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Measure Evaluation Results

UTR 2.2 Quality bus line

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Executive Summary

One of the main axes in the public transport network of Utrecht is the bus line connecting Overvecht – a district located in the northern part of Utrecht – with the city centre. The recurrent delays observed on this line imply considerable mobility problems for public transport users. The MIMOSA measure 'Quality Bus Line' aimed to improve the service quality of the bus line between the city centre and Overvecht. Based on an extensive analysis of the diverse options for optimisation the focused bus line, a set of short, medium and long term measures was developed, with the objectives to reduce travel times, enhance the reliability of the bus line and increase the number of users on this line.

The measure was implemented in two stages:
Stage 1: Baseline measurement (data collection) and inventory of the problems (August 2010 – September 2010) Within this analysis problems were inventoried by conducting measurements of the travel times, delays and numbers of passengers, carrying out a survey among more than 300 bus passengers and interviewing four bus drivers. The conclusions of the inventory of problems were the following: The *subjective* evaluation was quite positive, but *objectively* there were a large number of bottlenecks on the line. The different interpretation between subjective and objective evaluations can be explained by the fact that the range of travel times was quite broad, which makes the buses seem to travel on time.
However, the travel times were too long for the objective of the city: making this PT-route faster (a decrease of the travel time by 2.5 minutes), more attractive and more financially attractive (operation). The main problem identified is the bottlenecks.

Stage 2: Inventory of possible measures for the short and longer term (September 2010 – January 2011) Several solutions were elaborated and summarized in a technical report. One of these solutions was implemented in April 2012: the installation of traffic light prioritisation for the buses on one intersection (Brailledreef and Loevenhoutsedijk). Most of the elaborated solutions are planned to be fully implemented in the medium or long term. Only the above mentioned solution could be achieved within the CIVITAS MIMOSA period.

Unfortunately, the lack of efficient tools to collect valuable data on travel times did not enable an impact evaluation. The estimated cost for the design of efficient measurement tools was too high in relation to the available financial resources for the measure. Hence the measure evaluation focused on the identification of barrier and drivers through the process evaluation.
The **main barrier** was the delays in the implementation due to the interdependence of the 'Quality Bus Line' measure with other measures, like the revitalization of St. Jacobsstraat (see below) and the development of remote control of the bridges in which the communication between the buses and the bridge keeper – one of the measures in UTR 2.2 - will be taken into consideration.
One of the other measures– the redesign of St. Jacobsstraat – created significant political interest at the city level which contributed to support for the measure. In addition to improving the current bus lines and stations, politicians now want to revitalize the entire area along St. Jacobsstraat by giving more prominence to public transport and bicycles with the overall aim of integrating the neighborhood to the inner-city of Utrecht. This led to the elaboration of a Functional Design for the entire traffic infrastructure of St. Jacobsstraat. This political interest for the measure is a **driver** which ensures the support of the Municipality to implement the measure in the long-term.

For the implementation of similar measures, **some recommendations** can be taken into account. First, it is recommended to ensure that the objective of the project is embedded in policy documents beforehand. In Utrecht, this measure was concretely described in the Action plan for Air Quality which was adopted by the City Government. This provided a good basis for the development of the project, especially access to sufficient finances. Secondly, the involvement of residents from the earliest stages of the process is primordial for the **success of the measure**. It is highly recommended to clearly communicate with citizens to ensure that their expectations do not exceed the possibilities that can be reached with the available budget. Thirdly, sufficient time and effort should be devoted to compile an inventory of the interaction with other (infrastructural) projects for the area concerned.

There is a lot of political willingness to carry on with the measure. Nevertheless, the measure generated significant changes in the surrounding areas, which made the process complicated. The other solutions elaborated in the frame of the 'Quality Bus Line' measure – not yet implemented – are planned to be introduced in the following years. The overall goal is to achieve the expected objectives by 2020. Evaluation and monitoring will be therefore conducted in order to identify potential required adaptations in the implementation process and to measure if the expected effects are achieved and if the overall goal of the measure is reached.

