# Guideline for the deployment of strategic Traffic Management for Corridors and Networks

**Date:** November 16th, 2008  
**Version:** 0.3  
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- Blue – to be completed (remark for me)  
- Turquoise – to be discussed  
- Red – input required
1. General framework

EasyWay Core European ITS Services are services for European haulers and travellers, where road operators play a key role in their implementation and operation. A Core European ITS service means:

- The travellers shall know when to expect it (operating environment)
- It shall offer a minimum level of common content and functionality
- It shall offer a common “look and feel” when relevant

The proposed Core European ITS Services are considered to be mature enough and effective enough (in relation to EasyWay objectives) to form the backbone of deployment activities within EasyWay. EasyWay work planning and deployment activities will focus on the deployment of these services, together with enabling ICT Infrastructure.

These **Deployment Guidelines** are basic specifications for the implementation of the European Core Service “Strategic Traffic Management for Corridors and Networks”.

Strategic Traffic Management increases the performance of transport infrastructure by adding the potential of cross-border, network or multi-stakeholder co-operation. It defines Traffic Management Plans (TMPs) for the management of the European network and corridors including cross-border aspects and multi-modal capacities to allow for a more efficient use of the road network in Europe (and not restricting measures to country or local basis).

1.1. General Service description and objectives, including co-modality

The amount of long-distance/ international traffic strongly increases. Thus, long-distance is a target group of permanent increasing importance: One the one hand as **initiator of traffic problems** on the TERN, on the other hand as **road users with specific characteristics and user needs**. To cope with this, the long-distance traveller has to be supported with adequate service levels in both traffic management as well as traveller information on the TERN.

1.1.1. SERVICE DEFINITION

This European Service provides traffic management plans (TMPs) as broad solutions for complex tasks. The pre-defined strategies of the TMPs comprise a set of measures to inform and control the real-time traffic in case of unforeseeable or plan able incidents. The measures are always applied temporary (and not permanent), they are pre-defined and coordinated between the partners in advance. Initial situations can be:

- Accidents, road works, weather conditions, strikes, major public events, holiday traffic peaks, air pollution, emergencies or capacity overload on the road network or of public transport.
- The strategies are developed in advance from at least two autonomous partners. The pre-defined strategies are requested from the partner affected by the incident. They can be accepted or disapproved from every partner with equal right. The activation of the measure is done by one or more partners, depending on the spatial expansion of the incident.

There are three levels of traffic management plans applied:

**Cross-border TMPs**: cross-border networks and key corridors on the TERN
**Cross-regional TMPs:** national networks and key corridors on the TERN

**TMPs for conurbations:** Conurbations and the circumfluent highway network with relevance to the long-distance traffic.

Traffic management has to be ensured at the technical and organisational level. The service requires proper activation of information and control measures. This includes equipment at the road-side and TCC levels and multi-modal capacities (**technical readiness**). There also needs to be agreements and collaboration between authorities to engage in co-ordinated operation according to pre-defined sets of strategies (**organisational readiness**).

Co-modality can be applied on cross-border TMPs as well as on conurbation TMPs, but with different modes. The most important requirement for the implementation of inter- / multimodal TMPs is the forecast reliability of the incident. If the incident is plan-able or occurs regularly, modal shifting can be enabled more easily. Spontaneous modal shifting, particularly in conurbations, often fails because of missing capacities of the public transport.

Generally, the diversity of possible measures increases with the facility to forecast the incident. For predictable incidents, such as congestion due to commuter traffic or fairs, long-lasting strategies can be developed. Even static measures can be applied in these cases (e.g. pricing of public transport), but these do not belong to TMPs as defined above, since they affect permanent.

Main aspects of the long-distance co-modality are the combination of road- and sea freight traffic (example: Spain- Morocco, duration of shipment) and more and more the combination of road and rail freight traffic. In conurbations the main aspect is the combination of road and public transport for individual traffic.

The following table shows measures, which can be applied according to prospective initial situations. A set of those measures composes a traffic management plan. Which of them are combined to define the traffic management plan, always differs. Thus, in the following of the table the measures themselves are described and not the plans because this would mean to describe each combination of different measures. A set of examples of typical combinations is given in chapter 4 Bibliography and examples of deployment.

The shown forecast reliability of the initial situation is a tendency; of cause it varies with the concrete incident (e.g. some extensive road works are planned for years, some have to repair an unexpected damage).

The selection of measures is based on the above described definition. It says that within TMPs measures are applied temporarily and not permanent. Thus the aspect of intermodal traveller information is e.g. an aspect of ES 1. Nevertheless traveller information is one of the measures of a TMP and within this scope described in the guidelines at hand.

This also applies to the dissociation from the CS 1 – Management of sensitive road segments. Measures as dynamic HGV overtaking ban, ramp metering or speed control are seen as aspects of CS 1, because they often affect only one specific section of a corridor. Nevertheless a traffic management plan implies a set of these measures, particularly in conurbation areas and of cause they do not only influence the segment itself but the network as a whole. Thus, they are also described here.

Intermodal TMPs, particularly on long-distance-corridors often affect HGV-traffic. Modal shift of freight transport to rail or to shipping is a very complex subject of the ES 3 Freight & Logistics. The stakeholders of these intermodal logistic traffic differ completely and thus the
influence of authorities on this aspect is limited. In the long term they can be influenced through political decisions, but that is not the scope of TMPs.

However, three aspects of freight transport belong to the context of traffic management plans, because they affect the road network strongly and they are part of public responsibilities:

- Ban of driving for HGV / dynamic overtaking ban for HGV
- Access control for HGV (in the context of air pollution in conurbations) and
- Temporarily hard-shoulder or lane usage for HGV-parking
## Guideline for Core Service Deployment

