



**CROSS
BORDER
MANAGEMENT**

An overview of experiences on the cross border
re-routing corridors in The Netherlands

Rijkswaterstaat



Ministerie van Verkeer en Waterstaat

CENTRICO



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1. About this document

1.1. Scope of the document

The current report is produced by the Department for Traffic Management and Information of the Dutch Ministry of Transport, Public Works and Water Management / Rijkswaterstaat(RWS). It intends to provide RWS and the partners in CENTRICO working or planning to work on cross border re-routing corridors with an overview of the experiences and lessons learned from the activities in The Netherlands. As such the report is of value both during the process of implementing such a corridor as well as during the operational phase. The four re-routing projects in which The Netherlands are currently involved are described.

1.2. Reading guide

The report consists of:

■ Introduction

This chapter is an introduction on CENTRICO and cross border management. This includes general information on the projects and activities concerning the re-routing corridors, in which the Netherlands is included.

■ Description of the pilots

- Köln-Eindhoven
- Antwerpen-Rotterdam
- Arnhem-Oberhausen

Each description is structured in the same way:

- Initial project goals

This part describes the corridor, with its initial goals and all participants involved.

- Current Status

The second part covers the current status of the project concerning conditions, monitoring and communication.

Note: The pilot Brussels-Aachen is just mentioned, but not described in detail, as there is only little Dutch involvement.

■ Experiences

This chapter concerns all experience gained during the pilot projects.

■ Conclusions and recommendations

The final chapter covers the conclusions and gives some recommendations on CBM for future projects.

1.3. Acronyms

CBM	Cross Border Management
VMS	Variable Message Sign
CENTRICO	Central European Region Transport Telematics Implementation project
TERN	Trans European Road Network
TEMPO	Trans-European intelligent transport systems PrOjects
VCNL	The Dutch Department for Traffic Management and Information (Verkeers

KLPD	Centrum Nederland), part of Rijkswaterstaat/Ministry of Transport
BOSS	Dutch National Police (Korps Landelijke Politie Diensten)
RVC	Decision support system (Beslissing OnderSteunend Systeem)
VCA	Regional Traffic Centre (Regionaal Verkeers Centrum)
RWS	Traffic Centre Antwerpen (Verkeerscentrum Antwerpen)
	Rijkswaterstaat (Directorate General of the Dutch Ministry of Transport, Public Works and Water Management)

2. Introduction

2.1. Background

In 2001 the TEMPO programme (for Trans-European intelligent transport systems PrOjects) which lasts until 2006 was launched by DG TREN of the European Commission. The intention of this programme is to realise a higher level of co-ordination between the different actors and its aim is to stimulate a harmonised and synchronised deployment of intelligent transport systems and services on the Trans-European Road Network.

The TEMPO programme identifies some key objectives as well as priority actions. The four main objectives are:

- optimising the use of road capacity and of passenger and freight traffic flows;
- savings in terms of road safety, due to reduced incidents and reduced impacts of incidents;
- alleviating environmental damage through reducing traffic congestion
- facilitating the (international) road user.

Within the TEMPO programme six Euro Regional projects were started: ARTS, CENTRICO, CORVETTE, SERTI, STREETWISE and VIKING. Recently a new project, CONNEKT was started, which includes central and eastern European countries. The coverage of these projects is shown in figure 1.



Figure 1. Coverage of the Euro Regional projects

2.1.1. CENTRICO

CENTRICO is the acronym for Central European Road Transport Telematics Implementation Co-ordination, Euro regional Project. It is an organisation in which several European regions participate to coordinate the implementation and harmonisation of cross border traffic management to inform the road users about large incidents and possible alternative routes on the trans European road network (TERN). Partners within CENTRICO are the western states of Germany, Belgium, The Netherlands, Luxemburg, the northern regions of France and south-eastern part of the United Kingdom (see figure 1).

The project objective is to reduce congestion on the TERN in the CENTRICO regions by between 5 and 15 percent depending on location. Additional aims are to reduce environmental impact caused by transport delays and to improve network safety. The projects within CENTRICO receive financial support from the European Commission..

The existing traffic management and information centres have an up to date view on their networks. By exchanging information between the traffic centres, the road users, can be informed and guided more efficiently in case of large incidents on the international routes.

2.1.2. Cross Border Management

Cross-border management (CBM) is meant to facilitate international traffic. It relies on international cooperation between several national or regional road authorities. It is used to improve the flow of traffic on economical important routes and to inform the road user on the best route to his destination. Within CENTRICO several CBM projects have been defined, such as Brussels-Paris, Brussels-Nancy, Arnhem-Oberhausen and Rotterdam-Antwerp. An overview of all the planned re-routing projects within CENTRICO is given in figure 2.



Figure 2. Re-routing projects within CENTRICO

2.2. CBM re-routing projects in The Netherlands

The Netherlands are currently involved in four CBM re-routing corridors: Eindhoven-Köln, Rotterdam-Antwerp, Arnhem-Oberhausen and Brussel-Aachen.

In The Netherlands Cross Border Management is applied when there is a large and long lasting incident on the international routes. Goal is to improve the traffic situation (less congestion) on the economical important, cross border routes to the benefit of the road user. Using the knowledge of the actual traffic situation on those routes (temporary) measures can be taking to improve the traffic situation. In The Netherlands the measures applied in the CBM projects are to inform the road users about alternative routes.

More than 80% of the traffic crossing the Dutch borders by road uses a route of one of the four CBM corridors. This corresponds to an average of about 200.000 vehicles per day.

Since CBM relates to international traffic, the communication between the different countries and between the many (!!) different organisations involved plays an important role in these projects.