A Introduction

A1 Objectives

The measure objectives are:

High level objectives:

- Increase of modal split towards sustainable modes.
- To improve the air quality in urban areas (less cars in city centre and increase usage of collective passenger transport)

Strategic level objectives:

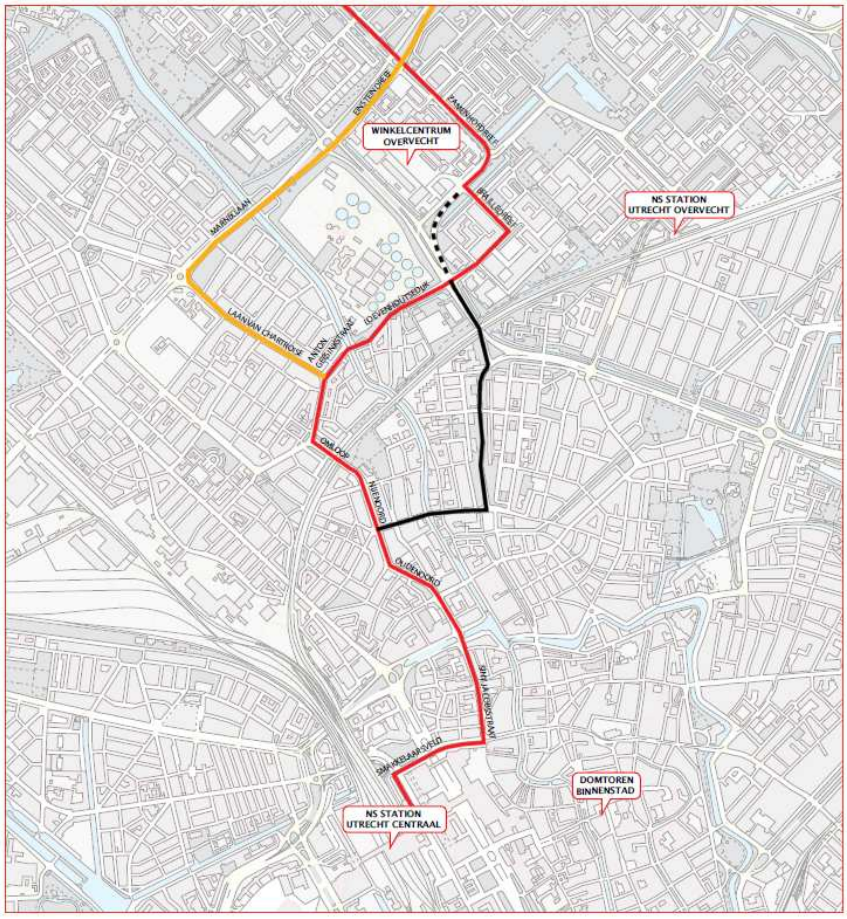
- Increase of speed and reliability of bus transport.

Measure level specific objectives:

- Improvement of the quality (travel times) and reliability of the PT connection between the city centre and Overvecht (Northern part of the city).
- Increase usage of the buses on this line.

A2 Description

Bus lines travel each day between Central Station and Overvecht (a district in the northern part of Utrecht). These bus lines use partly the same route; after the 'Zamenhofdreef' in Overvecht they split up.



Picture A2-1: Bus lines to Overvecht: the red line shows the current bus route to Overvecht (lines 6 and 7), the yellow and black ones were the possible alternatives for the short term.

However, huge delays on the bus lines to Overvecht are reason for concern since this is one of the major public transport axes for the city (after the bus lines to the University area "De Uithof" and the new area Leidsche Rijn).