### Traffic management measures according to prospective initial situations

<table>
<thead>
<tr>
<th>Target group</th>
<th>Traffic management measures</th>
<th>forecast reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>RU</td>
<td>Traveller information... about the traffic situation (for one specific mode of transport)</td>
<td>x x x x x x x x x x</td>
</tr>
<tr>
<td>RU</td>
<td>Traveller information... with the aim to change his departure date</td>
<td>x x x x x x x x x</td>
</tr>
<tr>
<td>RU</td>
<td>Traveller information... with the aim to change his departure time</td>
<td>x x x x x x x x x</td>
</tr>
<tr>
<td>RU</td>
<td>Traveller information... with the aim to change his means of transport</td>
<td>x x x x x x x x x</td>
</tr>
<tr>
<td>RU</td>
<td>Traveller information... Weather information (winter)</td>
<td>x</td>
</tr>
<tr>
<td>HGV</td>
<td>Re-routing... of all road users</td>
<td>x x x x x x x x x</td>
</tr>
<tr>
<td>HGV</td>
<td>Re-routing... of HGV-traffic</td>
<td>x x x x x x x x x</td>
</tr>
<tr>
<td>HGV</td>
<td>Re-routing... of other specific groups (e.g. public transport)</td>
<td>x x x x x x x x x</td>
</tr>
<tr>
<td>RU</td>
<td>Change of infrastructure capacity...lane control/ dynamic lane management</td>
<td>x x</td>
</tr>
<tr>
<td>RU</td>
<td>Change of infrastructure capacity...hard shoulder running</td>
<td>x x</td>
</tr>
<tr>
<td>RU</td>
<td>Change of infrastructure capacity...temporarily used bus-lanes</td>
<td>x x</td>
</tr>
<tr>
<td>HGV</td>
<td>Change of infrastructure capacity...temporarily hard-shoulder or lane usage for HGV-parking</td>
<td>x x</td>
</tr>
<tr>
<td>HGV</td>
<td>Change of infrastructure capacity...change of traffic light control</td>
<td>x x</td>
</tr>
<tr>
<td>CO</td>
<td>Change of infrastructure capacity... temporary P+R area</td>
<td>x x</td>
</tr>
<tr>
<td>PT</td>
<td>Change of infrastructure capacity...Extra- or additional public transport capacity</td>
<td>x x</td>
</tr>
<tr>
<td>RU</td>
<td>Dynamic speed control</td>
<td>x x x x x x x</td>
</tr>
<tr>
<td>HGV</td>
<td>Dynamic overtake prohibition for HGV</td>
<td>x x x x x x x</td>
</tr>
<tr>
<td>RU</td>
<td>Acess control</td>
<td>x x x x x x x</td>
</tr>
<tr>
<td>RU</td>
<td>Ramp metering</td>
<td>x x x x x x x</td>
</tr>
</tbody>
</table>

(RU = Road User  
CO = Co-modal  
HGV = Freight transportation  
PT = Public transport)
1.1.2. SERVICE OBJECTIVES

Long distance traffic has different characteristics and needs from local traffic. It consists mainly of three categories of traffic:

1. Freight transport
2. Holiday traffic
3. Cross border traffic

All these three categories of long distance traffic share the same extra problems compared to local traffic, which are:

- The language problem.
- Lack of knowledge of local rules and legislation.
- Unfamiliarity of long-distance travellers with the road network (including possible alternative routes).
- Unfamiliarity of long-distance travellers with usual traffic conditions.
- Unfamiliarity of long-distance travellers with possible sources of information.
- Most ITS solutions are implemented locally and benefit regional and local users, rather than long distance traffic.
- Large number of different road and transport operators
- Large number of service providers and traffic information services

Besides these challenges, freight transport has some additional specific problems:

- Fully occupied HGV parking areas,
- illegal parking on hard shoulder,
- safety of goods (especially at parking areas),
- the respect of national legislation (load limits, working hours, …),
- the lack of coordinated information and crisis management across borders (especially during adverse weather conditions).

Thus, from the end users point of view the objective is to place an additional European layer on the existing services, which allows the end user

- to be familiar with the design and function of the service, regardless of location
- to expect access to a certain combination of services
- to receive cross-border seamless and consistent information and services
- to expect a harmonised information and control interface, ensuring understanding also at first visit
to expect understandable and language independent information.

• to know always where to get access to information on alternative travel and transport options

These objectives are quite ambitious and include some operational requirements, on the technical as well as on the organisational level.

TECHNICAL LEVEL:

To be completed

ORGANISATIONAL LEVEL:

• to develop a framework for harmonised and consistent application of traffic management strategies in locations where various stakeholders share traffic management responsibilities. The objective is to provide consistent information along a journey.

• to strengthen the cross-border cooperation and the mutual understanding of road operators

• To exchange knowledge experience and know-how in developing tools for strategy management between the stakeholders on a European level.

• To fasten and to standardise the co-ordination process

• To enhance the quality of TMPs permanent

• To take workload from the operators

• Intensify data exchange between stakeholders of conurbation areas and national highways. In this context the activation of conurbation TMPs due to air pollution with impact on the surrounding highways is a relatively new challenge.

To be completed

1.1.3. DISRUPTION / PROBLEM TO CONSIDER

ORGANISATIONAL LEVEL:

• Prioritization of strategies (cross-regional ⇔ cross-border strategies)

• Gleichebrechtigung der Partner: Abstimmungsprzess erforderlich mit nicht immer optimalem Ausgang (Ablehnung muss akzeptiert werden)

• Possibilities and boundaries of information transfer due to the display facilities of the system (Abschnitt der Störung kann nicht angegeben warden)

• Erfassung lässt keine genaue Angabe der Staulänge zu, Reisezeitverluste schwer zu berchnen, da Staugeschwindigkeit unbekannt

• Broadcasting companies can not be enforced to broadcast the traveller information or re-routing recommendation. Most of the broadcasting companies have their own quality management and check information and advice before announcing it. This can lead to delays and even to a different estimation of the situation, which implies for the end user in consist information over the different information mediums. This risk concerns
particularly private broadcasting companies. Thus, it is very important to involve them from the scratch and to foster a good relationship with them.

- Weitergabe sensibler Rohdaten sollte vermieden werden (Abstimmung von vordefinierten Strategien)
- Co-modality (private traffic operators, questions of flexibility and capacities)
- Consistent information content should be given through all service providers
- Language (during the co-ordination process as well as of traveller information systems)
- Private Service providers (with their own data base and their own recommendations for road users)
- Legal and political framework
- Autobahnbetreiber (Neumann BW – Korridor Elsass nachfragen)
- Different technical equipment and personal manpower
- TMPs for conurbations: The overlapping and interlocking strategies on narrow space are very complex. Priorities of strategies have to be defined in advance.
- TMPs for conurbations: Traffic releases on the conurbation secondary network imply increasing traffic on the surrounding highways and vice versa. This possibility to displace traffic and thus negative effects of traffic to sensible zones requires an intense planning and coordination process in advance and a trustful strategy activation process.

1.1.4. CONDITIONS FOR THE DEPLOYMENT OF THIS SERVICE: OPERATIONAL ENVIRONMENT

Offline development, pre-definition and evaluation of strategies

Online Strategy activation

The experience has revealed that versed and motivated staff is essential for the operational process of online strategy activation. At different work steps it can be and has to be supported by systems, but it is a non-realistic approach, that the whole strategy activation process can be automatised. The following figure shows the process of online strategy activation and the work steps which need staff support.

Unforeseeable incidents are detected in most cases by systems, but staff has to verify if the initial situation really exists. Important aspects for the strategy activation as extent and estimated duration of the disturbance are still communicated verbal. Thus, the verification of an Initial situation has to be manually supported.

Another point is a “plan able” initial situation, which occurs periodical, such as congestion in conurbation areas due to rush-hour traffic. These situations allow a clear assignment of the initial situation. Here, a fully automatised incident detection and strategy request process is possible.

The strategy confirmation can be given by staff or by systems. But even in this work step, it applies that many aspects to be considered, can currently not be given by systems (personal
estimation of police on-site; impacts of events, etc.). Thus, staff always has to check the system decision and give its final “go”.

The strategy implementation is a work step, which is suitable for a stronger automation in future. The automatically switching of traffic management systems as well as the pre-defined messages and addressees for traveller information can be an important contribution to less work load for the staff. But experience has shown, that also here staff has to check the implementation process of the system. It has to react in case of system breakdowns. Here human intuition is necessary, it can not be deposited any kind of breakdown in the system.