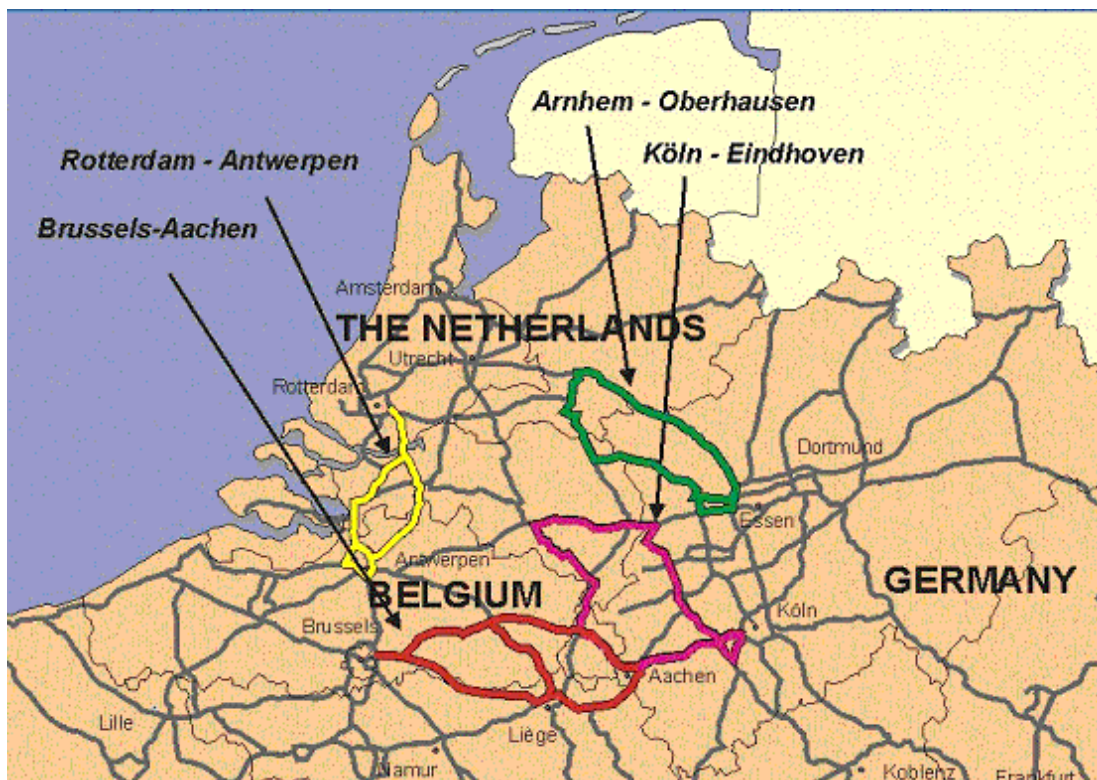


Figure 3. Corridors with Dutch involvement

The work on Eindhoven-Köln and Rotterdam-Antwerp started in 1996 and both CBM corridors are operational now for several years. Eindhoven-Köln and Rotterdam-Antwerp had also the objective to gain experience on the organisational and operational issues related to CBM and to learn how to prepare and implement other re-routing projects.

Both corridors have been set up as a pilot implementation. An extensive evaluation study has been done on both those corridors. These reports are available (in Dutch) for readers interested in more details. These projects showed what traffic related effects a re-routing measure can have and what role re-routing can play as a part of incident management. These two projects also provide an indication of what the costs and benefits are of CBM.

Arnhem-Oberhausen has become operational for the Dutch part in April 2004. The German side is waiting for approval of the technical plan by the Bundesministerium. The Netherlands have a limited involvement in the Brussel-Aachen corridor since only a small part of the alternative route runs through The Netherlands. For that reason this corridor is not further described in this report.

The current report intends to provide the readers with insight in the experiences gained by NL in setting up, implementing and running CBM re-routing corridors. Especially Eindhoven-Köln and Rotterdam-Antwerp were both set up as pilots serving to learn while doing.

The current report focuses primarily on the Dutch experience in the corridors. The involved corridors have of course counterparts in Germany and Belgium, but the specific experiences in those countries can best be reported by the corresponding authorities themselves.

3. Description of the pilots

In the following chapter a more detailed description of the pilots regarding the Dutch part of the corridors is given. For every pilot the initial project goals and the current status for the Netherlands is covered.

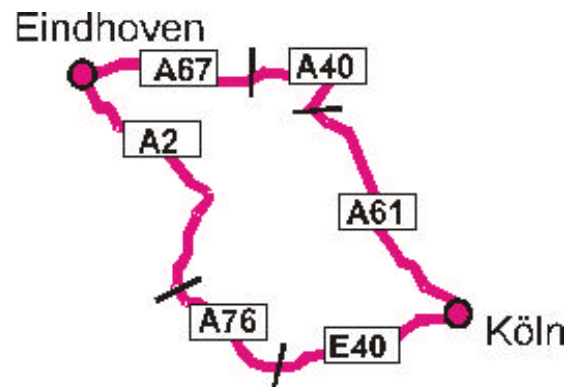
3.1. Eindhoven-Köln

Eindhoven-Köln is the first CBM re-routing corridor project in The Netherlands and in fact also the first operational cross border corridor in Europe. It was officially started at the border near Venlo in January 1998 by the three transport ministers of The Netherlands, The German Federal Government and Nordrhein-Westfalen. Being the first re-routing project one of the main purposes was to gain experience that could be used by later projects.

3.1.1. Initial project goals

The corridor

Eindhoven-Köln was chosen for a cross border project because the corridor serves as a highly important link between the Dutch main ports, Amsterdam and Rotterdam, and the German Ruhr Area.



On this corridor there are two alternative trajectories:

- A2 (NL), A76 (NL), E40 (D)
- A67 (NL), A40 (D), B221(D), A61(D), A4 (D)

These trajectories have a similar travel time and are of similar distance.

Furthermore more than 25 percent of traffic on these roads consists of freight traffic.

Objectives

- To facilitate cross-border traffic in case of delays due to incidents or road works by re-routing and disseminating traffic information.
- To gain experience in the implementation of CBM, so that these experience can be used in the development and execution of CBM on other international corridors.

- To determine the potential benefits of CBM, for this corridor in particular, but also in general.

Participants and their responsibilities

The Netherlands	
<ul style="list-style-type: none"> ■ VCNL = The Dutch Department for Traffic Management and Information (Verkeers Centrum Nederland) ■ RVC Zuid West Nederland (RVC ZWNL) ■ KLPD = Dutch National Police (Korps Landelijke Politie Diensten) ■ RWS district office St. Joost ■ RWS district office Venlo roads ■ RWS district office motorways Eindhoven 	<ul style="list-style-type: none"> ■ VCNL is responsible for communication between the Dutch and German participants (like RVC ZWNL and TMC Köln) and for collecting and distributing traffic information. ■ RVC ZWNL is responsible for the operational aspects of the CBM ■ KLPD was responsible for the operational aspects of the CBM in the pilot phase. KLPD indicated when a CBM procedure might be needed. ■ St Joost is responsible for the operational aspects of the CBM ■ Venlo is responsible for the operational aspects of the CBM ■ Eindhoven is responsible for the operational aspects of the CBM
Germany	
<ul style="list-style-type: none"> ■ TMC Köln 	<ul style="list-style-type: none"> ■ TMC Köln is responsible for the operational aspects of the CBM

3.1.2. Current status

The preparations for this corridor started in July 1996; after one and an half year it became operational in January 1998. In July 1998 an evaluation study was done. Since 1998 continuous improvements took place. After the pilot the responsibilities slightly changed, but this does not affect a CBM procedure.

Monitoring

On the entire corridor traffic is measured either with inductive loops with additional police observation.

Informing Road user

The road-user is informed either on the road by VMS's, text cars or via the normal information services available in The Netherlands. The Traffic Centre informs its service providers, when CBM is started.

Intensities

In 2003 the average number of vehicles using the Dutch part of this corridor on a weekday was 43.000 on the A67 and 30.000 on the A76. (see Annex IV)

CBM action per year

Now about 15 to 30 times per year a re-routing is activated on this corridor. The expected 100 times a year was not realistic for several reasons:

- As a ground rule every country first has to try to fix a capacity problem on its own. Only when this is impossible the neighbouring country can be asked for help and CBM procedure or an other form of re-routing can be used.
- CBM as such is used for unexpected capacity problems. So a re-routing action for road works is not called CBM, but the CBM equipment (VMS's/text cars) can be used for this action.
- Sometimes CBM can not be used, because the alternative route is congested as well.

