

## **0 Executive Summary**

The measure makes it possible for users to get Real Time Passenger Information (RTPI) for all stops in the city on their mobile phones. There are approximately 1500 bus stops, 15 city bus lines and 25 urban bus lines in the municipality. This way of providing information is expected to increase user satisfaction and could also be a way to attract new user groups to public transport. Furthermore, an interface to the national Journey Planner has been developed, where entering is substituted by either GPS positions or predefined locations. The approach used in ARCHIMEDES provides information in a convenient manner that is expected to increase user satisfaction among present users and potentially attract new users to public transport, including tourists, and thereby expanding the market for public transport.

The technological development within the mobile phone field is fast developing. To be sure that the service provided throughout the project is up-to-date, the measure was designed to include three different features:

1. Development of the mobile platform “NTmobil.dk”.
2. Location Based Services providing RTPI via mobile phone on the nearest bus stops, based on GPS.
3. “Take Me Home” feature for mobile phone based on GPS data and the National Journey Planner.

The main conclusions of the evaluation of this measure can be summarised in the following points:

- By September 2011 the “Take Me Home” Java application had been downloaded 3143 times.
- Due to technical challenges, user statistics on NT live have not be accessible for this evaluation. In a short period of 12 days during June 2012, the user statistics shows that there are about 425 daily unique users. The average visit is between 3 and 4 minutes, and there have been about 2000 unique visitors.
- The number of users that know about and use NT Live has increased from 9% in 2009 to 26% in 2012, according the implemented surveys before and after and the number of users that know about but do not use the service have increased from 34% to 47% in the same time period.

Concerning the process the following recommendations can be made:

- Instead of developing an application or mobile service, the possibility is to release RTPI data via a public API or a XML output. This will make it possible for creative developers to create applications and services that will benefit the public. The downside of this approach is that there is no control of the way data is used and presented and this can lead to errors or mistakes. Another downside is that if you do not have control of where data is used you do not know if changes in the way data is structured will affect applications.
- In other projects like this, we recommend that the period of time over which the project is developed and implemented is very short. Otherwise, there is a risk that the project is outdated before it is implemented.

## **A Introduction**

### **A1.1 Objectives**

The measure objectives are:

(A) High level / longer term:

- To increase the number of PT users.

(B) Strategic level:

- To increase satisfaction among users of PT.

(C) Measure level:

- (1) To provide information in order to attract new users to PT – including tourists not familiar with the PT system.
- (2) To provide users with Real Time Passenger Information (RTPI) on their mobile phone for all bus stops within the corridor.
- (3) To provide users with information on their mobile phones in a convenient manner.

### **A1.2 Target groups**

The target groups of the measure are:

- Present users of PT – the measure represents a new way the passengers can get information about their journey.
- People not familiar with the PT system (including tourists) – the measure represents an easy accessible way to get information.

## **A2 Description**

Although significant emphasis is put on securing quality of public transport in Aalborg, delays do still occur, and sometimes passengers report feeling unsure if the bus is delayed, or if they themselves have arrived too late at the bus stop. Uncertainty about planned and actual departure times and the location of bus stops are some of the barriers that discourage potential passengers from using public transport. The availability of RTPI prior to getting on a bus and on board information (via screens, ARCHIMEDES measure AAL 69) is expected to lower these barriers and give the traveller “peace of mind”. At the same time the system contributes to improving the image of public transport as a modern means of transport and thereby helping public transport to appear as an attractive alternative to car use.

In this measure, a mobile portal for public transport has been developed, including a set of Location Based Services (LBS) for mobile phones (based on the mobile phone’ GPS).

The LBS includes RTPI from 30 of the nearest bus stops selected from the present GPS position, and a ‘Take Me Home’ service that gives the user a combined walking and PT trip from their present GPS position to your predefined home address. It achieves this by integrating the GPS position, and saved user information, with the national Journey Planner.

The measure makes it possible for users to get RTPI for all stops in the city on their mobile phones. In the corridor there are approximately 375 bus stops and there are approximately 1500 bus stops, 15 city bus lines and 25 urban bus lines in the municipality. This way of providing information is expected to increase user satisfaction and could also be a way to attract new user groups to PT. Furthermore, an interface to the national Journey Planner has been developed, where entering is substituted by either

GPS positions or predefined locations. The approach used in ARCHIMEDES provides information in a convenient manner that is expected to increase user satisfaction among present users and potentially attract new users to public transport including tourists, and thereby expanding the market for public transport.

The technological development within the mobile phone field is fast developing. To be sure up-to-date service can be provided throughout the project the measure was designed to include three different features (see B4 Actual implementation of the measure).

### **A3 Person in charge for evaluation of this measure**

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## **B Measure implementation**

### **B1 Innovative aspects**

The innovative aspects of the measure are:

- **Use of GPS technology in mobile phones - nationally** – The GPS technology that can be found in many mobile phones today are used to locate the nearest bus stops.
- **Information directed at users of PT** – The measure focus at users or potential users of PT. The measure will result in an improvement in the way information about PT can be reached.

### **B2 Planning of Research and Technology Development Tasks**

Not relevant.

### **B3 Situation before CIVITAS**

The complete IT infrastructure for delivering RTPI including the bus PC and backoffice system with prognoses algorithms in Aalborg, were planned as part of EU project VIKING and implemented during the CIVITAS I VIVALDI project.

As part of the VIVALDI project, RTPI was implemented on 40 variable message signs (VMS) at major bus stops in Aalborg. The information has proved to be of great benefit for public transport users and as a consequence helps to maintain uptake of public transport, although it only covers the most important bus stop in Aalborg. Equipping bus stops with VMS is very expensive and is, therefore, only possible for major stops with a high customer flow. But in Denmark, almost everyone carries a mobile phone. So by using these mobile phones as VMS for RTPI, the information is spread to all people and all bus stops; the investment is taken up by the users and the technology is always kept up-to-date.

As a consequence of this, a mobile service was implemented as part of the EU MIDAS project. This service was menu based prompting the users to choose in a three level menu before the RTPI were presented. In this way, it was possible to solve the two problems of the insecurity of remembering the precise name of a bus stop, and the difficulties of entering long names on a mobile phone. However, this MIDAS service still had certain limits regarding flexibility, which were reduced by the ARCHIMEDES measure. As an even better solution it is now possible to skip the menus and present the user for RTPI based on the users GPS position. As a parallel, an interface to the national Journey Planner has been developed, where entering is substituted by either GPS positions or predefined locations. The approach used in ARCHIMEDES provides information in a convenient manner that is expected to increase user satisfaction among present users and potentially attract new users to public transport including tourists, and thereby expanding the market for public transport.