The implementation of services for modal or temporal shift often implies a higher organisational complexity. Here as well pre-defined messages can help, but the organisational work has to be done by staff.

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**figure 1**: work steps of an online strategy activation

The mentioned aspects emphasize that in case of TMPs for unforeseeable incidents, the road network has to be monitored 24 h a day. In most European traffic management centres this is ensured. If partners have only special hours of attendance, it might be a solution, if
they provide data about the traffic situation on their network to the partners and / or integrate the partner into the internal information process (e.g. with the police).

Workload and staff for the operation of a TMP are hard to define, since the staff has many parallel tasks.

The motivation of the operators to co-operate with staff of partners traffic management centre is essential. This motivation can be enforced if operators get involved early in the development and pre-definition process.

if periodic meetings on the level of neighbouring operators take place with the aim

- to know each other in person,
- to exchange experiences,
- to discuss operational difficulties of the TMP.

1.2. European dimension

Efficient use of the main corridors of the TEN-T as well as cross-border networks requires effective regional and multinational cooperation to establish and prepare alternative routes and management strategies. Linking of regional TMPs along a long-distance corridor, according to specific needs and requirements, is an effective means of deploying a Europe-wide service.

(Evtl. auch aus LDC / Khaled)

1.3. Contribution to EasyWay objective

Traffic management plans (TMPs) address especially long-distance traffic. They have to aim to plan and to develop and to operate local and national ITS infrastructure in order to take the specific requirements and problems of long-distance traffic into greater consideration. Thus; traffic management plans are the organisational aspect for a successful management of long-distance traffic. But they are not the only one. The success even depends on the ITS infrastructure; which is available. These two aspects, traffic management plans (TMPs) and traffic management systems (TMS), can not be regarded separately. They both contribute to the Easyway objectives, in close interrelation. Thus, it won’t be easy to define a specific contribution of TMPs to the Easyway objectives and to distinguish the benefit from the benefit of the systems themselves.

The efficiency of existing TMPs and their contribution to the Easyway objectives is difficult to judge.

Reason: Lack of TMPs evaluation methodology

[ each topic supported by figures and examples ]

Safety: Significant reduction of accident rate
Environmental impact: Significant reduction climatic damage; energy efficiency
Network efficiency: congestion reduction,
Significant reduction of travel time and operating costs
Shall we here name examples, how existing TMPs contribute to Easyway objectives? To be considered: The results are not transferable!! Examples:

**Corvette: Figure?**

Hard-shoulder running on the Ring-road around Munich (A99), Germany

Due to the activation of hard-shoulder-running the capacity of the lane could be increased by 20% during peak hours and the traffic flow could be homogenized.

**Centrico: Figure?**

Hard-shoulder running on the A3/A5 in Hessen

Analysis of the section A5 between Nordwestkreuz and access point Friedberg have shown, that due to the hard shoulder running congestion-caused time losses of about 3,200 vehicle-hours could be saved. This means an economic benefit of about 50,000 Euro per day, respectively over 10 Million Euro per year.

**Centrico: Figure?**

Rampmetering in conurbation areas in North Rhein-Westphalia

To be completed

**Corvette: Figure?**

Network control system Nürnberg

In case of sufficient capacity on the alternative routes, 15% of the whole traffic, which is 40% of the traffic with the specific displayed destination, can be re-routed.

To be completed see. Easyway partners, Input required

### 1.4. State-of-the-art

What is the situation in relation to the Service? (Nor exact description of each TMP)

**International/Cross-border TMPs:**

In West Europe are already existing quite a lot cross-border TMPs. The initial situations are as manifold as the traffic management measures applied. In the North-West re-routing and traveller information measures outweigh. In the South-West various experiences with TMPs for HGV and co-modal TMPs exist. This diversity as regards content is important for tailor-made solutions. But great diversity is not only recognisable regarding the content, but also regarding organisational and technical aspects. Reasons for it are the different policy goals and regulations (organisational aspects) and the different technical equipment, standards and specifications (technical aspects). Step-by-step these aspects have to be harmonised on
a European level. Thus the connection of existing TMPs would be simplified, experiences would be transferable and double development work would be avoided.

Most of the existing cross-border TMPs have a North-South orientation. Only in the area of the Benelux a strong East-West orientation is noticeable. Existing TMPs base on agreements of neighbouring states, thus the approaches are not transferable.

In Eastern Europe a great backlog is visible. Only Slovakia and Hungary have some TMPs operational.

To be completed

Input required

Objectives for future work - TMPs:

Stronger link up of national TMPs and thus establishing new international TMPs
Sustain the East-West orientation of cross-border TMPs.
Assist new member states in Eastern Europe establishing appropriate TMPs.
Harmonise international TMP and systems approaches and structures on a European level.

Objectives for future work - Traffic Management Systems:

• Deployment and implementation of ITS systems (e.g. re-routing, speed control, ramp metering) on the road network (main and secondary) in order to reduce accident rate, travel time, operating costs and climatic damage
Implement ITS systems to enhance the efficiency of TMP (VMS, traffic information services, parking areas, etc.).

National/ Cross-Regional TMPs:

Establish and optimise national strategies and TMPs involving international aspects.

TMPs in conurbation areas

TMPs for conurbations are in many regions a new field of work with less long-lasting experience. Most of them are initiated due to air pollution or due to the strong impairment the conurbation area brought by the long-distance traffic. Longer-lasting experiences were made in TMPs for conurbation areas in case of events or regularly occurring congestion caused by commuter traffic.

Enhance harmonised traffic management and control systems including at urban interfaces.

TMP affects relevant traffic situation and / or Event (Traffic Incident, Weather conditions, Seasonal traffic, Holidays)

Applied Strategics, Applied Measurres
There are various web-based traveller information services which vary strongly in comprehension and quality. Even those portals for a specific group of road users only link to the data source. This facilitates the user to find the relevant information, even in foreign countries. But it is no contribution to a better understanding and orientation on the individual page with the traveller information.

Some superior pages, which compose links to data sources for specific target groups, cover the same region.

2. Technical issues

2.1. Functional and information architecture

figure 2 shows the functional architecture of an offline development, pre-definition and evaluation of strategies, whereas in figure 3 the functional architecture of an online-strategy activation process is shown.
Offline development, pre-definition and evaluation of strategies

Development, pre-definition and revision of Strategies

- Statistical traffic data
- Experiences of road authorities
- Legislation and policy objectives
- Technical and staff equipment

Spatial application area
Thresholds for Strategy activation
Exact definition of measures
Organisational chain; Competences
Prioritization of Strategies

Development of a Strategy Library

Functions

Development and Pre-definition of Strategies

Online Strategy activation (see figure 3)

- Statistical traffic data
- Experiences of road authorities
- Survey of incidents and strategy activations
- Interviews, questionnaires with operators

Evaluation of Strategies

Partner 1 – n

figure 2: Offline development, pre-definition and evaluation of strategies
Online Strategy activation

figure 3: Online strategy activation
The shown operation chain is a closed loop, the functions recur with each strategy adjustment and also when the strategy gets deactivated.