Every year a meeting is held between all partners to discuss the current status and possible adjustments.

3.2. Rotterdam-Antwerpen

3.2.1. Initial project goals

Since December 1999 (official opening at the CENTRICO Conference), the Antwerp-Rotterdam corridor is operational. This corridor is linking the most important ports in Europe (Rotterdam, Antwerp).

The corridor

Rotterdam-Antwerp was chosen for a cross border project because the corridor serves as a highly important commercial link between the ports of Rotterdam and Antwerp: It is an important hinterland connection.

On the corridor there are two alternative trajectories:

- A16 (NL), A1 (B)
- A17 (NL), A58 (NL), A4(NL), A12(B)

These routes are both equal in distance and travel time. In Belgium both are experienced as equal routes, in The Netherlands the route via the A16 is seen as the main route.

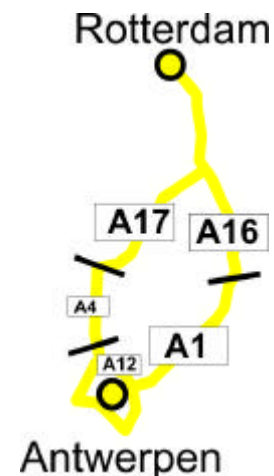
Objectives

Experience

To gain experience in the development and execution of CBM, so that these experience can be used in the development and execution of CBM on other international corridors.

Congestion

Both Antwerp and Rotterdam are at the heart of the European harbour activities and are subject to heavy morning and evening congestion problems. For this reason, the newly developed CENTRICO re-routing sign was also tested on this corridor.



Participants and their responsibilities

The Netherlands	
<ul style="list-style-type: none"> ■ VCNL 	<ul style="list-style-type: none"> ■ VCNL took over the responsibility of KLPD after the pilot phase for collecting and distributing traffic information and for communication between the Dutch and Belgian participants (like Ministry of Flanders and RVC ZWNL)
<ul style="list-style-type: none"> ■ RVC-Zuid West Nederland (RVC ZWNL) 	<ul style="list-style-type: none"> ■ RVC ZWNL is responsible for the operational aspects of the CBM
<ul style="list-style-type: none"> ■ KLPD = Dutch National Police (Korps Landelijke Politie Diensten) 	<ul style="list-style-type: none"> ■ KLPD is responsible for incident information to be used for CBM
<ul style="list-style-type: none"> ■ Regional Office Noord Brabant 	<ul style="list-style-type: none"> ■ Regional office N-B is responsible for the operational aspects of the CBM

Belgium	
<ul style="list-style-type: none"> ■ VC Antwerp = Traffic Centre Antwerp (verkeerscentrum Antwerp) 	<ul style="list-style-type: none"> ■ Decide on CBM measure with help of Rijkswacht
<ul style="list-style-type: none"> ■ Rijkswacht = Flemish federal police department) 	<ul style="list-style-type: none"> ■ Inform VCA of necessity of CBM and operate the DRIP

3.2.2. Current status

CBM on this corridor is operational since December 1999 and in the summer of 2004 the international partnership could help solve capacity problems when the ring Antwerp is closed.

Monitoring

Most part of corridor traffic is measured either with inductive loops or with additional police observation. Some monitoring systems are being installed on the ring of Antwerp during the repavement works starting summer 2004.

Informing Road user

The road-user is informed either on the road by VMS's, text cars or via the normal information services available in The Netherlands. The Traffic Centre informs its service providers, when CBM is started. On the ring of Antwerp the used text cars were replaced by VMS's on fixed gantries.

Intensities

In 2003 the average number of vehicles using the Dutch part of this corridor on a weekday was 64.000 on the A4 and 115.000 on the A16. (see Annex IV)

CBM action per year

Now about 30 to 50 times per year a re-routing is activated on this corridor. The expected 100 times a year was not realistic for the same reasons as Eindhoven-Köln.

3.3. Arnhem-Oberhausen

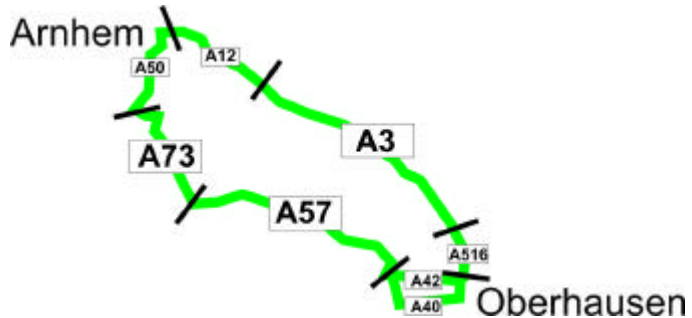
The Arnhem-Oberhausen corridor is the most complicated and therefore was the last one to be implemented so that the experience from the other corridors could be used.

3.3.1. Initial project goals

The corridor

On the corridor there are two alternative trajectories:

- A12 (NL), A3 (D)
- A73 (NL), A50 (NL), A57(D), A40 (D)



The first trajectory is considered the main route for both sides. This route is 97 km long and travel time without delay is approximately 54 minutes. The secondary route is 134 km long and travel time is 1 hour and 14 minutes.

Objectives

The objective is to facilitate cross border traffic in case of incidents. This will be done by re-routing and providing traffic information between Arnhem in The Netherlands and the conurbation Ruhr area in Nordrhein-Westfalen.

Participants and their responsibilities

The Netherlands	
<ul style="list-style-type: none"> ■ VCNL ■ Regional Traffic Center Noord Oost Nederland (RVC-NON) ■ KLPD = Dutch National Police (Korps Landelijke Politie Diensten) ■ District offices Planken Wambuis/Nijmegen ■ Regional police departments Gelderland/Brabant/Limburg 	<ul style="list-style-type: none"> ■ VCNL is responsible for communication between the Dutch and German participants (like RVC-NON and TMC Köln) and for collecting and distributing traffic information. ■ RVC is responsible for regional information on traffic and they have to activate the VMSs in case of CBM. RVC-NON can veto a CBM procedure. ■ KLPD is responsible for incident information to be used for CBM ■ The district offices provide regional information on traffic and they are responsible for flipping over the CENTRICO re-routing signs. ■ The regional police department provide information on the traffic situation on their road network

Germany	
<ul style="list-style-type: none"> ■ TMC Köln 	<ul style="list-style-type: none"> ■ TMC Köln is responsible for the operational aspects of the CBM and central co-ordination of a CBM procedure.

3.3.2. Current status

The corridor is operational since April 2004 for the Dutch side. The staff is fully trained . On the German side operation is planned to start at the end of 2004. The preparation to start operation of the signs implemented in 2003 as the second stage in the implementation process in NRW is running on schedule. A study which examines the efficiency of the established measures (2. stage) in NRW will begin after start of operation.