### **B4 Actual implementation of the measure**

The measure introduces three different new public transport mobile phone features.

The first feature is “NTmobil.dk”, which is a mobile phone platform integrating different PT mobile services. The second feature is a Location Based Service that provides RTPI via mobile phone on the nearest bus stops, based on GPS. The third feature is the “Take Me Home” feature based on GPS data, that saves user data and the National Journey Planner provides the user with public transport information.

The measure was implemented in the following two stages:

**Stage 1: Planning phase and development** (*November 2008 to January 2010*)

*The planning started in the fall 2008 and the strategic decisions were taken during 2009. Different possibilities for the framework were discussed. The technical possibilities and the state of art within the field of mobile phone information were investigated. This work resulted in a requirement specification of the measure and its different phases. It was decided to subcontract with an IT company for the mobile portal. A decision was taken to work with the National Journey Planner Cooperation (Rejseplanen A/S) on the GPS based RTPI and the 'Take me Home' function, since this would offer the best end-user product. The National Journey Planner Cooperation, owned by the Public Transport Authorities in Denmark, was ready to implement an application with similar GPS function to what was described in the full ARCHIMEDES project description as a goal for this measure. Therefore, it was decided to benefit from the synergy effects by building upon this National Journey Planner service and implement RTPI for the bus users in the Journey Planner.*

*Different features of the measure were discussed and it was decided to focus on the three features:*

- 1. Development of the mobile platform "NTmobil.dk"*
- 2. Location Based Services providing RTPI via mobile phone on the nearest bus stops, based on GPS*
- 3. "Take Me Home" feature for mobile phone based on GPS data and the National Journey Planner.*

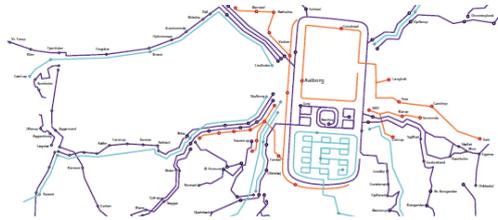
**Stage 2: Launch and marketing** (*January 2010 to May 2011*)

*The mobile platform, NTmobil.dk, that had been launched early in 2010 included a slight makeover of the mobile phone RTPI system (originally from the VIVALDI project). The 'Take Me Home' and the new GPS based RTPI were launched as a java application in October 2010. Migration of the functionality to HTML5 was launched in May 2011.*

*The marketing of NTmobil.dk started in spring 2010. The marketing campaign consisted of flyers, posters and magazine advertisement (Figure 1) introducing and explaining NTmobil.dk. The information screens in the buses (ARCHIMEDES measure 69) were also being used to advertise for the mobile phone features (Figure 2). In addition, advertisement for NTmobil.dk was placed in the introduction handbook for the new students in Danish and in English (Figures 3) in September 2010. As for the marketing of NTLive and the Take Me Home feature, those were a part of the overall marketing of NTmobil.dk. In order to test new information channels ARCHIMEDES recorded 3 small humorous campaign movies featuring the Take Me Home function, to be played on the information screens in the buses and to be promoted on YouTube.com. (See Figure 4 and 5). The most common way for users to get the JAVA application were from the websites of NT, the City of Aalborg and Trafikken.dk/Nordjylland (measure 9) or the journey planner website, Rejseplanen.dk.*

# NTmobil.dk

brug mobilen, når du skal med bussen



Gå ind på NTmobil.dk i din mobiltelefons browser. Her har vi samlet alt det, du har brug for, når du skal med NT

- live** — Tjek om bussen er forsinket på NT live
- mobil billet** — Køb mobilbillet til bussen eller Nordjyske Jernbaner\*
- rejseplanen** — Planlæg din rejse på rejseplanen
- mit nt** — Se din personlige side med udvalgte ruter og stoppestedsinformationer på Mit NT
- NTertainment** — Klik ind på NTertainment, hvis du keder dig på turen

\*NB: Mobilbilletten kan ikke benyttes i DSB-tog



Figure 1: NTmobil.dk poster

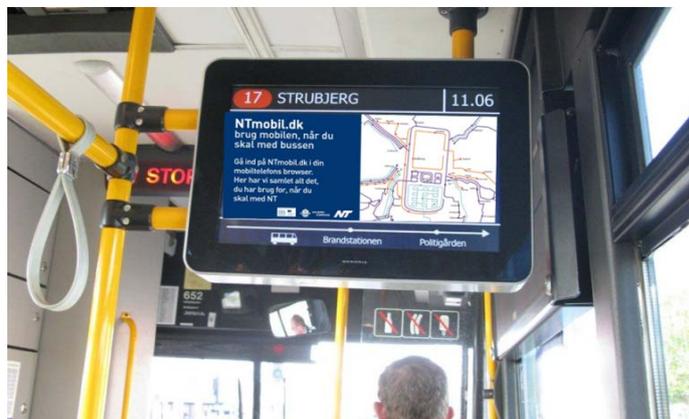


Figure 2: NTmobil on bus screens (Measure AAL 09). Manipulated view.

# NTmobil.dk use your mobile, when travelling by bus



Go to NTmobil.dk in your mobile phone's browser. Here you'll find all you need, when travelling by public transport in and around Aalborg

- live**  
Check if the bus is late on NT live
- mobil billet**  
Buy mobile tickets to NT's busses or Nordjyske Jernbaner\*
- rejseplanen**  
Plan your journey on rejseplanen
- mit nt**  
Check out your personal site, with bus-routes and bus-stop information on Mit NT
- NTertainment**  
Click on NTertainment, if you are bored

\*NB. The mobile tickets are not valid for use in DSB trains



Figure 3: NTmobil.dk advertisement in the introduction-handbook for new students, (English version)



Figure 4: YouTube promotional movie for the 'Take Me Home' function



Figure 5: YouTube promotional movie for the 'Take Me Home' function

### Stage 3: Data collection and evaluation

*The data collection was conducted in the period January 2009 to June 2011. The number of users that use the service is fairly low, and therefore it would not make sense to hand out a detailed questionnaire to a small group of passengers. Instead we decided to make it a part of NT's normal survey that's handed out to a large number of passengers every quarter.*

## B5 Inter-relationships with other measures

The measure is related to other measures as follows:

- **Measure AAL 09** – Modernising Travel Information: This measure includes modernising the homepages concerning PT. Information about the use of the mobile phone service are included as part of the new homepage.
- **Measure AAL 69** – On-trip Bus Traveller Information in Aalborg: Both measures focus at improving the way information about PT can be reached.