The main (long-term) objective of this measure is to decrease travel times by 25% between 2010 and 2020 on the bus connection between the city centre and the Overvecht district; this is equal to an average speed of 20 km/h instead of the current 15-16 km/h. This should lead to a time saving of 2.5 minutes. Other bus lines should be well-connected to this line, so these could also profit from the time-saving measures. Another goal is to increase the reliability of the bus schedule. Finally this measure should result in an increase in the usage of the buses on this PT connection.

To decrease the travel times a set of short, medium and long term measures was developed, after an extensive analysis of the options for optimisation of these bus lines. Due to the fact that most of these measures were medium or long term measures, these could not be (fully) implemented within the CIVITAS MIMOSA period. The measure that was fully implemented is the installation of traffic light prioritisation for the buses on one intersection (Brailledreef and Loevenhoutsedijk) in April 2012.

In the project team the departments 'Traffic and Transport' and 'Urban Development', both of the city of Utrecht, worked together with the public transport authority (the Region Utrecht (BRU)) and the local public transport company GVU. The three districts in the northern part of the city where the bus line to Overvecht drives through were also participating in the project.

This measure was introduced in the CIVITAS MIMOSA project with the Contract Amendment of Oct. 2009 after the cancellation of another measure.

B Measure Implementation

B1 Innovative aspects

There are no specific innovative aspects identified. Yet this measure is crucial in the development of integrated packages, e.g. in combination with the promotion of the park and ride facilities (UTR 2.1) or the fostering of the new city centre parking policy.

B2 Research and Technology Development

The following research and development activities have taken place.

Stage 1: Baseline measurement (data collection) and inventory of the problems.

To get a clear insight into the before situation in autumn 2008 numbers in relation to the travel times, delays and passengers of the bus lines to Overvecht have been collected from the local public transport company (GVU) system. Also the traffic model has been used to predict traffic developments up until 2020. The analysis of the collected numbers focused on the current bus lines to Overvecht (lines 6 and 7) (see picture A2-1). Furthermore a workshop was organised in the summer of 2010, in which the departments of 'Traffic and Transport' and 'Urban Development', the Region Utrecht (BRU) and the local public transport company GVU participated. In addition interviews were held with 4 bus drivers. Bus drivers were asked about their experience regarding the flow of the buses, if they know locations with structural delays and what solutions they think would help. Also a survey was conducted among bus passengers to measure how they experienced the bus lines in practice. In December 2009, the survey questionnaire was completed by more than 300 bus passengers. The respondents were almost equally split in terms of gender, most respondents were 16-40 years old. The main results were:

- 86% of the respondents used the bus line to travel to work.
- 45% of the respondents got the bus at the central station.
- 12% said the buses ‘always arrive on time’ at the destination and 13% said the buses ‘always arrive on time’ at the bus stop where they get the bus.
- 67% said that the buses ‘often arrive on time’ at the destination and at the bus stop where they get the bus.
- 12% said the buses 'usually arrive on time' at the destination and 14% said the buses 'usually arrive on time’ at the bus stop where they get the bus.
- The main reasons respondents gave for the delays of the bus were the number of people getting on and off the bus (43%) and the congested roads/waiting for the traffic lights (30%).