Monitoring

Monitoring on the A3 and A57 is not ideal, so in 2004/2005 it is planned to install induction loops there.

Informing Road user

For communication to the road user three VMS's are used at junctions Grijsoord, Waterberg and Valburg. To support these VMS's switching shields showing the CENTRICO Arrow are used. These signs are operated manually.

Intensities

In 2003 the average number of vehicles using the Dutch part of this corridor on a weekday was 60.500 on the A73 and 78.000 on the A12. (see Annex IV)

CBM action per year

An elaborate manual is written to help the operators with CBM procedures. This manual consists of general information on CBM, diagrams of the procedures and test cases to practise procedures and to get familiar with the conditions.

In the first months re-routing has been activated only a few times.

4. Experiences

This chapter concerns all experience gained during the pilot projects. It is divided into four subjects:

- Procedures
- Organisational issues
- Evaluation
- Costs/Benefits

4.1. Procedures

The following paragraph describes the procedures, first the conditions to start a CBM procedure and second the general description of the CBM procedure. The experiences gained on this subject are explained throughout the text.

4.1.1. Criteria for a CBM procedure

The initial criteria to start a CBM procedure were altered during the years in Table 1. you can see the small differences between 1996 and 2004: Difference in duration and formulation. The procedures used in the first part of the pilot were incomplete or insufficient, so they were improved during the operational period. For example at first the procedures did not include road works in The Netherlands and/or the descriptions of the road works were not always clear. Travel time difference was increased, because the introduction VMS made activation time of CBM shorter. The text cars could not be switched on from the traffic centre, which also slowed down the procedure. Now VMSs can be turned on from the traffic centre.

In practice the rules on criteria function as a guideline and are usually not followed, every partner acts on experience. For instance the alternative route for Arnhem Oberhausen is significantly (20 minutes) longer then the main route, so before advising the road user to drive via the alternative route must, the delay should be more than 20 minutes

1996	2004
<ul style="list-style-type: none"> ■ In case of an incident or road works ■ Expected travel time difference between the two routes is a minimum of 15 minutes. ■ This difference will continue for an hour 	<ul style="list-style-type: none"> ■ The expected obstruction-time is longer than 30 minutes ■ Or the delay is more than 15 minutes. <p>And for Arnhem-Oberhausen an extra condition is:</p> <ul style="list-style-type: none"> ■ Travel time on the alternative route must be 5 minutes shorter.

Table 1. Criteria start pilot-current situation.

There was a tendency to lower the threshold for initiating a CBM measure, because:

- this increases the benefits of the corridor
- the operators get more often experience in this

Later on CBM procedures were also initiated when a structural traffic jam occurs (peak hours). At the moment CBM is only used for unexpected capacity problems. So a re-routing action for road works is not called CBM, but the CBM equipment (VMS's/text cars) can be used for this action.

Determining if these criteria are met is somewhat difficult because:

- A system to determine the flow of traffic is not available or there are not enough monitoring data available to gain insight in delays. Real-time traffic data and traffic forecasts are required to better determine the need for and effects of a CBM measure.
- It is very hard to determine the period of the time it will take to clear the road after an incident.
- Operating the switching shields delays the process of activating CBM.
- In some areas it is difficult to determine the length of a traffic jam

4.1.2. Actual CBM procedure

General rules:

- VCNL is the central contact.
- VCNL communicates by phone with the national partners and foreign partners.
- RVC-NON communicates by phone with regional partners on the capacity of the alternative route.
- VCNL sends out a fax in case of CBM activation or deactivation.
- Partners on both sides have a veto on CBM.
- In special situations VCNL will decide on CBM, for instance during communication problems or military intervention with justification afterwards
- Ending the procedure should be just as careful a decision as starting one, sometimes it is ended too soon.

The following procedure is used for Dutch corridors. For a schematic overview of the procedure for The Netherlands and a sample of the fax sheet see Annex X and XX.

4.2. Organisational issues

4.2.1. General

- In The Netherlands the reorganisation of the KLPD-traffic department (to VCNL) had a positive influence on the information flow.
- Some of the operators were not properly instructed to handle a CBM procedure. This caused a problem with communication.
- All participants had a problem to determine when a CBM procedure should be initiated.
- Responsibilities and whom to contact between participants and within the organisation of some participants were not always clear.
- No steady police crew was available on the road to handle CBM.
- For Arnhem-Oberhausen an operators handbook was written especially for this corridor and it already proved very useful.

4.2.2. Communication

Cross border requests for CBM were not always picked up as quick as they should have been. CBM request occur not very frequently, therefore operators were not used to react on them. E.g.

- Faxes exchanged were not noticed between all other regular faxes received.
- Adding to that the used fax was not informative enough.
- Sometimes informing the foreign partners on the procedure is forgotten (no fax).
- Most of the time CBM is started before the other partners are informed. However in practice this proved not to be a problem.
- Fax can be used for logging purposes and a map can be added to make the location of the incident more clear.
- Some of participating traffic centres were hard to reach during weekends and non-office hours.

4.2.3. Practical

- Sometimes removing of the text cars was forgotten, at the end of a CBM procedure.
- Some roads have different names in both countries. Of course this causes confusion.
- CBM actions were not logged automatically. Keeping a record of these actions can lead to a better understanding and evaluation of CBM, furthermore it can be a good basis for decision support systems.

4.3. Evaluation

For both Eindhoven-Köln and Rotterdam-Antwerp an evaluation covering the procedures and the traffic effects was done in The Netherlands by Rijkswaterstaat. For Arnhem-Oberhausen evaluation for the Dutch side is planned for 2005 and for the German side evaluation will start when the corridor on their side is operational. The general results of the evaluation are described below, per corridor.

4.3.1. Eindhoven-Köln

An evaluation covering the procedures and the traffic effects was done in The Netherlands by Rijkswaterstaat.

For the initial evaluation they used:

- interviews
- several existing research documents
- simulation study

There was no monitoring data to measure the traffic effects, therefore a simulation study had to be done.

The final evaluation included the use of recent developments, reflective meetings with the evaluation team of CBM Antwerp-Rotterdam and VCNL and VC-ZN, more interviews and another model-study.

The evaluation has led to a significant number of improvements, which have been implemented. For example:

The evaluation showed that there have been many situations, which were suitable for a CBM action, but did not lead to such an action. The main reason was that the procedures took too much time, therefore for shorter lasting situations no re-routing could be started.

The effects are measured in terms of vehicle loss-hours due to delays on the routes. The effects of the CBM were difficult to measure and varied a lot. This was mainly due to insufficient monitoring of traffic data on the routes.

Primary, secondary and tertiary effects were taken into account. The secondary effects accounted for about 60% of the total effect. During the simulation study measured effects varied strongly.

4.3.2. Antwerp-Rotterdam

An evaluation was done for the period March 2000 – January 2001 and consisted of three parts:

- analysis of institutional aspects,
- impact analysis
- analysis of public acceptance

For the institutional aspects employees in the organization were interviewed.