Measure title: **Pre-trip & On-trip Mobile Phone Information in Aalborg**

City: **Aalborg**

Project: **Archimedes**

Measure number: **68**

## C Planning of Impact evaluation

### C1 Measurement methodology

#### C1.1 Impacts and indicators

The high level/longer term objective of the pre-trip and on-trip mobile phone information is to increase the number of people using PT. This is evaluated on city/corridor level in appendix A through passenger counts.

The indicators chosen for this measure reflect that there are several steps to obtain this objective. First, the technical aspects have to function as intended. This will be captured by looking at the service reliability and operation statistics. Second, the users' perception of the service needs to be positive this is measured by looking at the acceptance of the service and the perception of the quality of the service. Looking at these two different impact areas will reveal whether the measure has an impact on the number of people using PT.

##### C1.1.1 Selection of indicators

NO.	EVALUATION CATEGORY	EVALUATION SUB-CATEGORY	IMPACT	INDICATOR	DESCRIPTION	DATA /UNITS
	<b>SOCIETY</b>					
14		<b>Acceptance</b>	Acceptance	Acceptance level	Attitude survey of current acceptance of the measure	Index (%), qualitative, collected, survey
			Acceptance	Use of service	Statistics on phone use	No and %, quantitative, collected
	<b>TRANSPORT</b>					
19		<b>Quality of Service</b>	Quality of service	Quality of service	Perception of quality of service	Index, qualitative, collected survey.
			Service reliability	Accuracy of information provided	Number and percentage of accuracy of the positioning	No and %, quantitative, collected, measurement
			Occupancy	Number of passengers	Number of passengers on specific bus routes	Number
			Operation	Operation statistics	Down time of the service	Down time, No and %, quantitative, collected

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### C1.1.2 Methods for evaluation of indicators

No.	INDICATOR	TARGET VALUE	Source of data and methods	Frequency of Data Collection
14	Acceptance level		<p>Data was collected through a survey conducted among the users of public transport. The survey included acceptance in relation to this specific measure and public transport in general. The survey addressed users of public transport in order to get a user group that potentially could use and know the service. The survey was conducted through questionnaires handed out in the buses. The questionnaires could easily be filled out and mailed so tourists and non frequent users could participate in the survey. The rate of response for the first survey conducted in November 2009 (M14) was 70% and the rate of response for the survey in October 2011 (M37) was 85%. About 600 questionnaires were handed out in every survey.</p> <p>Furthermore, a focus group interview was conducted in March 2009. Participants in the focus group were 12 citizens who take the bus at least a couple of times per month. The input from the focus group interview is seen as part of the before data.</p>	2 times.
	Use of service		Statistics on phone use as collected by the supplier throughout the project.	From M16 and onwards.
	Service reliability		The setup of the system requires that the accuracy of the service in relation to positioning is tested. This was done before the measure was implemented. The reliability of the system was tested through a number of tests, where it was tested whether the system was able to find the location and give appropriate directions.	1 time.
	Operation		Statistics on down-time was collected by the supplier throughout the project.	From M16 onwards.
19	Quality of service		<p>Data was collected through a survey conducted among the users of public transport. The survey included acceptance in relation to this specific measure and public transport in general. The survey addressed users of public transport in order to get a user group that potentially could use and know the service. The survey was conducted through questionnaires handed out in the buses. The questionnaires could easily be filled out and mailed so tourists and non frequent users could participate in the survey. The rate of response for the first survey conducted in November 2009 (M14) was 70% and the rate of response for the survey in October</p>	2 times.

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	Number of passengers		Periodic visual passenger counts conducted on bus stop level. Counts were made on every third departure on the bus line. These manual counts focussed at the development in the corridor and could be compared to the automatic photocell counts conducted continuously.	2 times

Measure title: **Pre-trip & On-trip Mobile Phone Information in Aalborg**

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### **C1.1.3 Planning of before and after data collection**

<b>EVALUATION TASK</b>	<b>INDICATORS INVOLVED</b>	<b>COMPLETED BY (DATE)</b>	<b>RESPONSIBLE ORGANISATION AND PERSON</b>
Survey among users of public transport. Acceptance and use of the present mobile phone service will be in focus.	Acceptance level.	M14	Morten Jensen, City of Aalborg.
Design and conduction of a survey focussing on the acceptance and quality of the service.	Acceptance level, Quality of service.	M37	Morten Jensen, City of Aalborg.
Collection of statistics on phone use and down-time	Use of serve, Operation	M16-onwards	Supplier
Test the accuracy of the service in relation to positioning.	Service reliability	M16	Supplier
Conduction of passenger counts in the corridor	Number of passengers	M13 and M37	Morten Jensen, City of Aalborg
D12.2 Baseline and first results from data collection	All indicators	Month 34	
D12.3 Draft results template available	All indicators	Month 48	
D12.4 Final version of results template available	All indicators	Month 50	

**Indicators on number of passengers are as described evaluated in** a overall analysis in appendix A.

The questions included in the questionnaire, are presented in an English version, in Annex B.

## **C1.2 Establishing a baseline**

The baseline for this measure is concerned by two important aspects; awareness and use of the pre-trip and on-trip mobile phone information. The objective of the measure is to increase awareness of the services and to give the citizens the right information about public transport.

Baseline data are based in the results of 'before' survey and counts implemented in month 13 and 14, October and November 2009, in the bus network.

## **C1.3 Method for Business as usual scenario**

Business as usual includes not establishing the pre-trip and on-trip bus traveller information. However, improvement of the way passengers can get information about PT is a general focus area and therefore a business as usual scenario is impossible to establish.

## **C1.4 Cost Benefit Analysis**

There will be no CBA as part of this measure.

## **C2 Measure results**

### **Acceptance and use of service of NT live**

A focus group interview was conducted in March 2009. Participants in the focus group were citizens who take the bus at least a couple of times per month. Thus 12 users of public transport between 18 and 68 years old participated in the focus group.

The interviews aimed to gain insight into how users perceive public transport, how they use it and whether they experience barriers when using of public transport. There were different purposes with the interviews, and one of them was to examine the attitudes towards NT live.

One of the participants mentioned NT Live in connection with the ability to get information about departures. Only a few of the younger participants were familiar with NT Live, and only one had tried to use NT Live - without success.

