobile phone and probably these cases when TBC driver has used mobile phone while getting into traffic accident are rare or the number is statistically insignificant. Thus the only possibility to find out about the impact of the new communication system to traffic safety is to estimate the impact to mobile phone usage by bus drivers.

It is also difficult to evaluate the impact of the new communication on security in PT. While the knowledge of existence of SOS button can prevent attacks to other passenger or PT driver, it cannot prevent fire or need for medical assistance to passengers. Since the numbers of such events connected to TBC are also on the limit of statistical significance and there is a range of other and more important factors besides PT communication system contributing to solving the events, the evaluation is again not realistic.

The final but most important problem for any kind of evaluation was that the system became operational and all connection stability issues we solved in June 2012, leaving only 3 months for impact evaluation and in case of random events such as problems, traffic accidents and events connected to security the period is insufficient.

Considering the explanations above the only possibility was to interview the persons who are working with the new system daily and to as for assessment of the impacts of the new PT information system.

Table C1.1: Indicators.

NO.	EVALU-ATION	EVALUATION SUB-CATEGORY	IMPACT	INDICATOR	DESCRIPTION	DATA /UNITS
16	Society	Acceptance	Acceptance	Acceptance level	Attitude survey of change in acceptance of PT drivers and operators	Index, qualitative, collected, survey
TAL 2.3-1	Transport	Safety	Transport safety	Usage of mobile phones during driving	Relative change in usage of mobile phones during driving	Index, quantitative, collected, survey

Detailed description of the indicator methodologies:

- **16 acceptance level and TAL 2.3-1 Transport safety** – acceptance level of bus drivers and operators was measured with one anonymous survey in August 2012, after the system had been fully operational for 2 months. The sample of the survey was 120 drivers and 10 managers/operators who have actually used the new communication system in their work. This was approximately half of the drivers who work with the new communication system daily – representative sample for the survey. The survey was voluntary for bus drivers, many drivers were on vacation at the time of the survey.

Only the answers from operators were marked to separate them from the answers of bus drivers. The questions in the survey were:

1. How do you value the impact of the new system to your working conditions (useful, not useful, don't know, negative). In case of negative, please explain.
2. How do you agree with the following statements about the new system (totally agree, agree, don't know, don't agree, totally disagree):
   - The working arrangement was improved, because information between driver and operator is transferred quicker;
   - Traffic safety was improved, because there is no need to use mobile phone for communicating with operator while driving:
3. What is your position on the new possibility to send messages (totally agree, agree, don't know, don't agree, totally disagree):
   - It helps to improve working arrangement, because it is now easier and quicker to send information and buses location
   - It helps to improve safety, because it is easier for driver to send information about problems and buses location
4. How much is your work influenced by the paragraph in the Traffic Code which forbids the usage of a mobile phone without hands-free systems while driving?
   - It does not influence me, I use hands-free system
   - It does not influence me, I don't use mobile phone while I'm driving
   - With installation of the new system it is easier to follow that paragraph

The question 1 was used for evaluating general acceptance on the new communication system and the second part of the question 2 was used for evaluating the potential impact of the system to traffic safety.

C1.2 Establishing a Baseline

No baseline was created for the measure indicators because no quantifiable change could be detected from the impact of the measure.

C1.3 Building the Business-As-Usual Scenario

No BAU scenario was created for the measure indicators because no quantifiable change could be detected from the impact of the measure.

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

Impacts category	Indicator	How does it impact	Why it was not assessed
Society	Awareness	Awareness of bus drivers on the communication system changes when it is taken into use	The general awareness of bus drivers on the new communication system has no useful meaning.
Transport	Time for reporting and solving a PT vehicle problem	The new system can be expected to improve the time for solving various rising problems with PT, at least the time it takes to report and explain the problems and vehicles location to operator	No statistics available from the TBC on the previous problem-solving times. “System operational” time for evaluation was too short.
Transport	Nr of cancelled trips	When communication about problems and buses location is quick, it is sometimes possible to send a substitute bus so the same trip can be continued or at least the returning or next trip could be substituted.	Too few buses were equipped with the new system to see any difference in statistics. Also, the possibility of substituting a bus varies depending on the problem and the location where it occurred. “System operational” time for evaluation was too short.
Transport	Accuracy of PT timekeeping	Originally planned indicator, similar with previous.	Communication is too small factor in the overall result, especially when only part of the TBC fleet was equipped with the new system. “System operational” time for evaluation was too short.
Transport	Perception of quality of PT services	If the communication system means quicker reacting to problems, less cancelled trips and better timekeeping, it should be possible to perceive it	There are several other factors, which contribution to the quality of PT is bigger and only part of the TBC fleet was equipped with the new system.
Transport	Safety, nr of injured and killed	Not using mobile phone while driving results probably in higher traffic safety level and thus in smaller number of injured and killed.	There are too few accidents with TBC buses in one year for statistics, the period for accident statistics should be ideally at least 3 years, only 3 months of operational system was available for evaluation. Also, it is usually difficult to prove that the cause of an accident was talking on a mobile phone.
Economy	The communication costs of TBC	The communication costs from calling to drivers could be saved with the new system.	The aim of the system was not to save from the communication costs but to improve the communication and traffic safety. Also, too few buses were equipped with the new system to see any difference in statistics.