To assess the traffic impacts of the CBM measures a total of 23 incidents was analysed. To give an example: on March 1st, 2000 an accident happened on the ring road of Antwerp near the Kennedy tunnel and the road was closed. The reaction of the road users to the information given on the VMS near Klaverpolder (from 09:30-11:40 hrs) is shown in figure 4. The figure shows the percentage of traffic travelling on the A16 in the direction of Antwerp. The period 09:56-11:30 is taken to calculate the percentage with a message on the VMS sign and the period 12:00-13:45 for the percentage without a message on the VMS.

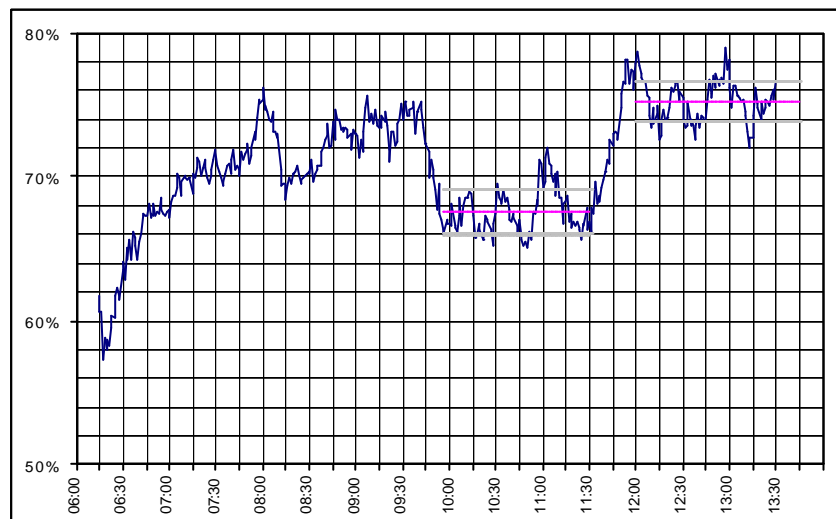


Figure 4. Use of the main route to Antwerp on March 1st 2000.

Apart from this evaluation there was a Flemish-Dutch co-ordination team which evaluated the CBM process regularly, during the project.

Showing texts on delay or advise on re-routing on the DRIP influences 5 to 8 percent of road users in the direction of Rotterdam. The result depends on the type of text and not on the type of incident.

4.4. Cost-benefits

4.4.1. Costs

The costs of for the Eindhoven-Köln pilot were € 330.000 for the Netherlands. This included the project costs, the text cars and the switching shields. Investment costs of about € 500.000 for 'road side VMS' were planned. Meanwhile these VMS's were installed.

For the Rotterdam-Antwerp pilot the costs summed up to an amount of about € 450.000.

4.4.2. Benefits

With the simulation model for Eindhoven-Köln the financial benefits were estimated. Giving the actual number of 40 reroutes and a percentage of 3.5% of traffic following the re-routing advice the savings sum up to an amount of € 287.000 per year, including the secondary effects (improvement of the traffic flow on the original route, because there is less traffic).

Analysing all incidents resulted in the conclusion that CBM improves the traffic flow quality on the route Rotterdam -Antwerp. During incidents in the direction of Antwerp about 5%-8% of the traffic follows the re-routing advice given and saves about 150-200 vehicle hours of delay. Using the same assumptions as for the corridor Eindhoven-Köln and a yearly number of re-routings of 50, the savings in money can sum up to € 149.000 per year.

The analysis of the public acceptance consisted of a survey among road users. During two incidents a questionnaire was distributed among affected motorists. The results showed that 15% of the road users had rerouted because of the VMS information. More than 50% got the information from other media, such as radio, television, text, Internet or colleagues. This does not mean that the VMS's are useless, because the road users that already had chosen to take another route, got extra information that confirmed their decision and thus making their journey more comfortable. In general the road users were satisfied with the information given. They found the information clear, understandable and useful.

Not all costs and benefits were taken into account. For instance operational costs were neglected as well as the positive effect on road safety. Other, less tangible benefits are the improved cooperation between traffic centres at both side of the border, the improved insight in each others working procedures and the increased awareness of the problems of international traffic. Traffic centre VCNL can and does for example ask traffic centre Köln to reroute traffic via Belgium when a problem occurs on the route Köln/Aachen-Rotterdam.

CBM does not only benefit the international traffic on the re-routing corridors, but the national traffic as well.

Finally the VMS have dual purposes, they give information for CBM re-routing, but most of the time they are used for giving other information to the road user, such as traffic warnings, travel times and traffic information especially in conurbation areas.

5. Conclusions and Recommendations

5.1. Conclusions and recommendations in short

In general every partner/authority involved is pleased with the CBM procedure and its effects. They are aware of the necessity and benefits of CBM. The road users too are pleased with the re-routing options .

Conclusions (lessons learned):

- One contact per country per corridor to avoid confusion with all actors involved.
- Clear criteria needed on when to start CBM measures.
- Better traffic information is needed for traffic managers.
- Only one language should be used to avoid confusion.
- Avoid a situation like Arnhem-Oberhausen, where the Dutch side is operational and the German side is not, due to difference in (legal/ government) procedures.

Recommendations

- Improve monitoring systems.
- More research needed on user needs.
- CBM measures need more publicity for the road user. At the same time they should be promoted within the transport ministries to raise support for further development.
- Extend CBM re-routing to other national corridors.
- Make available a decision support system for re-routing (for NL:adapt/improve BOSS or a similar system).
- More VMS's are needed to increase the number of decision/re-routing points and thus increase re-routing possibilities.
- Replace manually operated switching shields by VMS's operated from the traffic centre
- Use English as the formal language (write all documents in English)
- Organisational/Legal/Public differences in participating countries should be identified and taken into account when starting a CBM project.

At last a general remark is made on the necessity and benefits of CBM re-routing: The benefits in a broader sense should not be underestimated. Cross border management means co-operation of parties with a different culture and different way of working. It means getting to know each other and winning each others confidence, which costs time. Based on that regular contacts develop, in the end creating opportunities for further co-operation. Experience learns that new initiatives in this respect were taken.

5.2. Conclusions and recommendations in detail

5.2.1. Organisational

Conclusions

- The pilots provided a solid basis for cross border cooperation between Germany/Flanders and The Netherlands.

- Traffic Centre must be able to control the signs alongside the road.
- The best way to communicate between all partners is by telephone. It works faster and better, because of real-time interaction.
- Some partners are hard to be reached and therefore hinder the CBM procedure, it usually results in a delay.
- The involved traffic centres must be operational 24 hours a day and 7 days a week.
- Not all incidents that can be a reason for a starting CBM procedure, result in a CBM procedure, because the effects of the incidents are not always estimated correctly.
- VCNL does not yet have a standard evaluation procedure.
- Criteria on when to start a CBM re-routing are unclear. All the partners operate on human estimates on the length and duration of a traffic jam or the delay for the road user.
- Both countries act first, and then they communicate. The decision on the start of a CBM procedure is taken in the country, in which the incident has taken place.
- CBM is successful despite of the fact the procedures are not always followed.