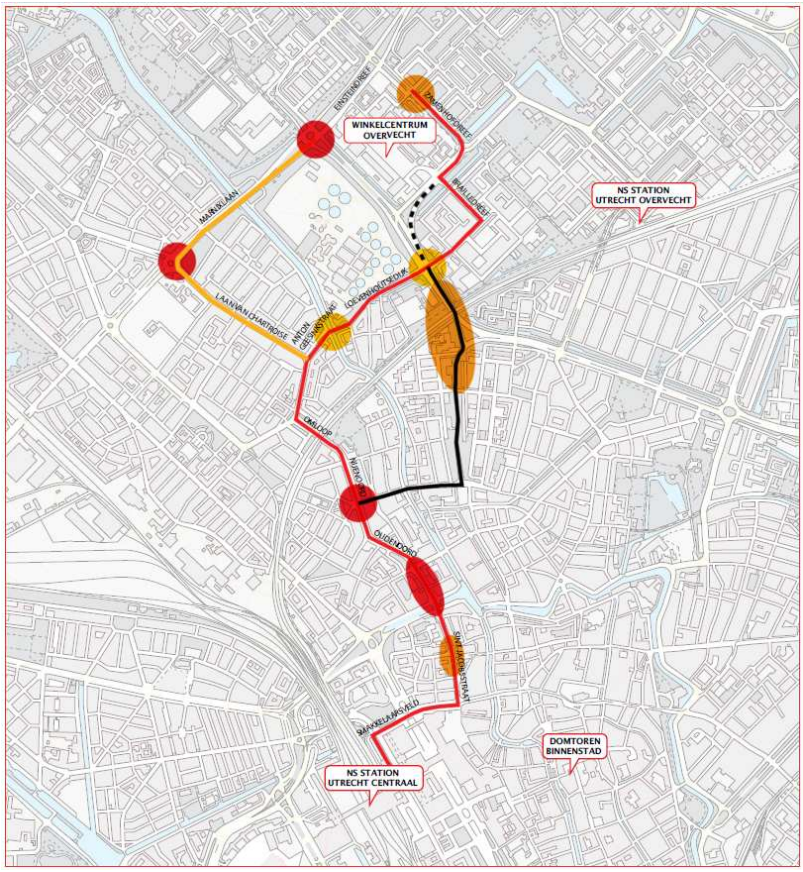
The main results of the inventory and analyses were:

- Objective judgements learned that a large number of problems existed on the bus lines to Overvecht. On the other hand the experiences of bus drivers and passengers were quite positive. The reason for this difference is that the timetable schedules were quite long, so the buses were not delayed.
  Nevertheless the travel times and spreading of the traveltimes were too big with regard to the objective to speed up these bus lines and thus increase the number of passengers.
- Manual counts of the people that get on and off the buses showed that each day 8,000-9,000 passengers use bus lines 6 and 7 between Central Station and Overvecht (both directions). The frequency of the bus lines to Overvecht was 12 times per hour, bus lines 6 and 7 each drive to Overvecht 6 times per hour (in both directions).

- The first part of the bus route to Overvecht had the most bus lines: 32 buses (in both directions, so 64 in total) drove through the St. Jacobsstraat and 24 through the Oudenoord.
- On some parts of the bus route the buses have their own bus lane;
- With the exception of one crossing (Brailledreef/Loevenhoutsedijk) the buses to Overvecht have priority at the crossings with traffic lights thanks to Vehicle Communication (VECOM – detectors in the road).

Picture B2-1: one of the bridges on the bus route to Overvecht

- Bus passengers were quite satisfied with the bus lines to Overvecht. They were satisfied with the reliability. Nevertheless the chaotic situation at central station was often mentioned as a problem.
- Bus drivers thought that the bus lines leading from the central station to Overvecht could be improved. The central station in particular is a problem as well as one of the bridges (the Rode Brug) in the summer due to the opening of this bridge.
- The travel time from the Central Station to Overvecht according to the timetable was approximately 12 minutes, the average driving speed was 15-16 km/hour. To reach the proposed decrease in the travel time of 2.5 minutes, the average driving speed needed to increase to 20 km/hours.
- The measured speeds of the buses showed delays on the part of the route through the St. Jacobsstraat to the Zamenhofdreef of 4.5 minutes.
- In spite of VECOM, the biggest delays for the buses appeared on and around crossings with traffic lights; due to the lack of bus lanes the buses stood in the same line as the cars.



Map B2-1: The red line shows the current bus route to Overvecht, the yellow and black ones are possible alternatives. The dots show the locations where the delays occur

The travel times were measured in the autumn of 2008 by the on-board system of the buses of the local public transport company. This system measured the travel times of all the buses between all the bus stops. These data have been used to calculate the delays between every two bus stops compared to the travel times in which 85% of the buses needed to fulfil their journey. The total delay between two spots is the sum of the periods of time in which the bus drove less than 5 km/hours. The red dots in map B2-1 show the parts where the bus is more than 60 seconds delayed in the evening rush hour. On the orange parts the buses are delayed less than 60 seconds. The delays on the yellow parts are unknown.