The offline development and the online activation of traffic management strategies shall be linked closely. This requires a permanent documentation and analysis of the strategy activation process. A technical evaluation can support this process (see chapter 2.5 Criteria and methods for the technical evaluation of the measure).

Description of each function and possibilities to realise it:

**FUNCTION: STRATEGY CO-ORDINATION (EXAMPLE TO BE DISCUSSED)**

**Manual strategy co-ordination**

The partner affected by the incident proposes the activation of one pre-selected strategy, and requests the other partners by phone, fax, email or web-based. If all other partners agree, the strategy will be activated.

+ Low technical communication infrastructure necessary (compared with automatically or centrally managed strategy co-ordination).
+ Consideration of not digitized data (phone calls, fax, and information from police or road user) is easily possible.
+ Consideration of experiences and personnel estimation of the staff is easily possible.
+ If the co-ordination works by phone or fax, strategies can be adjusted spontaneous and quick.
+ No transfer of raw data necessary.
+ Independence from technical breakdowns. Change to another communication mode is possible.
- 24-h monitoring in the traffic management centres is necessary.
- Competent staff is essential for the quality of strategy co-ordination.

**Automatically strategy co-ordination**

The system of the partner affected by the incident detects the initial situation and requests the other partner automatically (possible communication systems: email, web-based). The partners confirm either manual or their system confirms automatically.

+ Incident detection system and digital communication tool is necessary.
+ The detection of an initial situation depends on the thresholds defined in advance. Thus, the strategy activation depends strongly on the critical value defined in advance. Also the possibilities of the system, to vary the threshold against daytime, day of week, holidays etc are an important aspect for effectual strategy activation.
+ Pre-defined strategies can be saved in advance, thus misunderstandings about the definition of a strategy are eliminated.
+ The co-ordination works language independent.
+ No transfer of raw data necessary.
+ The staff can be supported by the system, which means reduces workload.
- Not-digitized data and personnel experiences of the staff can not be considered spontaneous by the system.
- No possibility to make spontaneous and quick any necessary adjustments.
- Incident detection and strategy co-ordination are depending on technical breakdowns.

**Centrally managed strategy co-ordination**

One central system analyzes data from all partners; every partner has access to the system for to request a strategy. If the system confirms the strategy activation as possible, it will be activated.

+ Broad technical infrastructure is necessary.
+ The detection of an initial situation depends on the thresholds defined in advance. Thus, the strategy activation depends strongly on the critical value defined in advance. Also the possibilities of the system, to vary the threshold against daytime, day of week, holidays etc are an important aspect for effectual strategy activation.
+ Pre-defined strategies can be saved in advance, thus misunderstandings about the definition of a strategy are eliminated.
+ The co-ordination works language independent.
+ No possibility to make spontaneous any necessary adjustments.
+ If the system works reliable, considerable reduced workload for the staff.
+ Staff assignment can be centralized.
- Not-digitized data and personnel experiences of the staff can not be considered spontaneous by the system.
- Incident detection and strategy co-ordination are depending on technical breakdowns.

2.2. **Required ICT Infrastructure**

The required infrastructures are described against the function they support. The following picture gives an overview of the groups of systems necessary for the online strategy activation process and offline strategy development and evaluation.
**EasyWay**

**Guideline for Core Service deployment**

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**Infrastructure for online strategy activation**

- Systems for Incident detection
- Systems for Strategy co-ordination

**Strategy implementation**

- Traffic management systems
- Traveller information systems

**Infrastructure for offline development, pre-definition and evaluation of strategies**

- Systems for development and pre-definition of Strategies
- Systems for evaluation

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**Figure 4: Systems and functions of online strategy activation and offline strategy development and evaluation**

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**Systems for incident detection**

**Inductive Loops**

**Road Users; Floating Car Data (GPRS)**

**Police**

**Highways Agency (Autobahnmeisterei), Regional Control Centres**

**Video Cameras**

**ANPR Cameras** (Automatic Number Plate Recognition) [NPR cameras (Number Plate Recognition), LPR cameras (License Plate Recognition)]

The ANPR cameras are used for gathering flow and journey time information.

As a vehicle approaches the camera the software takes a series of 'snapshots' and stores them in a file. When the number plate is of sufficient size for the OCR software the frame is scanned and the registration number is converted to ASCII code and held in a list. This continues for a series of images according to the speed and position of the vehicle. The list is scanned for similarities and a 'favourite' selected to retain. The system would typically scan and compare 10-15 images, with 5 being considered the minimum for high accuracy.

The Application of infrared illumination to ANPR allows number plate recognition also at night. Therefore, taking advantage of the retro-reflective characteristics of number plates, the illumination from the illuminator will be reflected directly back to the camera. Thus only infrared light will be seen without any visible light or other reflections or refractions.


**SYSTEMS FOR STRATEGY CO-ORDINATION**

**FAX**

+ Written, thus clearly understandable and “binding”
+ Possibility of bilingual communication (through bilingual formulars)
+ Reliable (sender gets a message, if fax could not been sent; nearly no system failures)

- Time-consuming communication method

**PHONE**

+ Verbal balance of different interests is possible
+ Personal communication contributes to a better understanding at each other
+ Possibility to adjust strategies if necessary

+ Quick communication method
+ Complex and time-consuming if many partners work together (conference channel could be a solution)
+ Reliable

- Language problems

**E-MAIL**
E-mail can be sent language independent
E-mail contains clear definition of strategy, misunderstandings are nearly impossible
- Technical unreliability (due to firewalls and spam filters, insufficient feedback about the reception of the mail)
- E-mail communication often conflicts with the system safety requirement in the traffic management centres.
- E-mail is often received on separate computers (due to the safety requirements), thus operators overlook the message with the strategy request and answer too late or not at all. => Time-outs cause the drop out of strategy activations.
- E-mail communication is too slow
- The whole coordination process causes numerous e-mails, which is regarded as awkward by staff members.
- Little flexibility in adjusting strategies spontaneous

WEB-BASED COMMUNICATION TOOL (CSM APPROACH)
Core element of this approach is in Germany the Interregional Strategy Manager (ISM) that is based on server-client architecture and applies pre-defined traffic management strategies for the adjustment, activation and de-activation between the involved traffic centres. The approach is based upon joint on-line activation and de-activation in full consensus from all involved authorities.

On the technical side so-called strategy brokers are installed at the participating traffic centres. They are prototype systems for cross competence definition and activation of traffic management strategies. Strategy communicators (which are set up in some traffic management centres) are strategy-communication-application servers for the other partners that employ Clients, such that the management can be applied. The strategy communicators have the task to:

- Co-ordinate the acceptance process between the involved partners (clients) for the activation of traffic management measures (workflow-support and monitor)
- Monitor the strategy status
- Monitor the communication between the partners
- Host the strategy client of neighbours without extra own IT-infrastructure
- Visualise strategies conforming to the OGC standard (web map server).

Other partners employing the internet-based Clients can access information about the status of the strategies and involve in the request and acceptance process between the various partners. The communication between the various partners employing the Clients is done through E-mail messages.

Advantages and challenges of the system:
+ Communication is language independent
+ Short reaction time
+ System contains clear definition of strategy, misunderstandings are nearly impossible
Comfortable strategy request through pop-up window with a comfortable user interface showing all information about the requested strategy and the necessary steps.