Possible improvements and recommendations

- Make CBM a standard procedure for all people involved.
- Make traffic centres operational 24 hours a day and 7 days a week.
- Make clear what the responsibilities are. Cooperation can be improved by appointing one responsible party for every country.
- Implement more monitoring equipment to determine traffic flow, the length of traffic jams and the time it will take for these traffic jams to clear up.
- Set up a standard evaluation procedure.

5.2.2. Traffic related

Conclusions

- The traffic flow improved due to CBM actions.
- Showing texts on delay or advise on re-routing on the VMS influences 5 to 8 percent of road users in the direction of Rotterdam. The result depends on the type of text and not on the type of incident, it can lead to 170 or even 300 re-routers per hour.
- The effects of CBM decrease near some junctions.
- Incidents on the Northern route of Rotterdam-Antwerp, hardly result in any shift from the E19 to the A12-A4-A58-A17.
- In The Netherlands starting a CBM procedure depends on the length of the appearing traffic jam, not on expectations.
- Usually the criteria are met when a CBM procedure is switched on

Possible improvements and recommendations

- Improve the detection and information systems on the national and international routes.
- Improve logging of requests and actions done to support staff members.
- Improve embedding of CBM in the RWS organisation.
- Trigger CBM also at daily queues at well known places.
- Automate CBM procedure as much as possible.
- Use real-time data..
- Provide an improved support (training, feedback) to operators.
- Develop a Decision Support System.
- Use peak hour lanes.
- Reduce the time criteria to switch on a CBM.
- Do not react on congestion, anticipate congestion.

- Find out if it is desirable and possible to show delay and congestion on the DRIP on the A17/A58/A4.
- Lower the threshold for initiating a CBM action. This will depend on the reaction time to activate the measure and on the possibilities of alternative routes.
- Extend the re-routing to the Randstad area.
- Extend the road network covered by the CBM corridor.
- Start re-routing measures at other corridors and connecting corridors.
- Evaluate real-time data.

5.2.3. Perception Road User

Conclusions

- If correctly informed half of the road users, who are used to stay on the normal route out of habit, are willing to take another route.
- The main reason for re-routing, for half of the drivers, is congestion (or if it is too crowded on the road).
- Road Users usually do not know the names of junctions, they prefer names of cities and road-numbers.
- A large part of the road users does not decide on re-routing because of CBM, but because of messages on the radio, videotext or communication with other road users (truck drivers).
- In general the road user feels re-routing advice has a positive effect on arrival time, traffic safety, speed, length and duration of congestion and travel time.

Possible improvements and recommendations

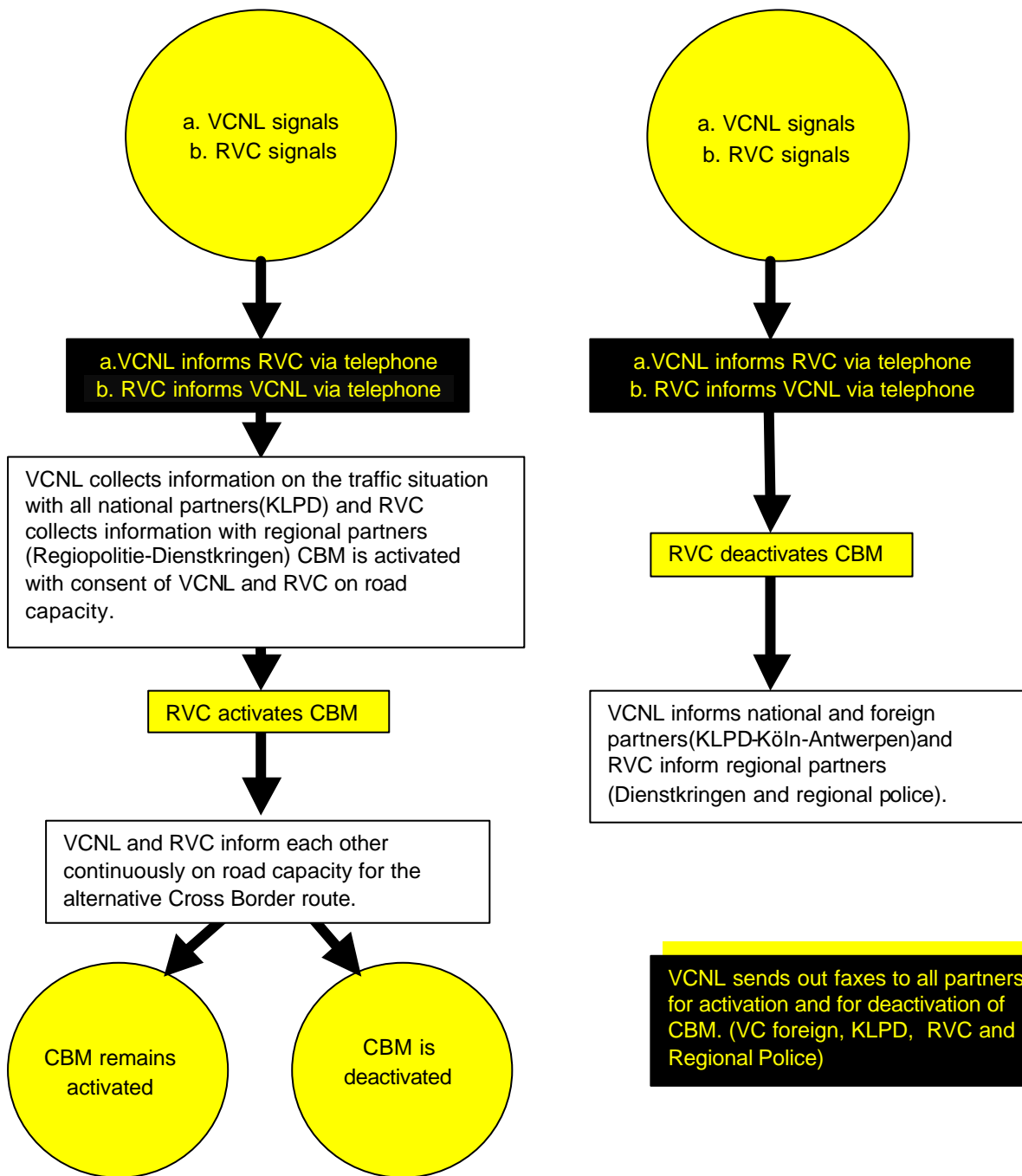
- Use names of cities or road-numbers instead of junctions on the VMS.
- Evaluate the perception of the road-user (again) to gain insight in their needs for traffic information.
- CBM needs more publicity to improve the road users attitude towards traffic information and re-routing.

ANNEXES

Annex I:	Schematic overview of Dutch CBM procedure.
Annex II:	Fax form template
Annex III:	Status and general info all CENTRICO corridors
Annex IV:	Table with intensities on the Dutch part of the corridors

Annex I: Schematic overview of Dutch CBM procedure.