C2 Measure Results

C2.1 Economy

Not applicable

C2.2 Energy

Not applicable

C2.3 Environment

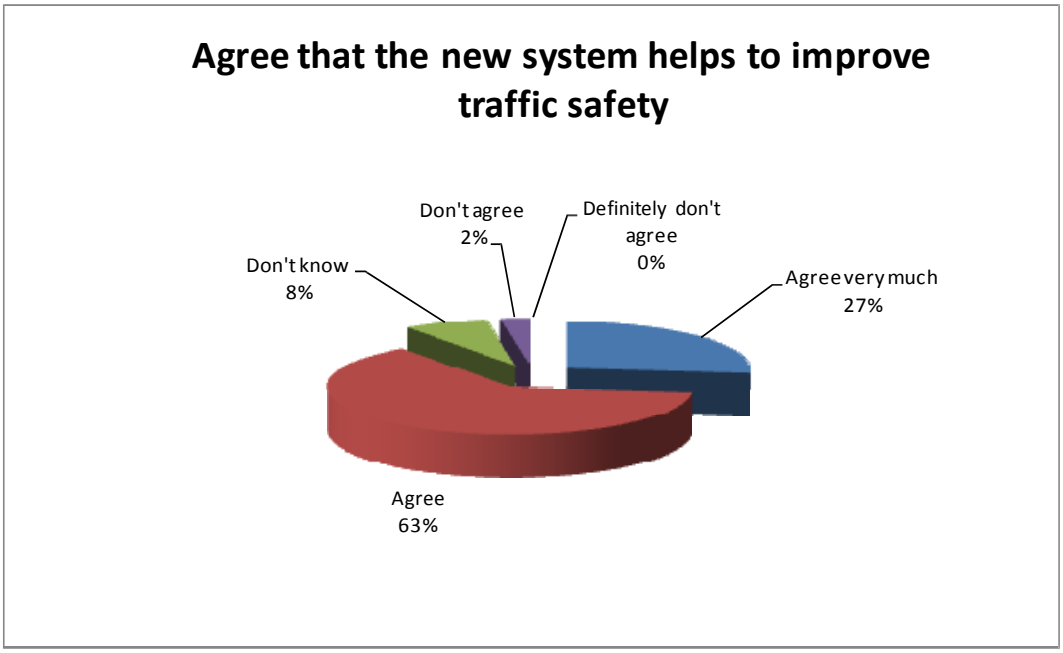
Not applicable

C2.4 Transport

Impact of the measure to the transport system was measured with a potential impact of the new communication system to traffic safety. The potential was measured with following questions: “How do you agree with the following statements about the new system: Traffic safety was improved, because there is no need to use mobile phone for communicating with operator while driving.” and “How much is your work influenced by the paragraph in the Traffic Code which forbids the usage of a mobile phone without hands-free systems while driving?”

The first question brings out the assessment of impact to traffic safety and the second question gives indication to the actuality of the problem before implementing the measure. The results from the question are presented on the figure 3.