Communication can be supported by a decision support system, which could mean less work load for the operator.

Easiest way to communicate with many different partners.

Possibility of a nearly fully automatically coordination process, especially in case of regularly occurring incidents, such as congestion due to commuter traffic.

On the European level the CSM approach is a successful step forward to reinforce the possibilities of a European harmonisation on a major aspect of long distance traffic.

- Technical unreliability at first (it takes time until a new system works experienced and reliable)
- General dependency on system breakdowns (fallback solutions have to be defined)
- Usually invest and operating costs
- Little flexibility in adjusting strategies spontaneous, but comments can be added

There is no consistent estimation about the best communication technology. The preferred system depends on the kind of TMP (necessary amount of co ordination), the frequency of activation and last but not least the personnel and technical possibilities of the partners.

**Systems for Strategy Implementation - Traffic Management Systems**

**Variable Message Signs (VMS); Dynamic Route Information Panels**

**Variable Direction Signs**

Here also to be named adding variable direction signs

**Traffic Control Systems**

Here also to be named lane direction control signal
RAMP METER, RAMP SIGNAL

TRAVELLER INFORMATION PANELS

Example Frankfurt

ROUTE GUIDANCE SYSTEMS, NAVIGATION SYSTEMS

TRAFFIC LIGHTS (TMPs FOR CONURBATIONS)

STRATEGY IMPLEMENTATION - TRAVELLER INFORMATION SYSTEMS

RADIO BROADCAST (SPOKEN MESSAGE)

- Broadcasting companies can not be enforced to broadcast the traveller information or re-routing recommendation => risk that information content is in no accordance with content through other traveller information systems.

- Normally, the information is only announced twice an hour, this leads to considerable delays in the information flow.

RDS-TMC

- Only standardized types of messages can be selected out of a message catalogue

ONLINE-SYSTEMS (PC OR PTA WITH INTERNET ACCESS)

TELETEXT

ROAD SIDE TERMINALS

SCREENS AT REST AREAS

PRINT MEDIA

PHONE-BASED SYSTEMS (CALL-CENTRE, AUDIO TEXT, SMS, WAP)

MOBILITY SERVICE CENTRES

FAX-ON-DEMAND
## Guideline for Core Service Deployment

### Functions

- **long-distance/cross-border TMP**
- **cross-regional TMP**
- **TMP in conurbations**

### Target group

- **Measures**
  - Inductive loops
  - Road user, Floating car data (GPRS)
  - Police
  - Highways agency, urban/regional or national control centres
  - Video cameras
  - ANPR cameras
  - other data sources (e.g. of service providers, PT operators)
  - meteorological sensors
  - Fax
  - Phone
  - E-mail
  - Web-based communication tool
  - Variable Message signs (VMS), dynamic route information panels
  - Variable direction signs
  - Traffic control systems
    - ramp meter, ramp signal
    - Video panels, Traveller information panels
  - Route guidance systems, Navigation systems
  - Traffic lights (TMPs for conurbations)
  - Radio broadcast (spoken message)
  - RDS-TMC
  - Online-systems (PC or PTA with internet-access)
  - Teletext
  - Road side terminals, Screens at rest areas
  - Print media
  - Phone-based systems (call-centre, audio text, SMS, WAP, PTA)
  - Mobility service centres

### Systems

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<th>Strategy implementation - Traveler information systems</th>
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### Strategy implementation - Traffic management systems

1. **Incident detection**
2. **Strategy coordination**
3. **Strategy implementation - Traffic management systems**
4. **Strategy implementation - Traveler information systems**

### Strategy implementation - Traffic management systems

- Incident detection
  - Road user, Floating car data (GPRS)
  - Police
  - Highways agency, urban/regional or national control centres
- Strategy coordination
  - Web-based communication tool
  - School-based communication tool
  - Meteorological sensors
  - Variable message signs (VMS), dynamic route information panels
  - Variable direction signs
  - Traffic control systems
    - ramp meter, ramp signal
    - Video panels, Traveller information panels
  - Route guidance systems, Navigation systems
  - Traffic lights (TMPs for conurbations)
  - Radio broadcast (spoken message)
  - RDS-TMC
  - Online-systems (PC or PTA with internet-access)
  - Teletext
  - Road side terminals, Screens at rest areas
  - Print media
  - Phone-based systems (call-centre, audio text, SMS, WAP, PTA)
  - Mobility service centres

### Strategy implementation - Traveler information systems

1. **Traveler information**
   - About the traffic situation (for one specific mode of transport)
   - With the aim to change his departure date
   - With the aim to change his means of transport
   - Weather information (winter)
   - Change of infrastructure capacity... lane control/dynamic lane management
   - Change of infrastructure capacity... hard shoulder running
   - Change of infrastructure capacity... temporary used bus-lanes
   - Change of traffic light control
   - Access control
   - Barrier control

2. **OD Modal shift to public transport by temporary P+R area**
   - Extra- or additional public transport

### Other data sources (e.g. of service providers, PT operators)

- Data sources
  - Meteorological sensors
  - Road user, Floating car data (GPRS)
  - Police
  - Highways agency, urban/regional or national control centres
  - Video cameras
  - ANPR cameras
  - other data sources (e.g. of service providers, PT operators)

### To be completed
2.3. Standards and agreements (existing and required)

Ramp metering systems: Ramp metering Synthesis
VMS: Mare-nostrum, VMS-Platform?

Variable direction signs: Guidelines for the uniform design and application of dynamic displays for re-routing and integrated traffic information

Düsseldorf dmotion: Binding definition of interfaces = Approach of a common and portable solution of traffic management strategies under comprehension of different authorities.

Content: Creation of a standardised interface for exchange of strategies („KEx OCIT“) to merge motorway and city philosophies

Technische Abhängigkeit von einem System sollte vermieden werden.

Input DATEX required!!!!

Re-routing measures have to be enabled in DATEX II. It has to be possible, to send one message to the broadcast company including Information about the disturbance as well as a re-routing information. Current state: The broadcast company receives one message in RDS-TMC format from the Bundesmeldestelle, containing information about the disturbance and one e-mail message from the Hessian Road Authority including a re-routing information.

The ISM strategies have to be integrated in the DATEX II catalogue. This would enable a standardised data exchange between the traffic centres and would enable a strategy coordination process based on a standardised data protocol.

DATEX II catalogue has to be supplemented regularly considering new requirements (such as detailed weather data).

Because of the continuously increasing complexity of the DATEX II catalogue, it has to be possible, to extract building blocks.

2.4. Need for additional specifications

... 

2.5. Criteria and methods for the technical evaluation of the measure

A technical evaluation would call for a standardized and clear evaluation methodology. This on the other hand would assume a comparable database at different locations all over Europe with similar TMPs. This currently is an unrealistic assumption. Besides, policies and legal basic conditions differ strongly. Thus; a Europe-wide standardized evaluation methodology should be a future task, but evaluation can not wait for its realization. Pragmatic approaches have to be found to get easily a feed-back about the success of a TMP.