	PROCEDURES	EXAMPLE
1	The partner who will start the CBM makes a telephone call to all the traffic centre partners to inform that a FAX is coming.	<i>When an accident on the A12 near Velperbroekplein has taken place, the traffic centre VCNL makes the telephone call.</i>
2	If there is at that moment no direct reason to refuse rerouting, the partner who will start the CBM makes the FAX and sends it to all other traffic centre partners.	<i>Traffic centre VCNL makes and sends the FAX.</i>
3	The traffic centre partners send back the FAX to the asking partner after they have filled it in under their name: GO or NOGO START rerouting.	<i>All the other traffic centre partners agree to start a CBM.</i>
4	As soon as the asking partner has received the fax from the other traffic centre partners he sends it back to the others, after having filled in OK or No – rerouting and time. In Case of NO: STOP In case of OK, go to step 5	<i>Traffic centre VCNL sends the FAX and rerouting is started.</i>
5	When rerouting is no longer necessary, the traffic centre, which started the CBM, sends the FAX to all the other traffic centre partners after having filled in stop rerouting GO	<i>Traffic centre VCNL sends the FAX</i>
6	The traffic centre partners send back the FAX to the asking partner after they have filled it in under their name: GO or NOGO STOP rerouting.	<i>Traffic centre TMC Köln sends back the fax to the traffic centre VCNL</i>
7	When all partners agree that rerouting can be ended, the traffic centre that started the CBM, sends a fax OK STOP REROUTING to all partners.	



Annex II: Fax-form Template

Communication between VC-NL en RVLZ Köln

Communication between VC-Netherlands and RVLZ Köln

FROM	VC -NL	RVLZ Köln
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REROUTING OBERHAUSEN - ARNHEM

Duty officer :
Date and time :

Incident route **Oberhausen-Arnhem** Incident route **Arnhem-Oberhausen**

Event type	
Accident	
Roadwork	
Weather conditions	
Other	

Lanes	
available	
closed	
Blocked completely	

Time indicators about the event	
Start time	...h...
End time foreseen	...h...

Road nr	Km pnt	Section	Near or between exit(s)...(optional)

	Fax: +31 30 280 74 74 Tel: +31 30 280 74 90	Fax: +49 221 147 35 17 Tel: +49 221 147 32 17
START	VC -NL	RVLZ Köln
sending	GO	GO
	NOGO	NOGO
Re-routing by		
STOP	VC-NL	RVLZ Köln
YES		
NO		

Time (h)	OK	NO
Rerouting		

Time (h)	OK
Stop Rerouting	



Additional Information

Annex III: Status and general info on CENTRICO corridors

Status corridors 2004

Contact information

A list of contact information is included of every project manager per corridor. This relates not only to the Dutch partners but to the partners of all Centrico re-routing corridors. For more detailed information please contact the project manager as indicated.

Available documents in the Netherlands

Several documents on the CENTRICO corridors were collected. An overview is given of the documents available in The Netherlands at the moment. For more information please contact the project manager as indicated.

		Status 2004						
	Corridor	Complexity [number of partners]	Project team active [Yes/No]	Signed agreement available [Yes/No]	TMP available [Yes/No]	Budget available [keuros]	planned operation/ operational since [year]	Evaluation planned [Yes/No (a)=available]
	Paris - Brussels	3	Yes	Not yet	In progress	80/year	2004	Yes
Ruhr Channel	Aachen - Brussels	4	Yes	No	Yes	1,5	2004	No
	Cross Channel							
	Mosel - Saar network	4	No	No	Not yet	3,5	2006	No
	Brussels - Nancy - Beaune	4	Yes	Yes	Yes	160	2003+	In progress
	Antwerp - Rotterdam	2	No	Yes	Yes	-	1999	Yes (a)
Randstad Rhine-Ruhr	Eindhoven - Köln	2	Yes	No	Yes	3,1	2003	Yes (a)
	Arnhem - Oberhausen	2	Yes	No	Yes	5,1	2004	Yes
Rhine	Rhein Main Area	1	No	No	Yes	10,5	2001	No
	Mainzer Ring	2	Yes	No	Yes	?	2005	No
	Köln - Koblenz	2	Yes	Yes	Yes	3,1	2004	Yes
	Rhine - Neckar	3	No	Yes	Yes	350	2004+2007	No
	Frankfurt - Koblenz							

Contact List (2004)