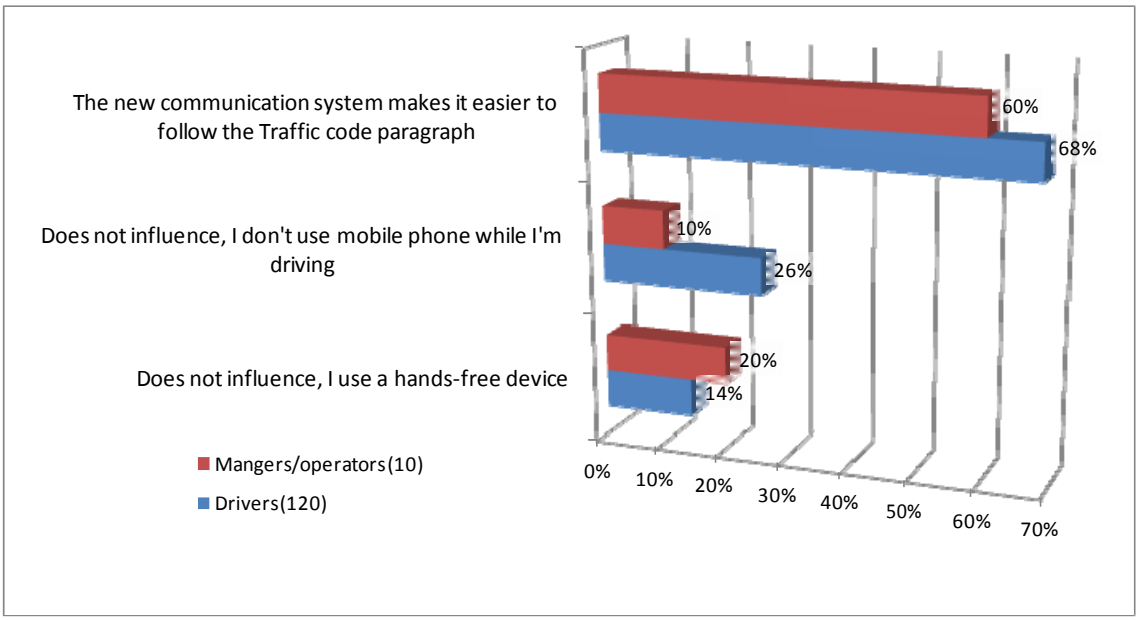
Figure 3 Bus drivers assessment on the impact of the new communication system on traffic safety



The results show 90% positive assessment by bus drivers and also 90% positive assessment by managers/operators.

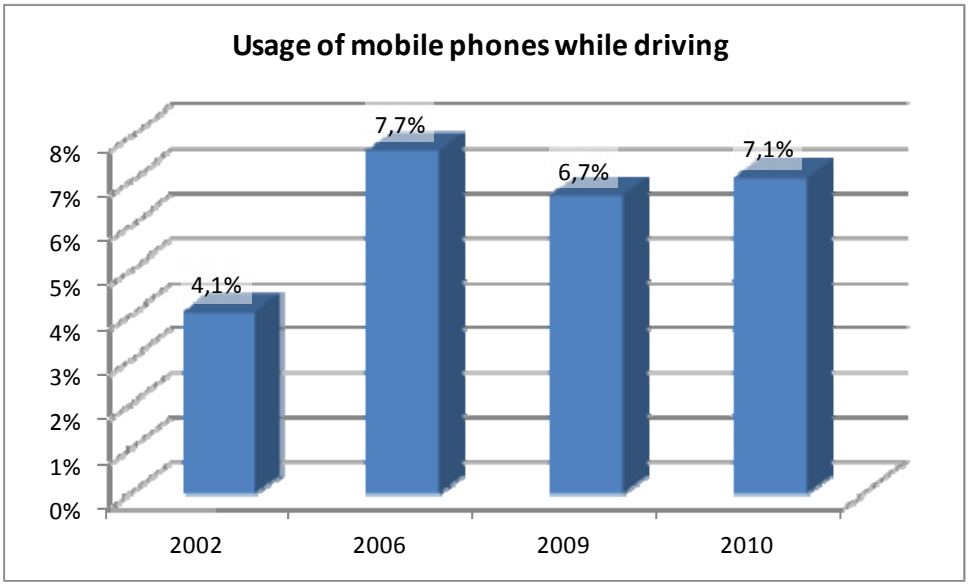
The second question was used as a check for the actual situation with mobile phone usage during driving as it is connected to traffic safety. Results from the question are presented on the figure 4.

Figure 4 Impact of the new communication system to usage of mobile phones by drivers during driving



The results show that there was a good reason for implementing the new communication system, when considering traffic safety - 68% of bus drivers were potential mobile phone users while driving. While it is not known exactly how often the usage of mobile phones while driving is the cause for traffic accidents in Estonia, the usage of them is high as can be seen on the figure 5. It is the result of annual traffic behaviour monitoring arranged by the Estonian Road Administration and the usage is counted in 3 Estonian cities for all vehicles in traffic flow. While there is no separate statistics for bus drivers available, the usage of mobile phones by truck drivers is very similar to personal cars.