Several participants asked what NT Live is - they have never heard of it. Thus, one of the conclusions from the focus group interview in March 2009 was that NT could advertise more for it.

There were several positive comments on NT Live, but several participants founded that it had a limited use. Some believed that as the bus is rarely delayed, it is acceptable for users to wait a few minutes. Furthermore, several of them were used to the buses coming in short intervals, so they feel no need to know if there is delay. Some of the participants used the VMS at the bus stops to see when the bus arrives.

Several participants at the focus group interview believed that NT Live would be a quick way to get information about departure times, if you are for instance somewhere, and you do not know when the next bus departs. In such a situation, NT Live could be useful. The youngest participant believed that it would be too burdensome to key in the information with a mobile phone.

Positive aspects the respondents mentioned related to NT live include:

- To check if the bus is delayed.
- Do not need to go out early.
- When switching between train and bus or bus to bus - you must hurry or you have two extra minutes to change.
- Good for places where the frequency is not high.

- Quickly check the times if you're somewhere where you do not know the departure times.

### Service reliability and operation

By September 2011, the “Take Me Home” java application had been downloaded 3143 times. The use of the NT Live service has been logged via Google Analytics. Unfortunately there have been problems with the account on which the user statistics are logged, without possibility to restore the account. We are currently trying to solve the problems with help from Google but we have not found a solution yet. The only available user statistics from a short period of time show that there are about 425 daily unique users. The average visit is between 3 and 4 minutes and the total number of daily visits is about 650 a day. In the short period (12 days) we have user’ statistics there have been about 2000 unique visitors.

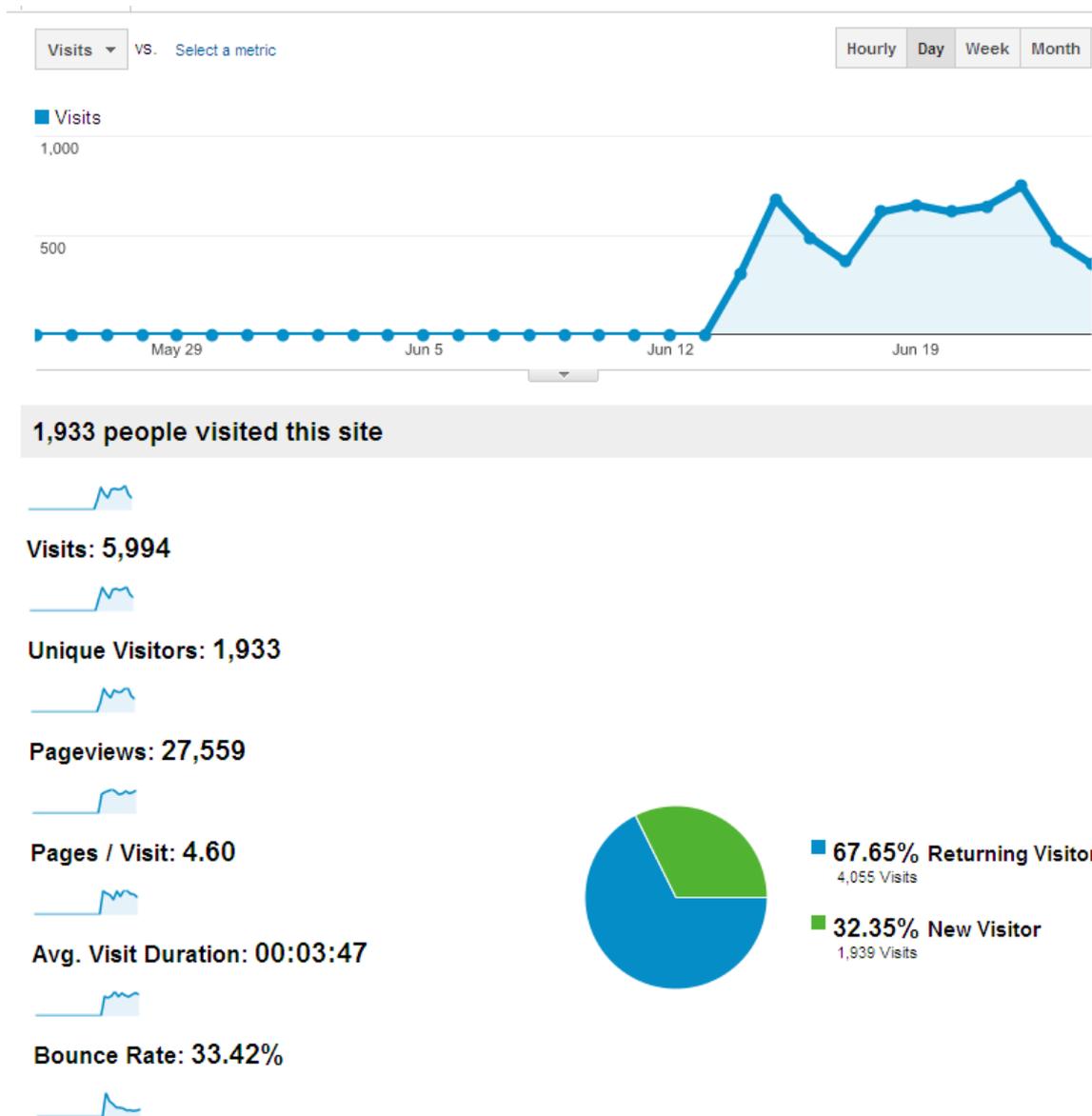
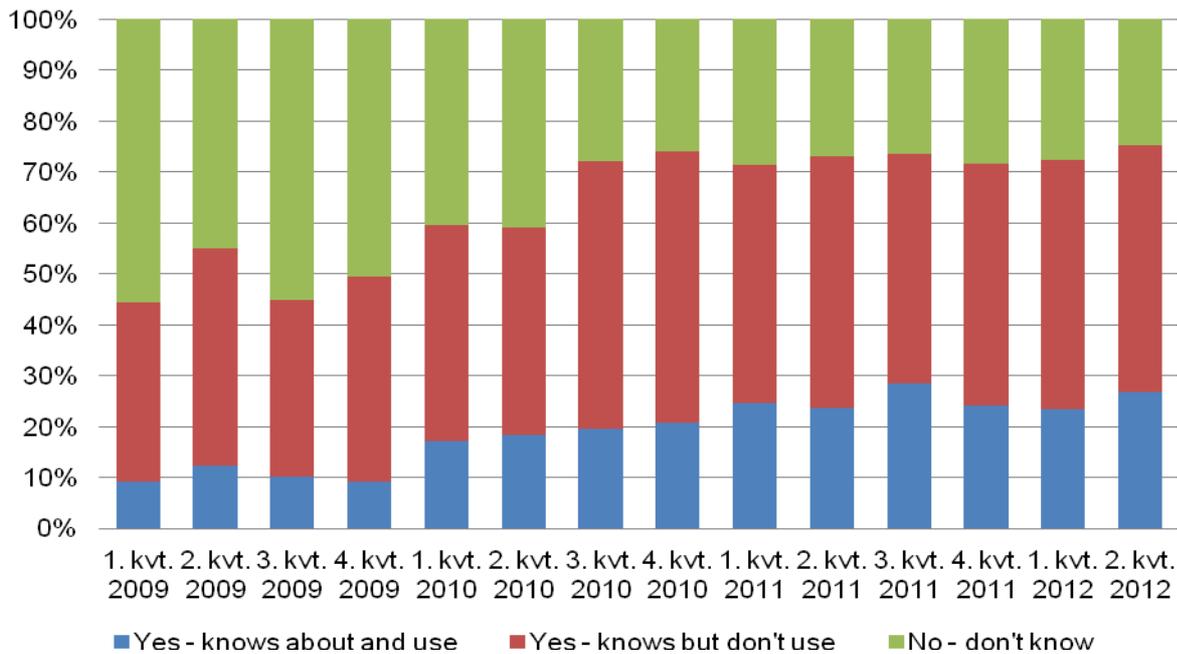