Map B2-1shows the bottlenecks in 2010 before the implementation of this measure. The red and orange spots indicate those parts of the route between two bus stops where the buses experience delays in the evening rush hour.

Central Station direction Overvecht	Delays – morning rush hour (sec/bus)	Delays – evening rush hour (sec/bus)
Rozenstraat and St. Jacobstraat	25	50
St. Jacobstraat - Oudenoord	90	135
Oudenoord – David van	15	60
Ondiep – Van Hoornekade	40	40
Van Hoornekade – Hospital	70	70
Rode Brug (Red Bridge)	20	20
Crossing Brailledreef	30-60	30-60

Table B2-1: delay times of the buses from the Central station of Utrecht to Overvecht. Source: Public transport company GVU.

Overvecht direction Central Station	Delays – morning rush hour (sec/bus)	Delays – evening rush hour (sec/bus)
Hospital Overvecht - Van	160	180
Rode Brug (Red Bridge)	20-30	20-30
Crossing Brailledreef	30-60	30-60
Nijenoord – David van	10	60
Oudenoord - St. Jacobstraat	55	60
Rozenstraat en St. Jacobstraat	20	30

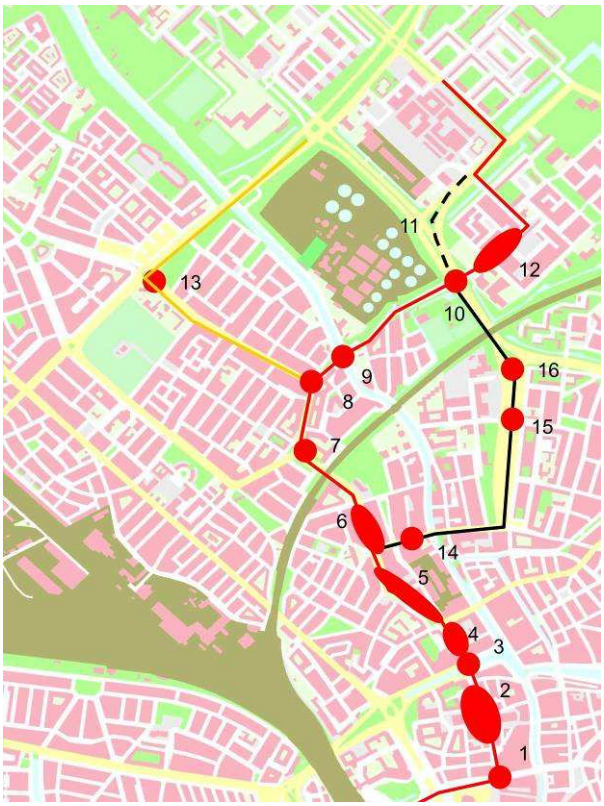
Table B2-2: delay times of the buses from Overvecht to the Central station of Utrecht. Source: Public transport company GVU.

Conclusions from the inventory of problems were the following:

- The *subjective* evaluation was quite positive, but *objectively* there are a large number of bottlenecks on the route.
- The difference in perception can be explained by the fact that the range of travel times is now quite broad, which makes the buses seem to drive on time.
- However, the travel times are too long for the objective of the city: making this PT-route faster, more attractive and more financially attractive (operation). This can only be done by solving the bottlenecks.

Stage 2: Inventory of possible measures for the short and longer term.

For each problematic location solutions to speed up the bus lines to Overvecht were inventoried. Again a workshop has been organised, in the autumn of 2010, with the same participants that were present at the first one. Possible measures were compared to the objectives and based on the results measure selections were made.



Map B2-2: Overview of the locations/possible solutions to speed up the bus lines to Overvecht.