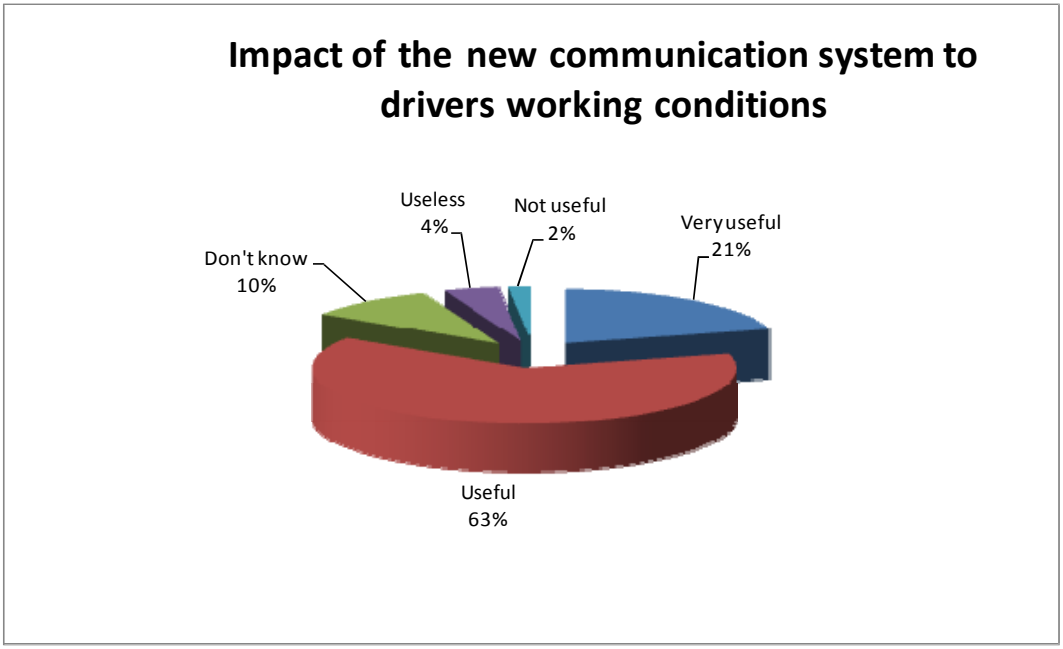
Figure 5 Usage of mobile phones while driving in 3 Estonian cities, % of traffic flow



C2.5 Society

Impact of the measure was also evaluated with assessment of bus drivers and managers/operators to the new communication system. The general acceptance was measured with the survey question: "How do you value the impact of the new system to your working conditions?" The results of bus drivers' answers are presented on the figure 6.

Figure 6 Bus drivers' assessment on the impact of the new communication system on their working conditions