Figure 6: User statistics from NT Live

**Acceptance**

NT makes quarterly user evaluations with a questionnaire that's handed out to the passengers where they must give a rating of different parameters in relation to the service. This evaluation show that the number of users that know about and uses NT Live has increased from 9% to 26% in the period 2009-2012 and the number of users that know about but don't use the service have increased from 34% to 47%. In total the number of users that do not know NT live have been reduced from 57% to 27 %.

**Knowlegde about NT Live**

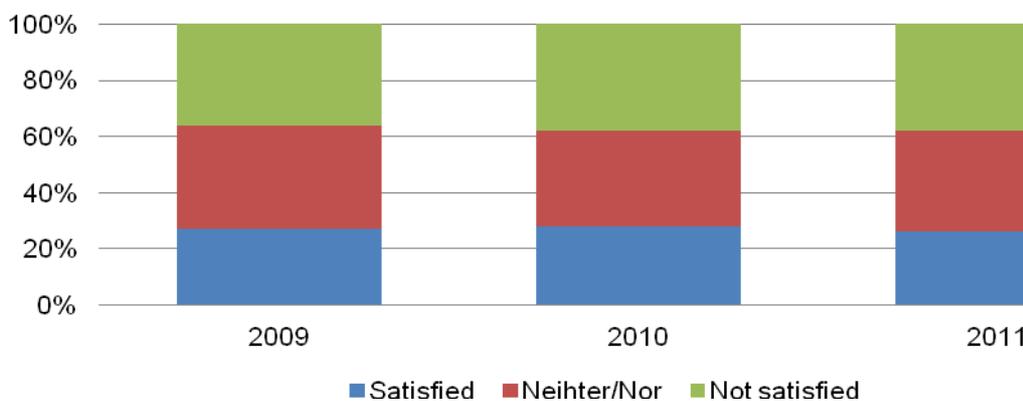


**Figure 7: User knowledge about NT live in the period**

In the quarterly user evaluation, there are a number of questions related to the user satisfaction with information about public transport in general. These questions are also relevant in relation to this measure, since this measure constitutes an important part of the total information package.

On figure 8, it can be observed the satisfaction level in relation to information about delays and cancelled trips. As it can be seen on the graph the satisfaction level from 2009 to 2011 are more or less unchanged.

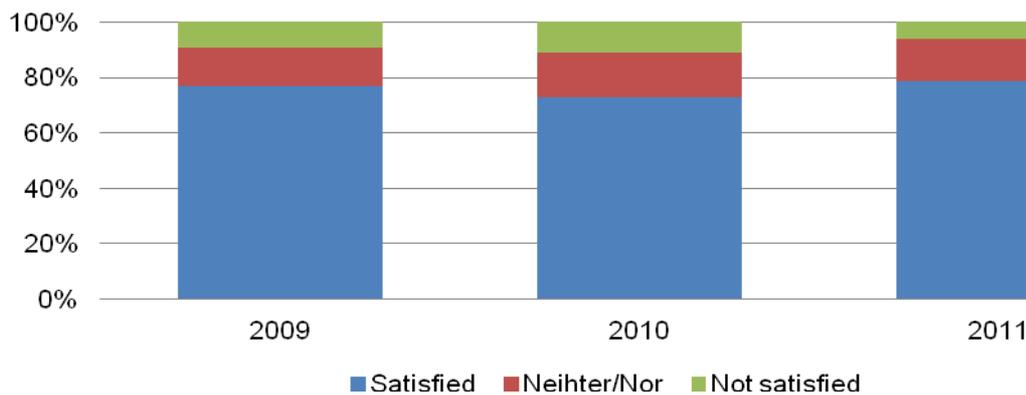
**Infomation about delays and cancelled trips**



**Figure 8: User satisfaction with information about delays and cancelled trips.**

In terms of satisfaction with information about departures at the bus stop the measure could also have had an impact. As figure 9 shows the satisfaction level have increased from 2009 to 2011. In total the satisfaction level has increased with 1 % and the not satisfied has been reduced with 3%. The increased satisfaction could be related to that people are able to use easily access departure information at through the mobile phone service when waiting at any bus stop instead of only being able to get the information when waiting at one of the where RTPI is installed.