Corridor	Projectmanager/Custodian contact	Organisation	email	tel	Received documents	
Paris - Brussels	Catherine Panier	M. E. T. - I&T	cpanier@met.vlaanderen.be	00 32 81 21 9513		
	Michèle Sens	Ministère de l'Équipement, du Logement et des Transports (DSCR)	michèle.sens@equipement.gouv.fr	+33(0)387204547		
	E. Kenis	Ministère Vlaamse Gemeenschap, Dep. LIN. Adv. Verkeerskunde	erijm.kenis@in.vlaanderen.be	+32(0)25537810		
Aachen - Brussels	Catherine Panier	M. E. T. - I&T	cpanier@met.vlaanderen.be	00 32 81 21 9513		
	E. Kenis	Ministère Vlaamse Gemeenschap, Dep. LIN. Adv. Verkeerskunde	erijm.kenis@in.vlaanderen.be	+32(0)25537810		
	René Usath (NRW)	Ministerium für Verkehr, Energie und Landesplanung des Landes Nordrhein-Westfalen (MVEL)	rene.usath@met.nrw.de	+4921 1837-4584	Questionnaire (16)	
	Bernd Bartel (NRW)	Ministerium für Verkehr, Energie und Landesplanung des Landes Nordrhein-Westfalen (Köln strassen)	bernd.bartel@koeln.strassen.nrw.de	+492218397-390		
Cross Channel	Caroline Vissier	Traffic Centre The Netherlands	c.m.vissier@ccnl.res.nimmsa.nl	+31(0)302807300		
Mosel - Saar network	Kate Charlesworth (for now)	FaberMaussell Ltd	Kate.Charlesworth@fabermaussell.com		email from Kate with short status (15)	
Mosel - Saar network	Werner Schmitt (SL)	Ministerium für Wirtschaft und Arbeit	w.schmitt@wirtschaft.saarland.de	+49681501-3383	Questionnaire	
Brussels - Nancy - Beaune	Catherine Panier	M. E. T. - I&T	cpanier@met.vlaanderen.be	00 32 81 21 9513		
	Patrick Maljeque	Ministère de l'Équipement, du Logement et des Transports (DSCR, Sous Direction Exploitation et Sécurité des Routes)	patrick.maljeque@equipement.gouv.fr	+33(0)140818117		
	Michèle Sens	Ministère de l'Équipement, du Logement et des Transports (DSCR)	michèle.sens@equipement.gouv.fr	+33(0)387204547	Co-rrm with all information on Brussel-Beaune (15)	
Antwerp - Rotterdam	Caroline Vissier	Traffic Centre The Netherlands	c.m.vissier@ccnl.res.nimmsa.nl	+31(0)302807300	Evaluation CBM Rotterdam-Antwerpen (6); Briefing Note (7); TEMPO evaluation(8); Presentation(14)	
Eindhoven - Köln	E. Kenis	Ministère Vlaamse Gemeenschap, Dep. LIN. Adv. Verkeerskunde	erijm.kenis@in.vlaanderen.be	+32(0)25537810		
	Caroline Vissier	Traffic Centre The Netherlands	c.m.vissier@ccnl.res.nimmsa.nl	+31(0)302807300		
	René Usath (NRW)	Ministerium für Verkehr, Energie und Landesplanung des Landes Nordrhein-Westfalen (MVEL)	rene.usath@met.nrw.de	+4921 1837-4584	Eind rapport Pilot CBM Eindhoven-Köln (2); Leaflet (3); Briefing Note(4); TEMPO evaluation(5) Questionnaire (16)	
	Bernd Bartel (NRW)	Ministerium für Verkehr, Energie und Landesplanung des Landes Nordrhein-Westfalen (Köln strassen)	bernd.bartel@koeln.strassen.nrw.de	+492218397-390		
Arnhem - Oberhausen	Caroline Vissier	Traffic Centre The Netherlands	c.m.vissier@ccnl.res.nimmsa.nl	+31(0)302807300		
	Bernd Bartel	Ministerium für Verkehr, Energie und Landesplanung des Landes Nordrhein-Westfalen (Köln strassen)	bernd.bartel@koeln.strassen.nrw.de	+492218397-390	Minutes(10); RE- Entwurf Wechselwegweisung(11); Correspondence(12); Status report 1906(13) Questionnaire (16)	
	René Usath	Ministerium für Verkehr, Energie und Landesplanung des Landes Nordrhein-Westfalen (MVEL)	rene.usath@met.nrw.de	+4921 1837-4584		
Rhine	Rhein Main Area	Alexander Plitz (HE)	Hessisches Landesamt für Straßen- und Verkehrswesen (HLSV) Verkehrszentrale Hessen	alexander.plitz@hsw.hessen.de	+496974 30 57-212	Questionnaire (16)
	Mainzer Ring	Alexander Plitz (HE)	Hessisches Landesamt für Straßen- und Verkehrswesen (HLSV) Verkehrszentrale Hessen	alexander.plitz@hsw.hessen.de	+496974 30 57-212	
		Reiner Dölger (RP)	Ministerium für Wirtschaft, Verkehr, Landwirtschaft und Weinbau des Landes Rheinland-Pfalz (MWVLW)	reiner.doelger@mwvlw.rlp.de	+4961 3116-2283	Questionnaire (16)
		Guido Schuster (RP)	Landesbetrieb für Strassen- und Verkehrswesen, Rheinland-Pfalz (LSV)	telamtk@lv.rlp.de	+492613029-1470	
	Köln - Koblenz	Reiner Dölger	Ministerium für Wirtschaft, Verkehr, Landwirtschaft und Weinbau des Landes Rheinland-Pfalz (MWVLW)	reiner.doelger@mwvlw.rlp.de	+4961 3116-2283	
		Helga Rottenau	Ministerium für Wirtschaft, Verkehr, Landwirtschaft und Weinbau des Landes Rheinland-Pfalz (MWVLW)	helga.rottenau@mwvlw.rlp.de		
		René Usath (NRW)	Ministerium für Verkehr, Energie und Landesplanung des Landes Nordrhein-Westfalen (MVEL)	rene.usath@met.nrw.de	+4921 1837-4584	Kurzfassung, Netzbeeinflussung Hessen, Baden-Württemberg und Rheinland-Pfalz (1) Questionnaire (16)
		Bernd Bartel (NRW)	Ministerium für Verkehr, Energie und Landesplanung des Landes Nordrhein-Westfalen (Köln strassen)	bernd.bartel@koeln.strassen.nrw.de	+492218397-390	
		Guido Schuster (RP)	Landesbetrieb für Strassen- und Verkehrswesen, Rheinland-Pfalz (LSV)	telamtk@lv.rlp.de	+492613029-1470	
	Rhine - Neckar	Helga Rottenau	Ministerium für Wirtschaft, Verkehr, Landwirtschaft und Weinbau des Landes Rheinland-Pfalz (MWVLW)	helga.rottenau@mwvlw.rlp.de	+49(613)162171	
	Reiner Dölger (RP)	Ministerium für Wirtschaft, Verkehr, Landwirtschaft und Weinbau des Landes Rheinland-Pfalz (MWVLW)	reiner.doelger@mwvlw.rlp.de	+4961 3116-2283	Richtlinien Entwurf NEA Köln Koblenz (9) Questionnaire (16)	
	Alexander Plitz (HE)	Hessisches Landesamt für Straßen- und Verkehrswesen (HLSV) Verkehrszentrale Hessen	alexander.plitz@hsw.hessen.de	+496974 30 57-212		
Frankfurt - Koblenz	Reiner Dölger (RP)	Ministerium für Wirtschaft, Verkehr, Landwirtschaft und Weinbau des Landes Rheinland-Pfalz (MWVLW)	reiner.doelger@mwvlw.rlp.de	+4961 3116-2283	Questionnaire (16)	
	Guido Schuster (RP)	Landesbetrieb für Strassen- und Verkehrswesen, Rheinland-Pfalz (LSV)	telamtk@lv.rlp.de	+492613029-1470		

Documents available in the Netherlands			
	Received documents	Description	Language
1	Kurzfassung, Netzbeeinflussung Hessen, Baden-Württemberg und Rheinland-Pfalz		German
2	Eind rapport Pilot CBM Eindhoven-Köln		Dutch
3	Leaflet		English
4	Briefing Note Eindhoven Köln		Dutch
5	TEMPO evaluation Eindhoven Köln	Consised overview of evaluation	English
6	Evaluatie CBM Rotterdam-Antwerpen		Dutch
7	Briefing Note Rotterdam Antwerpen		Dutch
8	TEMPO evaluation Rotterdam Antwerpen	Consised overview of evaluation	English
9	Richtlinien Entwurf NBA Köln Koblenz		German
10	Minutes 2000-2003	Minutes for 12/12/03 01/08/03 12/10/00 28/06/00 12/05/00 15/03/00 28/01/00	English
11	RE- Entwurf Wechselwegweisung		German
12	Correspondence		English
13	Status report 1999		English
14	Presentation Evaluation Eindhoven-Köln		English
15	Cd-rom information on Brussels-Beaune	TMPs, maps, very detailed	French
16	Filled in questionnaires Germany and Belgium (overview)	Not much information on experiences, but a good general overview of participants, location and approach	English

Annex IV :Table with intensities on the Dutch part of the corridors

	Road section	Intensities	
		Wr	Wk
Rotterdam -Antwerpen	A4	46000	41000
	A16	115000	105000
Eindhoven-Köln	A67	43000	39000
	A76	30000	28000
Arnhem-Oberhausen	A2	65000	60500
	A73	60500	56000
	A12	78000	71000
	A50	90000	82000

Wr Average number of vehicles per week day in 2003

Wk Average number of vehicles per day in 2003