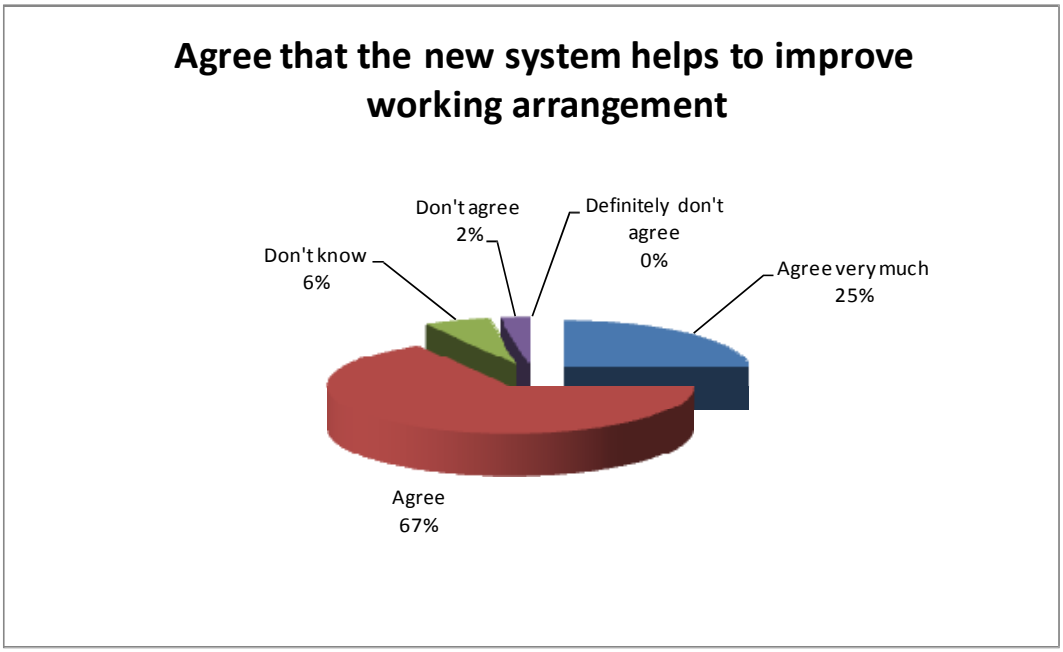


The result was 84% positive general acceptance towards the new communication system from bus drivers (figure 6) and 90% positive acceptance from managers/operators.

The general acceptance was confirmed with the respondents' assessment on the new communications impact on work arrangement and traffic safety (figure 3 and figure 7). The

results were obtained with answers to the questions: “How do you agree with the following statements about the new system: The working arrangement was improved, because information between driver and operator is transferred quicker; Traffic safety was improved, because there is no need to use mobile phone for communicating with operator while driving.”

Figure 7 Bus drivers’ assessment on the impact of the new communication system on working arrangement



The results confirmed the general acceptance with 92% (working arrangement) and 90% (traffic safety) positive answers from bus drivers. The results were similar for managers/operators - both 90%.

Assessment of bus drivers and managers/operators is an important aspect. While it does not prove positive impact of the new communication to efficiency of operating PT, it contributes to motivation of TBC employees. A motivated employee is more efficient in what he or she is doing and it helps to achieve the objectives of the measure.

C3 Achievement of Quantifiable Targets and Objectives

There were no quantifiable objectives in this measure.

C4 Up-Scaling of Results

The results could be up-scaled on different levels – from the local company level to national level. When the system has proven its value in practice, there is a good reason to install it into all Tallinn City Transport Company (former Tallinn Bus Company) vehicles. Communication arrangement in one company should be uniform to be effective and one reason for merging the different public transport companies was to be able to improve communication and work arrangement between different PT modes.

The second level could be municipal level, because there are several private PT companies operating in Tallinn and uniting them into the same system would open again new possibilities in improving working arrangement and general effectiveness.

The national level means introducing the same or similar system in other municipalities and introducing compatible system in intercity PT. One reason to do that is that PT is defined as a vital service in Estonian legislation and was therefore even allowed to be integrated into the TETRA communication used by emergency services. It was under consideration in the planning phase of the measure but the very high reliability and robustness of such system is not needed for PT as it comes with high cost. But the importance is still valid and therefore integration of all PT communication is worth considering.

C5 Appraisal of Evaluation Approach

The evaluation approach was able to bring out the positive aspects of the new communication system: potential improvement of traffic safety and positive acceptance by bus drivers and managers/operators. As explained under the chapter “C2 Measure results”, these aspects are important even when they do not prove the impact of the system to traffic safety and PT operating efficiency.

Ideally, the evaluation should have been quantifiable and based on facts, not only drivers and operators opinions about the influence of the new system. At the same time a communication is only one small factor contributing to reliability and quality of PT, thus its contribution is not easily measurable when implemented only to less than half of the fleet. It is also almost impossible to connect it provably to any change in traffic safety related statistics, even if it has been indicated with studies that usage of mobile phones while driving causes higher risk of accident. The situation was affected also by late implementation of the measure, leaving only 3 months of stable operational mode for evaluation.

As a conclusion the attempt to show the change in working conditions of bus drivers/managers/operators and change in mobile phone usage during driving was the only realistic approach to point out any results from the measure.

C6 Summary of Evaluation Results

The key results are as follows:

- **Positive acceptance from bus drivers and managers/operators** – 84% of bus drivers and 90% of managers/operators consider that the new communication system has positively affected their working conditions; 92% of bus drivers and 90% of managers/operators consider that the new communication system has improved working arrangement;
- **Potential improvement of traffic safety** – 90% of both drivers and managers/operators consider that the new communication system has improved traffic safety.

C7 Future Activities Relating to the Measure

There are currently no particular activities related to the measure planned for the near future since the system is relatively new (operational since June 2012) and has yet to prove its value in practice.