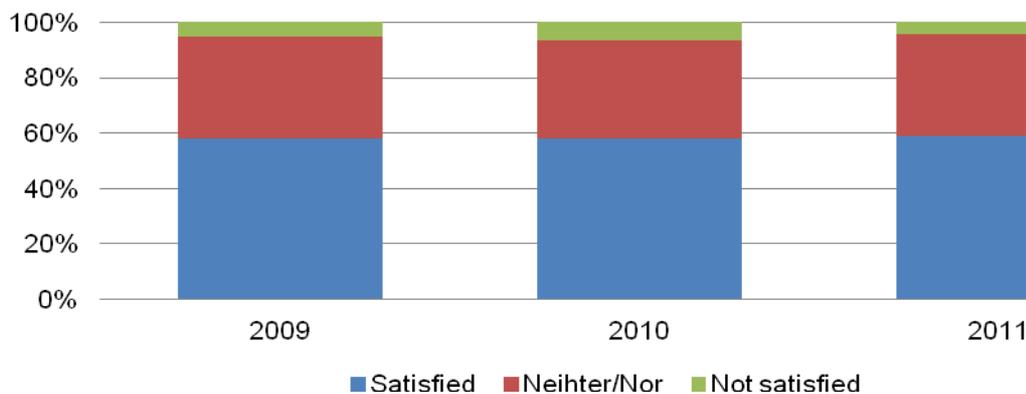
### Information about departures at the bus stop



**Figure 9: User satisfaction with information about departures at the bus stop.**

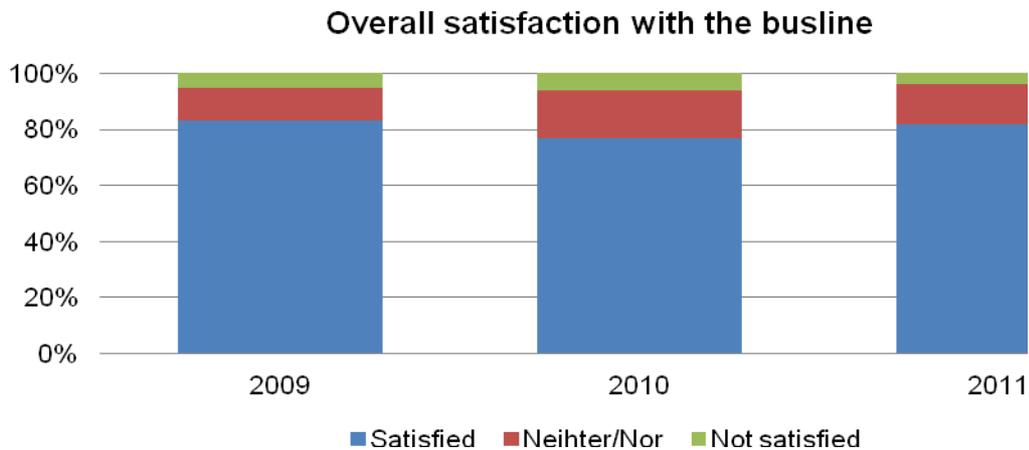
Looking at the satisfaction with the waiting time between interchanges can also be a way to evaluate whether the measure is successful, since getting information about waiting time increases the satisfaction. As figure 10 shows there is a small increase in the satisfaction in 2011 compared to 2009.

### Waiting time when changing between bus or train



**Figure 10: User satisfaction waiting time when changing between bus and train.**

In relation to the overall satisfaction with the busline in general it can be seen on figure 11 that the overall user satisfaction from 2009 to 2011 is more or less the same. The satisfaction has decreased with 1 %, while the number of people not satisfied with the busline has decreased with 1%.



**Figure 11: Overall user satisfaction with the bus line**

**Table C2.1.1: Summary of evaluation results in terms of society**

Indicator	Before (2009)	B-a-U (NA)	After (2011)	Difference: After –Before	Difference: After – B-a-U (NA)
Knowledge about service	Number of users that know about and uses NT Live: 9%		Number of users that know about and uses NT Live: 26%	+15%	
	Number of users that know about but don't use the service: 34%.		Number of users that know about but don't use the service: 47%.	+13%	
	Number of users of users that do not know NT live: 57 %.		Number of users of users that do not know NT live: 27 %.	-30%	
Acceptance	Satisfaction with information about departures at bus stops: 77% are satisfied, while 9% are		Satisfaction with information about departures at bus stops: 78% are satisfied, while 6% are	+1%	
				-3%	

	not satisfied.		not satisfied.		
	83% are satisfied in general.		82% are satisfied in general.	+1%	
	5% are not satisfied.		4% are not satisfied.	-1%	

### Number of passengers

Indicators on number of passengers will be covered by an overall analysis of the modal shift in the ARCHIMEDES corridor, developed across the measures. This is included in appendix A.

## C3 Achievement of quantifiable targets and objectives

No.	Target	Rating
1	High level / longer term: To increase the number of PT users.	***
2	Strategic level: To increase satisfaction among users of PT.	**
3	Measure level: To provide information in order to attract new users to PT – including tourists not familiar with the PT system.	**
4	Measure level: To provide users with Real Time Passenger Information (RTPI) on their mobile phone for all bus stops within the corridor.	***
5	Measure level: To provide users with information on their mobile phones in a convenient manner.	**
<b>NA = Not Assessed    O = Not Achieved    * = Substantially achieved (at least 50%)</b> <b>** = Achieved in full       *** = Exceeded</b>		

## C4 Upscaling of results

The service has already been upscaled to the whole area of Northern Jutland and can be used inside as well as outside of the ARCHIMEDES corridor. This is possible because the system is based on data from the national travel planner and NT's real time information system. There was no extra work related to developing the service to include the whole area of Northern Jutland and since there are a lot of the passengers that travel in the corridor that also travels outside it would not make sense to limit the service to the corridor. Therefore, no further upscaling is perceived possible for the system on the regional scale.

## **C5 Appraisal of evaluation approach**

The number of users that use the service is fairly low and we have therefore chosen to base the evaluation on the usage of the service and the general knowledge of the service rather than a more specific survey handed out to the passengers in the buses.

It can be difficult to evaluate the direct effect this measure has had on the increase in the number of passengers that use public transport. Several initiatives are implemented in the ARCHIMEDES corridor and it can be difficult to determine what influence one initiative have compared with the others. At the same time other factors may have influence in both positive and negative direction.

## **C6 Summary of evaluation results**

- The main conclusion of the evaluation of this measure can be summarised in the following points: By September 2011 the "Take me home" java application had been downloaded 3143 times.
- User statistics on NT live has due to technical challenges unfortunately not be accessible for this evaluation. In a short period of 12 days during June 2012 the user statistics shows that there are about 425 daily unique users. The average visit is between 3 and 4 minutes, and there have been about 2000 unique visitors.
- The number of users that know about and uses NT Live has increased from 9% in 2009 to 26% in 2012 and the number of users that know about but don't use the service have increased from 34% to 47% in the same time period.

## **C7 Future activities relating to the measure**

There are no activities planned related to the service, but this area is rapidly developing and today mobile units are an important source of information for almost every people. NT Live is an HTML-based service with all the upsides and downsides this gives. With smartphones being more and more common the need for a smartphone public transport app is probably one of the most obvious future activities because it gives some possibilities that HTML-based services cannot provide.