BEST PRACTICE EXAMPLE
The “TEMPO guidelines for reporting evaluation results – the TEMPO template” was designed to help the Euro-regional projects in the TEMPO programme to prepare and to present the results of their work on evaluating the implementation of ITS projects in a common format. It will help to ensure that results of similar implementations can be compared assisting in the transfer of results between sites and providing European added value.

The Guidelines is one of four documents produced by the EEG concerning a common approach to the evaluation and reporting of project results. The other documents, which address the issue of evaluation at a European level are:

“Euro-Regional Project Evaluation – Summary”,
“Handbook on evaluation best practice” and
“Euro-Regional Project Evaluation Guidelines”.

Technical evaluation of the TMP-effects

In this context a system-supported evaluation of TMP activations can be a beneficial tool. It can reduce the work load for the evaluation process considerable. Furthermore a continuous evaluation process enables a permanent strategy optimisation. And the evaluation of traffic management strategies on the base of cost-benefit-calculations as well as under environmental aspects belongs to the necessary steps of the application for public funds for road side infrastructure.

Appropriate data for technical evaluation of information- and re-routing TMPs

The following data is appropriate to a technical evaluation of the impact on traffic situation:

- Time-variation curves during the incident (recorded in the network at the section shortly behind the point of decision)
- Comparable time-variation curves as reference
- Impact of the incident (necessary data: onset-time of incident, ending of the incident, exact location, (average) congestion length [km], number of closed lanes, residual capacity)
- Average travel time of vehicles on the affected main route and on the alternative routes.
- Time point of the activation of the measure (switching printout of the VMS)

The following data is appropriate to a technical evaluation of the acceptance of a service:

- The number of clicks on web-pages with traveller information, number of phone-calls to a hotline.

Challenges of technical evaluations
But a technical evaluation also implicates some difficulties, which have to be considered. First of all: Not every data can be created digitally. Verbal information and estimation of on-site action force and operators, information about the reading of traveller information by the broadcast companies are only two examples of data of utmost importance, which can not be transferred to the system.

Another aspect, hard to be digitalised, is the interaction of simultaneous applied measures. They affect complex, to relate an effect to one specific measure is nearly impossible.

Generally it can be said, that an automatically evaluation is easier to realise for TMPs for “plan able" initial situations, which occur periodical (such as congestion in conurbation areas due to rush-hour traffic). It is also more appropriate, if the applied measures are realized by digital working systems, because here the strategy activation can be recorded by the system itself.

Another important matter is the diligently verification of the results by the staff. The experience shows, that especially the selection of a suitable reference time-variation curve is a complex task. Not only the daytime and the day of week have to be considered, but also aspects as events, holidays (also in neighbouring countries), incidents and road works on the surrounding network. This can not be achieved by a system.

For ex-ante evaluations, a basic precondition is the knowledge about the behaviour of the road-user. A realistic illustration of the route-selection behaviour is essential for any prognosis of the effects.

To sum up, technical evaluation is a young field of work, which can support the improvement of TMPs considerable, but which can never replace an analysis by the staff.

**BEST PRACTICE EXAMPLE**

The Hessian road Authority currently develops a tool for the technical evaluation of strategy effectively. The effectively of a measure will be calculated based on the congestion length, duration of congestion, number of affected vehicles. The economic damage will be numbered as lost vehicle hours. Besides an acceptance tool will be developed, which allows the assessment of the road users a acceptance. Basis is the comparison of incident time-variation curve with reference time-variation curve.

The tools will be developed until 2009; the running of the test phase is planned for midyear 2009.

**Technical evaluation of technical and organisational aspects**

Besides the evaluation of the measure itself, another aspect is quite important to validate continuously: Quality management, which means the technical and organisational functioning of the TMP.
For the success of a TMP it is critical to know, if there are any technical or organisational difficulties during the operation. Experience has shown that operational difficulties, which lead to decelerations or strategy aborts, can not be captured by the system itself. They are very individual and dependent on the specific situation. Suitable methods to capture them are questionnaires, which have to be filled out by the staff and continuous feedback meetings (ideally with stakeholders of all participating regions/states). Aspects, which can be captured in the questionnaire, are:

- Contradictions concerning the incident detection of different data sources
- Reasons for a refusal of strategy activation
- Reasons for a strategy cancel (technical reasons, time-outs...)
- Time of strategy request, strategy confirmation or cancel, implementation of measure => duration of strategy activation process
- Communication with other partners, such as broadcast companies and service providers
- Reasons for strategy modifications
- Time and lapse of strategy deactivation
- Used systems for strategy co-ordination
- Technical problems and their causing

Here a technical evaluation can only conditionally help. The reasons for difficulties are such manifold and unforeseeable, that they can not be registered by the system itself.

Presentation Guido Schuster am 3./ 4. Dezember

3. Service provision

3.1. Service implementation

The implementation of a TMP can have different scopes, depending on the already existing services and their interconnection:

- Deployment and implementation of a new TMP
- Revision, extension of an existing TMP
- Creating connections, network of existing and/or planned TMPs

**BASIC PRINCIPLES TO BE WORKED OUT FOR THE DEVELOPMENT OF A TMP**

Irrespective of this, the stakeholders have to work out the following basic principles while deploying a TMP:

- Registration of existing collection systems, control-systems and information-systems
- Registration of existing (road-, rail-, harbour- and other) infrastructure (capacity, traffic ability for different vehicles, planned extensions)
- Survey of travel demand (if possible including aspects of travel behaviour)
• Approach for detecting incidents (if necessary, definition of type and location of additional collection systems)
  a) Preliminary detection of problems / incidents (definition of categories of problems. Possible proceedings: interviews with experts, analysis of traffic messages, calculation of the estimated occupancy, control tours, analysis of system data)
  b) Real-time detection

**DEFINITION OF STRATEGIES**

Knowing about these basic principles, a TMP can be developed. The following aspects have to be defined in the TMP:

• Special definition of the main route and estimated affected sections
• Direction-related definition of alternative routes and their priorities
• Definition of content and exact wording for recommendation/ information
• Thresholds for strategy activation
• Strategy prioritization in case of overlapping strategies / interests
• Involved partners
• Tasks and competences of involved partners
• Organisational chain, connection of involved partners
• Applied technical infrastructure for incident detection
• Applied technical infrastructure for strategy coordination
• Applied technical infrastructure for strategy implementation
• Organisational / technical aspects of evaluation / quality management

Does here a description of each aspect make sense? Example:

**THRESHOLDS FOR STRATEGY ACTIVATION**

Relevant aspects for to define a threshold can be:

Economical aspects, safety aspects, environmental aspects, continuity of the displayed information and distance (travel time) from the display-section to the incident

Defined thresholds shall ensure a positive benefit of an activated measure. Therefore the calculation of a critical value from which point on the activation leads to a positive benefit is necessary. In case of re-routing measures the length of the alternative route in comparison with the length of the main route is a good indicator for the calculation of the threshold. The threshold should also ensure certain duration of the incident and thus avoid short activation periods. On the other hand a high threshold can provoke a short activation time.