D Process Evaluation Findings

D1 Deviations from the Original Plan

The deviations from the original plan comprised:

- **Delay in the procurement process –** the procurement process took more time than initially expected – the aim was to keep negotiations with three partners in order to make best possible choice.
- **Other MIMOSA measures contributed to delays -** Technical dependency of the system on other related MIMOSA measures of Tallinn made the process of finding suitable solution difficult and delayed the installing of equipment into PT vehicles.
- **Fewer buses equipped with the system –** 145 buses instead of originally planned 180 were equipped with the new communication system. This was because of the outcome of the procurement and the need for the system to be compatible with the MIMOSA measure 2.2 PT ticketing system equipment.
- **Expected results omitted from the objectives** – The following expected results were omitted from the objectives of the measure with project amendment before implementing the measure:
  (1) Solving of route network problems increase by 10% - the statistics was unavailable from the TBC and the scale of the measure
  (2) Failures of non-serviced trips decrease by 10%;
  (3) Reporting time about service problems in traffic decrease by 10%;

The main reasons for omission of the objectives were:

- Measure operational time was seen to be too short to evaluate the effects from the measure. By the time of making the omission decision of the objectives it was clear that the system would probably have only up to 6 months of stable operational time. Finally it turned out to be only 3 months;
- The predictable impact of the measure was too small for measuring events that do not occur regularly and have often very different nature (so the contribution of communication system to solving them effectively varies considerably). It is valid both for traffic accidents and interruptions in PT service;
- The scale of the measure covered only less than half of the fleet;
- There were no statistics available from the TBC on reporting time of problems.

D2 Barriers and Drivers

D2.1 Barriers

Overall barriers

- **Planning barrier** – Decision to treat all public transport information and communication system related MIMOSA measures separately and in separate procurements required considerably more time and energy for preparing the measure.

Preparation phase

- **Institutional barrier** – The chosen method of procurement (combination of dialogue and negotiations) slowed down the process.
- **Problem related barrier -** Lack of information and real experiences in Estonia on possible modern technical solutions slowed down the process of procurement and caused delays.

Implementation phase

- **Institutional barrier** – As the preparation phase was longer than expected, time for implementation was accordingly shorter. This made the implementation more stressful.
- **Institutional barrier -** Technical dependency of the system on other related MIMOSA measures of Tallinn made the process of finding suitable solution difficult and delayed the installing of equipment into PT vehicles.

Operation phase

- **Problem related barrier –** During testing period of the new communication system it turned out that the data communication part of system does not have necessary stability needed for the whole system to function properly. Troubleshooting the problem took 6 months and problems were finally solved with modifying and complementing software of the system. The barrier made the testing period very long and left only 3 months stable usage period for evaluation.

D2.2 Drivers

Overall Drivers

- **Problem related driver** – Development of worldwide technology offered possibility to use 3G standard mobile communication technology for the system.
- **Financial driver -** Financing through MIMOSA project has made it possible to equip the buses with new modern communication system.

Preparation phase

- **Organizational driver** – Commitment of the Tallinn Bus Company with arranging procurement process and negotiations with possible tenderers has given a thorough overview concerning different communication solutions with pros and cons and thus necessary confidence to make an optimal choice.

Implementation phase

- **Involvement, communication related driver** – Active and focused operation from all partners involved in the measure. This helped cooperation and achieving of the objectives in all measure phases.

Operation phase

- **Involvement, communication related driver -** Enthusiastic participation of all parties in using the new communication system and in finding and reporting of possible failures

and technical problems and in systemising and analysing of them was a one of the most important drivers which helped to work according to the strict schedule.

D2.3 Activities

Overall activities

- **Involvement, communication related activity** – The reaction to most barriers was to discuss them in several meetings among the TAK team to find solutions when possible.
- **Involvement, communication related activity –** TBC arranged several meetings with Tallinn City government to support integration of systems of different PT related measures.

Preparation phase

- **Involvement, communication related driver** – The reaction to most barriers was to discuss them in several meetings among the TAK team to find solutions when possible.