## D Process Evaluation Findings

AAL 68: Non focused measure

### D1 Deviations from the original plan

There are no major deviations from the original plan, but the service has been integrated with the national travel planner.

### D2 Barriers and drivers

The big challenge in this measure is the speed of technological development when it comes to mobile phone applications. When including the GPS dependent mobile phones functions in the proposal for a FP7 project, this was very innovative and ambitious and there was even reasonable uncertainty whether it would be possible to develop such a function in the project period. But, with the launch of the iPhone and other smartphones, and the open programming interfaces associated with these systems, some of the GPS based journey planner functions are already being created by third party developers, as for example private talented young people.

Another barrier is the complexity of the applications that the user is presented. If there a lot of different settings the user have to make it will certainly scare of a lot of users. The applications have to be made as easy to use as possible in order to get out to a wide group of people. This have certainly been made easier

It is a barrier to the spread of the GPS based RTPI and the Take Me Home function, that the present inability for a Browser to access the mobile phones GPS, makes it necessary for the user to download and install a program to access the functions. There is still unwillingness among ordinary users to do so. Luckily, this unwillingness is less prevalent amongst young people which comprise the target group for this measure.

#### D2.1 Barriers

##### Preparation phase

- **Barrier 1 (Technological)** If you want to make a mobile application it is important that you have a clear view on how the application should work. Often it is difficult to be on the cutting edge of technology and if the preparation phase is long the technology can advance to a level that has overtaken the original plan.

##### Implementation phase

- **Barrier 2 (Technological)** The location service was developed first to symbian and later to a HTML. During the project smartphones became more common and with that new possibilities. Another barrier is to get people to use the service. Information about the service is not always enough.

##### Operation phase

- **Barrier 3** No barriers experienced.

#### D2.2 Drivers

##### Preparation phase

- **Driver 1 (Technological)** – The demand for new intelligent services from the users is an important driver. Often we get requests for mobile services that will make it easier to use public transport.

##### Implementation phase

- **Driver 2 (Technological)** – The speed of the technological development will often mean that something that is difficult to do will be made possible.

#### Operation phase

- No barriers experienced.

### **D.2.3 Activities**

#### Preparation phase

- Planning: Make sure that you have the right concept from the beginning. Try to make a detailed description of the demand.

#### Implementation phase

- Technological: Projects like this must be developed and implemented fast because the speed of technological development can overtake the project if the implementation time is too long. We decided to base the service on data from the national travel planner

#### Operation phase

- Planning: The application is dependent of good and valid data. If the data is not correct the system will not give proper output and therefore it is important to make sure that data is correct.

## **D3 Participation of stakeholders**

### **D.3.1. Measure Partners**

- **NT** – Responsible of the planning and implementation of the measure.
- **City of Aalborg** – Represented in the working group related to the measure.

This task have been planned and implemented by a working group consisting of ARCHIMEDES' measure leader, two members from Nordjyllands Trafikselskab (NT) (Public Transport Authority of North Jutland) and a planner from the Department for Sustainable Development of the City of Aalborg. Within the working group, ideas were discussed, the solution designed and the project has been implemented.

### **D.3.2 Stakeholders**

- **Supplier** – Design and development of the system (subcontract).

## **D4 Recommendations**

The big challenge in this measure is the speed of technological development when it comes to mobile phone applications.

### **D.4.1 Recommendations: measure replication**

- **Recommendation 1:** Instead of developing an application or mobile service the possibility is to release RTPI data via a public API or a XML output. This will make it possible for creative developers to create applications and services that will benefit the public. The downside of this approach is that there is no control of the way data is used and presented and this can lead to errors or mistakes. Another downside is that if you do not have control

*Measure title:* **Pre-trip & On-trip Mobile Phone Information in Aalborg**

*City:* **Aalborg**

*Project:* **Archimedes**

*Measure number:* **68**

of where data is used you do not know if changes in the way data is structured will affect applications.

#### **D.4.2 Recommendations: process (related to barrier-, driver- and action fields)**

- **Recommendation 1 :** In other projects like this we recommend that the period of time over which the project is developed and implemented is very short. Otherwise, there is a risk that the project is outdated before it is implemented.

## Appendix A

### **ARCHIMEDES corridor - Number of passengers from 2009 to 2011**

For the part of the ARCHIMEDES corridor in the region of the University the modal split impact of ARCHIMEDES is expected to be: 2-4% less use of car among the students and employee reference groups; 1% annual increase in public transport use; and a 5% increase in cycling.

In order to investigate these objectives, two counts of bus passengers have been completed. This document will summarize the results of these counts and across measures conclude on the effects of ARCHIMEDES on the use of public transport. In the ARCHIMEDES project five measures directly linked to public transport have been implemented:

- Measure 1: Biofuels in Aalborg
- Measure 8: Travel Smart Card in Aalborg
- Measure 9: Modernising Travel Information in Aalborg
- Measure 68: Pre-trip & On-trip Mobile Phone Information
- Measure 69: On-trip Bus Traveller Information in Aalborg

#### Methodology

The passenger counts have been carried out before and after all measures were implemented. The first counting was made in the period 26 October to 8 November 2009 while the second counting was made in the period 9 November to 20 November 2011. All passengers entering and exiting the buses were counted manually at every bus stop for every second or third departure during daytime.