The following incident data can be consulted to define thresholds:
- (estimated) duration of the incident
- Congestion length
- Traffic density
- Travel time/ delays
- (Estimated) impacts of the incident (number of closed lanes, full closure?)

For plan able incidents (e.g. road works) the duration and the impact on the capacity can be a good indicator. If incidents occur spontaneous, the duration is hard to assess. Here, the measured congestion length is a suggestive indicator. Experiences have shown, that there is no interrelation between the congestion length and the duration of an incident. But the definition of a certain congestion length as threshold (here 10 km) ensured an incident duration of more than 2 hours.

Other important aspects:
- Location of disturbance in relation to location of displayed information
- Daytime
- Day of the week
- Parallel incidents and situations
- Network typology

**ORGANISATIONAL CHAIN, CONNECTION OF INVOLVED PARTNERS**

By now, two types of connection are applied: A centralised structure and a decentralised structure.

Applying a centralised structure, the incident and the basic conditions for strategy activation are captured by one specific partner. He activated the strategy and instructs the partners to implement the measures.

In a decentralised structure, every partner is able to detect an incident and to request a strategy. Normally, all partners have to agree basing on their specific (traffic) conditions. The implementation of the measures is requested after the agreement of all partners.

**Centralised structure**
- Centralised data management, which means more technical complexity, legal aspects of data provision
- Complex situations on long distance networks have to be estimated by the staff of one partner, no common estimation possible.
  + No strategy coordination process, quicker activation

**Decentralised structure**
- Time-consuming activation process => efficient and reliable strategy co-ordination process is necessary
  + Decentralized data management, less technical and organisational complexity. More flexibility
  + Situation can be analysed from experienced staff, which is familiar with the local situation.
**Guideline for Core Service deployment**

**STAKEHOLDERS INVOLVEMENT:**

**Offline development, pre-definition and evaluation of TMPs:**

**Cross-border TMPs and cross-regional TMPs:**
- Federal State authorities
- Road authorities
- Road maintenance authorities
- Forces of law and order (Police)
- Rescue services
- Forces for disaster control
- National railway companies
- Private motorway companies
- (Private) service providers
- Traffic services reporting office
- Broadcasting companies
- Automotive industries
- Telecom operators sector
- Association of Freight and Logistics Traffic
- ASECAP (European Association of Operators of Toll Road Infrastructures.)
- National Associations of Operators of Toll Road Infrastructures (ASFA; ASETA; AISCAT; ASFINAG)

**Furthermore for TMPs for conurbations:**
- (Local traffic control centre and other involved departments of) City and municipality
- Local police
- Local public transport organisation
- Car park operators
- Event organisers (e.g. fairs)
- Local press
- Local broadcasting companies

**Online TMP activation – Strategy coordination & implementation process**
- Road authorities
- Forces of law and order (police)
Rescue services
Forces for disaster control
Federal State authority
National railway companies
Private motorway companies
(Private) service providers
Broadcasting companies

Furthermore for TMPs for conurbations:
Cities and municipality
Local public transport organisation
Event organisers (e.g. fairs)
Local press
Local broadcasting companies

Resources:
Material means:
Doppelt 2.2 required ICT infrastucture
Human resources:
Abhängig vom Bestand, Grad der Automatisierung, vorhersehbar oder nicht => 24 h betrieb
Etwa gleiche Personaldecke bei den Partnern

3.2. Costs and benefits analysis
Costs and benefit analysis can be carried out as ex-ante evaluation or as ex-post evaluation. The results of ex-ante evaluations can give an indication for an expected benefit and are often used as reference for public funds for technical road-side infrastructure. A basic precondition for ex-ante evaluations is the knowledge about the behaviour of the road-user. A realistic illustration of the route-selection behaviour is essential for any prognosis of the effects.

Ex-post evaluation can give a more realistic picture of the effects of TMPs, let us suppose that the data base is proper. They are used as part of the quality management to optimise strategies permanent. Sometimes they can give a indication about the effects of planned infrastructure at other locations, But the transferability of results is limited (see below “Challenges of cost-benefit-analysis”.)
Costs and benefits of TMPs have can be calculated related to different user groups and components.

User groups can be:
- Traveller, pedestrian, cyclists
- Carrier, authorities, bodies, Police department, fire department
- The state as guarantor for a safe and efficient network
- Affected person (e.g. residents)
- The environment
- Economy (companies, who employ mobile personnel or who transport goods)

Benefit components are:
- Security
- Environment
- Travel time
- Comfort and reliability
- Operating efficiency
- Economical aspects

Investment cost components can arise from (depending if existing systems can be used for the TMP or if additional systems are necessary):
- Systems for incident detection
- (systems for strategy coordination)
- Traveller information systems and traffic management systems
- If necessary: traffic management centre

Operation costs arise from:
- Staff
- Maintenance
- Data transfer
- Software-update
- Technical modernisations

Challenges of cost-benefit-analysis:
- Through to the interaction of simultaneous applied measures, it is nearly impossible, to relate an effect to one specific measure.
- Applied TMPs can only conditionally be compared in their effects. Calculated benefits can only give a reference value, they are never transferable to other situation.
The research of re-routing TMPs in Germany showed that the number and the extent of incidents are very unsteady. Reasons are e.g. weather conditions, road works or other capacity losses on the (surrounding) network, holiday traffic. But not only during the course of the year, also comparing the years, great variances appeared. Experts came to the conclusion, that at least 5 years of evaluation are necessary to get statistical reliable data about the yearly benefit of a TMP.

Road-side systems as well as traffic management centres assure manifold benefits. Thus, the investment costs can often not be assigned to one specific TMP. The definition of the allocation of invest costs in percent to different TMPs is very difficult.

Deploying evaluation guidelines is a complex task which takes time. This leads to the effect, that cost rates for fuel, CO2-emission or time-losses are often antiquated and thus nor realistic. The cycles for updating them are too long.

Main benefit results from the saving driving time. The calculation of saved driving time bases on an assumption of the average travel time in the congested section and on the alternative route. Real time losses can often not be measured; here automatic plate recognition and floating car data can give more precise data. The influence of the benefit of only 5 km/h more or less is immense (in one case of a re-routing evaluation it achieved 35% to 41% more or less benefit).

Re-routing TMPs: One important aspect for the benefit-calculation is the additional length of the alternative route. Through to the fact, that each traveller has his own destiny and statistical data about destination allocations is rare and often not up-to-date, the exact calculation of additional length is difficult.

**RESULTS OF COST-BENEFIT-ANALYSIS:**

Under the following topic are described general results without naming the exact situation and evaluation procedure. These theses shall give an indication for authorities and other stakeholders, who plan TMPs about what to expect and what to pay attention to. Detailed results of specific TMPs are described in chapter 4 Bibliography and examples of deployment.

Re-routing TMPs

- Experiences show, that almost all re-routing TMPs exhibited positive benefits and are economically feasible in terms of travel time savings, reduced user costs and climate change impacts.
- The level of benefit of strategy is dependant on the level of diverted traffic during the incident. If it succeeds to re-route a considerable part of the traffic, the benefit is quite high.
- The level of benefit also depends on the additional length of the alternative route. This fact has to be considered when fixing the thresholds for the strategy activation. It is not conductive to agree to a low threshold, which leads to a negative benefit due to the long additional distance compared with the relatively low congestion length.
- (According to the German guidelines for cost-benefit calculations (EWS – Empfehlungen für Wirtschaftlichkeitsuntersuchungen auf Straßen)) the main benefit arises from the
savings of travel time for re-routed traffic in relation to original congested route. Other aspects, such as user costs or climate change are relatively low (>=5%).