In total 16 solutions have been analysed (shortly), see map B2-2 for the locations. Table B2-3 shows the solutions that were indicated as promising for the short term (2015):

Loc.	Description	Expected effects	Estimated costs (rough)
Shared part of the route (locations 1 to 5)			
1	Relocation of a bus stop from a crowded street to a quieter street around the corner	Decrease in travel times and an increase in comfort	€ 600,000
2	Remove traffic lights and redesign St. Jacobsstraat	Decrease in travel times in evening rush hours from the central station with 20-40 sec and to the central station with 30-40 sec (for 43 buses per direction/hour)	€ 1,000,000
4	Removal of a bus stop	Decrease in travel times of 30 sec (for 32 buses per direction/hour)	€ 1,000,000
5	Change of direction of the bus lane: instead of using it for the buses to the central station, it will be used for buses in the other direction	Decrease in travel times in evening rush hours from the central station with 20-40 sec (for 26 buses/hour)	€ 1,000,000
		Total expected effect in evening rush hour: • *60-90 sec less travel times to the central station* • *170-230 sec less travel times from the central station*	*Total estimated costs:* *€ 3,600,000*
Route along locations 6 to 12			
6	Implement bus lanes before and after the crossing in both directions or lengthen the existing bus lane in the direction to the central station in the central reservation.	Decrease in travel times in evening rush hours to the central station 20-40 sec, from the central station with 30-40 sec (for 14 buses per direction/hour)	€ 2,000,000
9a	To coordinate the times that the bridge opens with the bus lines, possibly by placing a display with online information	Not available	€ 100,000
10	To apply KAR so buses can automatically request priority at the traffic lights with a radio message	Decrease in travel times in evening rush hours 30-60 sec in both directions (for 12 buses per direction/hour)	€ 40,000
		Total expected effect on evening rush hour: • *Travel times to the central station reduced by 40-70 sec* • *Travel times from the central station reduced by 20-30 sec*	Total estimated costs: € 2,140,000

It was advised to not implement solutions at the other locations because of the negative effects of these.

Furthermore the following investigations needed to be completed in the middle and long term:

1. analysis of the integration and impacts of a bus station on the Einsteindreef;
2. analysis of the optimum access of the centre of Overvecht;
3. analysis of the desired bus network for the total district Overvecht (in conjunction with 1 and 2).

B3 Situation before CIVITAS

Buses that ride between the city centre and the north part of the city are confronted with frequent delays due to congestion, especially during evening rush hours, tuning of traffic lights and when the large amounts of people getting on and off at certain bus stops. This leads to reduced quality and reliability on this bus line.

The following problems exist on the current bus route to Overvecht:

- the travel times from the central station/city centre to Overvecht are too long;
- the travel times are irregular, the reliability is very low;
- this irregularity leads to high operating costs and due to this in the design of the new public transport terminal a large buffer must be taken into account (in space and time);
- the current public transport node at the shopping centre Overvecht is not recognisable;
- the recognisability of the bus lines to Overvecht is insufficient: it is not clear for passengers which buses go to Overvecht (orientation of the route);
- the river 'Vecht' is a barrier for the buses (the bridges).

Chapter B2 describes the problems in detail. Map B2-2 shows the locations where the delays occurred.

B4 Actual implementation of the measure

The measure was implemented in the following stages:

Stage 1: Writing of start document / action plan (March 2010 – August 2010).

The action plan describes which steps will be taken to come to the solutions and measures to reach the objective, a decrease in travel times. The City Board officially approved the document in October 2010. A press release has been issued on this.

Stage 2: Quick scan of the problems and (possible) measures (August 2010 – January 2011) This phase consisted of five steps:

- Step 1: Baseline measurement (data collection) & inventory
- Step 2: Analysis of the specific problematic areas in the corridor Utrecht-Overvecht. To facilitate this analysis, a workshop has been organised in the summer of 2010, in which the departments of 'Traffic and Transport' and 'Urban Development', the Region Utrecht (BRU) and de local Public Transport company GVU participated. The results of this workshop are written in minutes.