D3 Participation

D3.1 Measure Partners

- **Tallinn Bus Company (TBC)** – leading partner, responsible for preparation, implementation and running of the measure. The measure leader is employee of the TBC
- **Tallinn City Government** – principal partner in the MIMOSA project, owner of the Tallinn Bus Company. The city site leader is employee of the Transportation Department of Tallinn city.
- **Tallinn University of Technology** – principal partner, responsible for preliminary study, impact and process evaluation of the measure, including the cost benefit analysis.
- **Thoreb AB** – principal partner, responsible for installing the equipment on buses;

D3.2 Stakeholders

- **Bus drivers and operators -** The persons who were trained with this measure to use the new communication tool. Their actions have important influence on the outcome of the measure.
- **Users of PT** – End users who are potentially benefitting from the measure in several ways, from increased traffic safety and increased security, quality and reliability of PT.

D4 Recommendations

D4.1 Recommendations: Measure Replication

- **The measure effects are positive –** Although it was not possible to prove it by hard facts with evaluation, the measure impact on PT work arrangement has been positive by speeding up and making easier communication, reducing bus drivers need to use mobile phones while driving and to strengthen sense of security of bus drivers with an emergency button.
- **Whole fleet should be equipped with similar system** - It is important to equip the whole fleet of a PT company with similar communication system. Partially equipped fleet gives only limited effect. During summer 2012 additional 25 buses were equipped with the new communication system outside the MIMOSA measure.
- **There are no general negative lessons** - The barriers explained earlier in the document are city specific and did not have notable influence on the possibilities of achieving objectives of the measure.

D4.2 Recommendations: Process (Related to Barrier-, Driver- and Action Fields)

- **One integrated PT IT-system has advantages** - PT information and communication systems should be considered to be implemented as one integrated solution. This means driver communication, ticketing, positioning, real time passenger information, etc. Trying to implement different parts of the system separately and from different providers has many potential disadvantages: high amount of resources needed for arranging separate processes for acquiring and implementation, possible problems with compatibility of different parts, doubled equipment, etc.

Deliverable Summary

THE CIVITAS INITIATIVE IS CO-FINANCED BY THE EUROPEAN UNION

DELIVERABLE KEY INFORMATION	
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Context and Purpose

Please insert a brief description of the background and purpose for having the deliverable (***max ½ page***).

Currently coordination of work between Tallinn public transport bus fleet and traffic management unit is not supported by proper communication system. Insufficient traffic management information flow between bus fleet and management units causes the problems in everyday public transport route network and makes cooperation and synergy difficult to achieve and therefore PT service quality often suffers.

The Tallinn Traffic Development Plan for 2005-2014 states to work out new requirements for the quality of technical equipment of the PT fleet. In order to improve quality of PT traffic management and PT service quality, Tallinn will implement and test modern communication solution for PT fleet.

The modern communication solution for 180 Tallinn public buses will be installed. Smooth information flow will contribute to solving everyday operative problems and reduce risk of interruptions while serving PT users. Improvement of information flow on traffic conditions (according to time, special arrangements or meteorological conditions) will allow to choose the best solution to reach the optimal traffic flow in every situation. Improved communication process will allow traffic management to promptly react to unexpected congestion and help to better plan traffic modifications. Communication solution also will be new tool with ability to collect the detailed PT statistics.

Summary Contents

Please insert a brief description of the main activities carried out (***max 1 page***).

Together with Tallinn University of Technology we have planned the desired preliminary studies of the specified measure and also the preparatory actions for the evaluation.

Also the present situation in Tallinn Bus Company and the technical possibilities for different communication solutions have been analysed.

In cooperation with our partners Tallinna Transport Department and Tallinn University of Technology we have had meetings and workshops with the intent to work out and specify the best solution for Tallinn.

As the communication systems are an ineluctable part of the conception of future central traffic management and should be coherent with many other functions, so the main purpose of these meetings and workshops has been to find out the intersections with the other measures and to prepare effective solutions for the public competition. General principles and the basic documentation of the competition have been prepared and approved by the partners. The public competition has been announced and the participation of the representatives of the corresponding branch is welcome.

Functional Use

Please insert a brief description of the role of the deliverable in the context of the future workpackage/measure activities (***max ½ page***).

Tallinn PT Communication System supports development of innovative services. Objective is to promote public transport through innovative solutions that enable better quality of life and access to services for all social groups. The sophisticated IT solutions help to provide good services to PT users and contributes to quality collective passenger transport services. The city of Tallinn will implement and test modern communication solutions for Tallinn public buses and their management, which are an important part in complex information environment. Therefore, with these improvements, the communication solution will allow controlling a large part of bus traffic in the city and will also influence traffic communications in the whole PT area.

Contacts

Please insert the contact references of the responsible person for future queries.

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