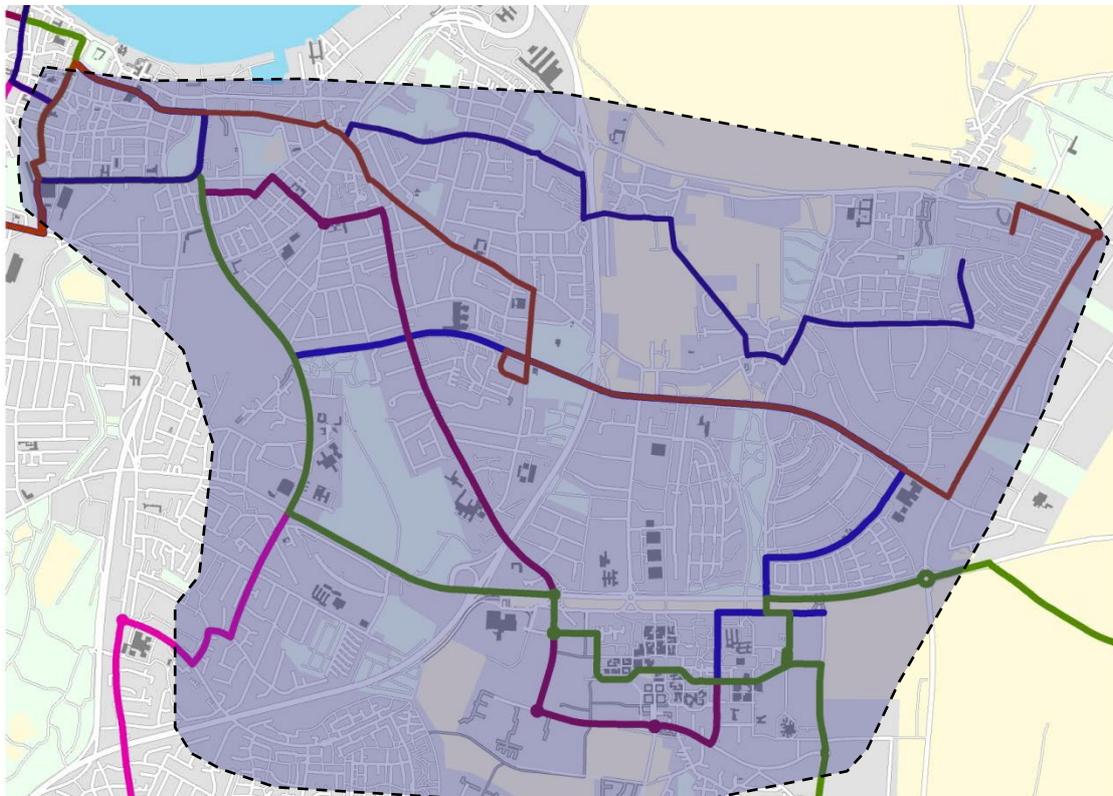


Figure A.1 Bus lines within CIVITAS corridor

The following bus lines are included in this analysis: Bus line 2, 11, 12, 14, 15 and 17. On the map the counting area within the ARCHIMEDES corridor is marked together with the bus lines going through the corridor.

The operational level has been almost the same throughout the period apart from the number of extra buses used.

## Results

The overall result shows that there has been an increase of 6.2 % in the number of passengers from 2009 to 2011.

There has been an increase in the number of passengers on all bus lines except bus line 2. An explanation for this might be that during rush hour there was a larger number of extra buses in 2011 than in 2009 and therefore the number of passengers that use the normal buses are spread out to more buses. We have not counted the number of passengers using the extra buses, but based on experiences a plausible estimate is that the number of passengers in average is 30 pr. extra bus. When including this number of passengers from the number of extra buses in both periods there have been an increase of 6.2 % in the number of passengers in the corridor.

	2009	2011	Change in %
<b>Line 2</b>	15,483	13,624	-13.6
<b>Ekstra buses</b>	1,200	3,450	
<b>Line 11</b>	5,258	5,469	3.9
<b>Line 12</b>	7,455	7,766	4.0
<b>Line 14</b>	5,996	6,513	7.9
<b>Line 15</b>	4,727	4,809	1.7
<b>Line 17</b>	5,464	6,767	19.3
<b>Total</b>	45,584	48,399	6.2

Table A.1 Compared results of counts 2009-2011

## Appraisal of Evaluation Method

The counts include both entering and exiting passengers, in order to make sure that all passengers are counted. This could be a source of error if there had been a significant change in the way the passengers travel in or across the corridor from 2009 to 2011. We have no indication of such a change.

Counting passengers is a resource demanding task if you do not have an automated system. As we do not have unlimited resources, we had to limit the number of trips and the period of time that we counted. We have counted every second or third trip and calculated the total number from these. The passengers are not necessarily evenly distributed between the different trips, and this could also be a source of error. As the counted trips are randomly chosen based on which trips the counters could reach, there should be no such systematic error.

The two periods in which we have counted are not exactly the same, but they are so close that we don't think this has a significant influence on the result.

In addition to these sources of errors there are a number of externalities that also could influence the result.

The weather is an important factor in Denmark, because a lot of the bus passengers choose to walk or ride their bike when the weather is fine, but when the weather is cold or rainy they use the bus. We have only counted the passengers over a relatively short period of time, and if there have been more cold or rainy days

one year than the other, this will affect the result. If we should compensate for that it would require a lot more counting.

One of the other measures in the corridor is improved bicycle lanes from the city centre to the university. This can also affect the number of passengers that use the bus, if they choose to ride bicycle instead of the bus. This is of course a good thing, but it will affect the number of passengers that use the buses.

### **Establishing a baseline for comparison**

The only passenger counting system we have in Aalborg is an old, simple automatic system that only detect entering passengers but not where, when or on which bus line. Counting from this system indicates that there has been an increase in the total number of passengers in the buses on 7.5% for the whole network. The results of the passenger count in the ARCHIMEDES corridor and this number is not comparable since they are made in two very different ways and with different purpose, but they can give an indication of a positive development in the whole city.

The Public Transport related measures that have been implemented on the bus lines in the corridor have later been extended outside the corridor by the PT authorities, and is supposed to have same positive effect outside the corridor as in the ARCHIMEDES corridor. Therefore it is not possible to establish a genuine 'business as usual situation' for documenting the positive effect in the corridor.

### **Conclusion**

Compared to the number of passengers in 2011 to 2009 the numbers have risen by 6.2% or 3.1% a year. This is well above the goal of 1% a year.

Trying to use the numbers of passengers on the rest of the network as a 'business as usual' is not possible, partly due to differences in the counting methods, partly due to the fact that the ARCHIMEDES improvements done in the corridor, later is extended to the rest of the system.

## Appendix B

### **English Summary of the quarterly customer survey**

The key questions of the questionnaire were:

- How is the possibility to get a seat
- How is the indoor climate
- How well is the bus cleaned
- How are the noise level and vibrations in the bus
- How is the indoor cleaning
- How is the outdoor cleaning
- Is the driver driving nice and calm
- Is the bus driver driving according to the timetable
- How is travel time of the total of the journey including waiting time
- Is the price OK
- Number of departures
- How do the departures suit your needs
- Is the number of stops on the bus line OK
- How is the waiting time when changing between bus and train or bus and bus
- How is the information about delays and cancelled departures
- Is the information about destination and line number clear
- How is the information about departure times at the bus stop
- How is the facilities at the bus stop
- How do you rate your overall satisfaction with the bus line.