The conclusion of these two steps was that the travel times were too long for the objective of the city to make this PT-route faster, more attractive and more financially attractive (operation). This could only be done by solving the bottlenecks
Step 3: Inventory of possible measures for the short and longer term. Again a workshop has been organised, in the autumn of 2010, with the same participants. The results of this workshop were presented in a short report.

- Step 4: Comparison of the possible measures with the objectives and make a selection based on that. A workshop has been organized for this.
- Step 5: Write a quick scan report “Overvecht snel en betrouwbaar” (translation: “Overvecht quick and reliable”), to be presented to the City board for approval.

The problems and the solutions for the short term are described in chapter B2.

Stage 3: Consultation of stakeholders about the suggested solutions (March 2011)

The stakeholders and other interested people were consulted about the draft vision “Overvecht snel en betrouwbaar”:

- The councils of the involved districts and other organised groups were informed by sending a so-called ‘wijkbericht’, this is a short summary of the vision.
- All the addresses along the whole bus route were sent this ‘wijkbericht’ too.
- On the evening of 31st of March 2011 a walk-in consultation was organised where people could come for information about the vision and ask questions (ten people made use of this opportunity).
- People could respond to the vision on a website, seven written responses were sent.

The responses were reported in the vision “Overvecht snel en betrouwbaar” and taken into account in the next steps and will also be taken into account in all future steps of the measure.

Stage 4: Approval of the Vision by the City Board (July 2012)

In July 2012 the Vision “Overvecht snel en betrouwbaar” including an appendix with new developments was approved by the City Board.

Stage 5: Implementation of solution 10 (March 2012)

In March 2012 one of the solutions was implemented: short distance radio (KAR) was implemented on one of the crossings so buses could automatically request priority with a radio message.

Stage 6: Research on the middle term solutions (second half of 2012)

Solutions 1, 2, 3, 4, 5, 6 and 9a were further researched and elaborated.

B5 Inter-relationships with other measures

The measure is not related to other CIVITAS MIMOSA measures. Nevertheless the improvement of the bus lines to Overvecht is not isolated. Examples of developments that influenced this measure are:

- the possible closing of a nearby square for traffic, without this closure the problems with regard to traffic jams on parts of the bus route to Overvecht cannot be solved;
- the replacement of the bus lines to Overvecht by trams;
- various measures in the redevelopment of the central station area;
- the rebuilding of a shop in the St. Jacobsstraat;
- development of remote control of the bridges; the communication between the buses and the bridge keeper – one of the measures in UTR 2.2 - will be part of this project.

C Impact Evaluation Findings

C1 Measurement methodology

Impact evaluation was not applicable. A set of short, medium and long term measures was developed. Due to the fact that most of these measures were medium or long term measures, these could not be (fully) implemented within the CIVITAS MIMOSA period. The measure that was fully implemented was the installation of traffic light prioritisation (KAR) for the buses on one intersection (Brailledreef and Loevenhoutsedijk) in March 2012.

The tool that reports the travel times of the buses could not deliver useful travel times because of the fact that this tool can only analyse whole months and the prioritisation was implemented halfway through March. Further research to measure the travel times would in proportion to this relatively small measure be expensive and impractical. Due to this, the measure is not evaluated on the impacts.

After the implementation of more of the proposed measures the impact on the travel times will be bigger. Once more of the proposed measures have been implemented in the following years – after CIVITAS MIMOSA - these will be evaluated to determine whether the desired effect has been reached.

C7 Future activities relating to the measure

It is planned that after CIVITAS MIMOSA the other proposed measures will be implemented.

In October 2012, a program of requirements will be developed for solutions 1, 2 and 3 and a traffic analysis will be done for solution 6.

The harbour department decided recently to implement remote control of the openings of the bridges. It will be researched whether the communication between the buses and the bridge keepers can be improved (solution 9).

Solutions 3 and 4 will be implemented through the air quality program and will be implemented before January 2015.

D Process Evaluation Findings

D.1 Deviations from the original plan

The deviations from the original plan comprised:

- **Delay** – due to different aspects (including postponed decision-making on related measures) the measure experienced some delays.

D.2 Barriers and drivers

D.2.1 Barriers

Preparation phase

- **Political support** - the action plan that should initiate the implementation of the measure was lacking some stable political support, due to the local elections.
- **Delay** – the measure was delayed due to postponed decision-making on other, closely-related measures.
- **Personnel changes** – some personnel changes took place which contributed to the delay of the measure.

D.2.2 Drivers

Preparation phase

- **Political attention** – One of the measures (the redesign of the St. Jacobsstraat which is one of the roads which the bus line uses to drive to Overvecht) has received a lot of political attention. This has resulted in an increase in the level of ambition. Within the CIVITAS measure a traffic light will be removed and two bus stops will be combined into one bus stop in order to decrease the travel times. Within the new policy document 'Utrecht attractive and accessible' the city wants more. The city wants to make this area part of the inner city and to give public transport and bicycles a clearer place on the road(s). This CIVITAS measure tries to support this ambition as much as possible and will at least make sure that in the future it's still possible to implement this ambition. This resulted in the measure leader developing a Functional Design for the entire St. Jacobsstraat (instead of only the parts of the traffic light and the bus stops). The city hopes that other involved organisations want to invest. The travel times of the buses will probably not profit from this higher ambition.
- **Action plan on Air Quality** – The project has a close relationship with the measures that were planned in the Municipal Action plan on Air Quality. The city government approved this Air Quality Action plan. The measures in this plan influence the amount of traffic and traffic flow on the bus routes in this measure.

D.2.3 Activities

Preparation phase

- In advance of the (delayed) political approval of the measures of this project and of other connected (non-CIVITAS) measures the measure leader started to develop the draft implementation plan. The measure leader started to make an inventory of the wishes and requirements for the redesign of the St. Jacobsstraat. The measure leader also started a study of measure 6.

Implementation phase

- The Short Distance Radio (solution 10) was implemented.

D.3 Participation

D.3.1. Measure Partners

- Region Bestuur Regio Utrecht (BRU) – this organisation is the public transport authority and a member of the project group.
- The local public transport company GVU – aware of all the problems on the involved bus lines and directly involved in this measure.

D.3.2 Stakeholders

- Three district councils in the northern part of the city - these have the right to advise the city board and are involved in the measure
- The district council of the city centre was consulted about one of the solutions
- Residents, entrepreneurs and other addresses along the bus lines were consulted about the solutions.
- Passengers using the bus lines to Overvecht.

D.4 Recommendations

D.4.1 Recommendations: measure replication

- Developments in other – related - projects can largely affect (the implementation of) your own project by causing delays. **Make sure that the objective of the project is embedded in policy documents beforehand.** This measure was concretely described in the Action plan for Air Quality which has been adopted by the City Government. This provides a good basis for the development of the project, for access to sufficient finances.
- **Make sure that the expectations** of residents **do not exceed the possibilities** that can be reached with the available budget.
- **Involve the residents** in the process right from the start.

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

- Form a Project team at an early stage and make sure to include people of various expertises (such as communication, traffic, spatial planning and design).
- Appoint a professional project leader.
- Involve the public transport operator in the project team.
- Take the time to write a solid project plan, the project will benefit from this throughout the entire lifetime of the project.
- Include a detailed description of the baseline measurement in the project plan, including suitable indicators.
- Keep the involved organisations informed (for example the districts).
- Take sufficient time to make an inventory of the interaction with other (infrastructural) projects for the area concerned.

E References

“Overvecht snel en betrouwbaar”, City of Utrecht, 20 April 2011