- Not quantifiable additional benefits have to be considered (also during the decision-making process about investments for infrastructure), which are:
  - Improved traffic information
    => Additional Service for drivers
    => Important contribution to road safety
  - speed up strategy activation
    => Reduction of the congestion spread,
    => Avoidance of resulting accidents
  - Strategically and operational benefit due to the cooperation
    => New possibilities of cross-border network management
    => Optimised operation inside the traffic management centres

3.3. End user orientation

Re-routing measures seem to be better accepted, if at least two systems (e.g. VMS and radio) give the same advice.

**COMMON END-USER INTERFACE**

Experiences with re-routing TMPs showed that the display of a longer congestion length on the main route lead to a higher level of compliance.
They also showed that the time of day has no impact on the traveller behaviour. Assumptions could not be confirmed, that the higher share of local / regional (commuter) traffic during the peak hours lead to a lower degree of acceptance.

By contrast, the location of the sign had a very great influence. Min reason for it was the allocation of the long-distance-traffic in the network. In conurbation areas, where –trouch to the dense infrastructure- there are various possibilities.

Another aspect with influence on the traveller’s behaviour is the kind of display. Although the results could not be verified statistically, they showed that the level of compliance was much higher, if they were given through variable message signs; variable direction signs achieved a quite small level of compliance. The results are an indicator. But the fact, that many effects together (e.g. content of the information, location of the sign) have an effect on the road users behaviour, has to be considered.

Broadcast information in combination with re-routing trough variable message signs showed no additional effect. A significant change of the time-variation curves at the point of time, when the message was broadcasted, could no be found out. But even this result has to be put into perspective, the route selection behaviours could not be allocated to a specific information system, user interviews were not made.

**END-USER ACCEPTANCE:**

s. LDC und Highlights

**TMPs for conurbation: (Düsseldorf dmotion)**

Level of compliancy outside peak hours 11.5% to 22.5%

During peak hours balanced conditions between main and alternative route

**3.4. Service Level definition**

Do we describe only existing or current deployed systems with best practice examples or do we also describe also future ideas as a “higher” service level? Or have future ideas to be described in the viability studies?

Service levels are a kind of quality level of a TMP from the end users point of view. They can belong to the following aspects:

- Level of information content
- Level of information quality
- Variance of supplied information systems

Technical service levels will not be addressed because the different systems for incident detection, strategy coordination and end user information / traffic control have all their specific advantages and challenges and their application always depends on the specific situation (see chapter 2.2 Required ICT Infrastructure). An assessment of which system has the highest service level seems not to be applicable.
**LEVEL OF INFORMATION CONTENT**

Information can be given about the incident itself (accident, road works, …), about the exact location of the disturbance, about the effects on the traffic situation (congestion length, travel time losses) and with re-routing advice.

Besides, intermodal information can be given such as travel time comparison, travel costs comparison, door-to-door information

**LEVEL OF INFORMATION QUALITY**

Language independent, Europe-wide logos / symbols / Signs for specific traffic situations

Internet: continuous design of map-based information through a standardised, geo referenced map. Common structure of web-based traffic information services

**VARIANCE OF SUPPLIED INFORMATION SYSTEMS**

Is the information only given through one system (e.g. variable message signs) or do all available systems supply consistent information? Has the road user a great variance of systems for to inform his self?

---

**3.5. Regulatory Framework (existing / need for)**

Traffic management plans presume the co-operation of at least two partners. The experience has revealed that co-operation on basis of equal bounds and rights of all partners is a proven self-conception. Particularly on the international level is not expedient, to establish an umbrella organisation for the management of TMPs and even the assignment of the leadership or the authority to decide to only one partner is an unrealistic approach.

This flat organisation requires an offline development and pre-definition of the strategies, and this is a long-lasting and complex task. Clear definitions; not only regarding content, but even regarding organisational aspects, are a crucial precondition for the successful implementation of a TMP.

- The following organisational aspects have to be defined in advance:
  - Who is allowed (and bound) to request a strategy under which conditions?
  - Who is allowed to accept or disapprove the strategy?
  - How to proceed, if one partner does not agree the strategy activation?
  - How to proceed, if one partner does not answer? (Time-out and procedure)
  - Do the partners have to justify their decision?
  - Is it desired, that partners get insight into the traffic situation of one-another?
  - How to proceed, if the traffic management centres have different operation times (e.g. during the night)?
  - Which strategy has priority in case of overlapping activations?

Due to the fact, that the partners are public authorities, who are legally autonomous and in the international context even work on different national laws, it is not necessary to define the above named organisational aspects on a legal and binding basis.
Here the appropriate instrument seems to be a “Letter of Intent” or a “Memorandum of understanding”. A “letter of intent” is a declaration of intent for planned co-operation in future. Against it, a “Memorandum of understanding” fixes existing co-operations. The documents define the modes of co-operation and ideally contain operation instructions for the above named aspects. Both are a declaration of intent but have no legal bindingness. Nevertheless it makes sense to conclude such an appointment in written form, on the one hand, because it requires a clear common understanding of the co operation, on the other hand because the signing of the contract can be seen as a milestone with appropriate media savvy.

A new challenge is the permanent increasing number of public-private partnerships in the field of traffic management. Here, where private stakeholders execute sovereign tasks or receive data, contracts have to be closed. Another current aspect is the use of private generated data for traffic management. Examples are the use of weather data or floating car data. Thus, public-private-partnership agreements become more and more important. The operation of the TMP has to be ensured, independent of the economical situation of the private data supplier.

3.6. Interaction with other services

Content of this chapter are on the one hand the overlapping contents of these Guidelines and of other Guidelines / Terms of Reference / Viability Studies. It is described subsequent and will help the responsibilities of the other European Studies, supporting actions and Viability Studies to adjust the content. On the other hand this chapter describes the situation and priority of overlapping TMPs.

*Interaction with other defined Easyway-services*

The interaction with other services always relates to specific topics. Thus, the coherency is respectively described with the declaration of the chapters which affects.

*Querbezug wird immer im Kapitel angegeben*
<table>
<thead>
<tr>
<th>Activity Domains</th>
<th>Core service/ Supporting Action/ Viability study/ ES</th>
</tr>
</thead>
</table>
| AD 1 TIS - Europe-wide Traveller Information Services | CS 1 Pre-Trip traveller information  
SA1 (Contributions to ES 4 - Mare Nostrum) |
|                  | CS 2 On-trip traveller information  
SA2 (Support to Framework for Route Recommendations) |
|                  | CS 3 Co-modal traveller information  
SA1 (Contributions to ES 4 - Mare Nostrum) |
|                  | CS 3 Management of sensitive Road Segments  
SA2 (Support to Framework for Route Recommendations) |
|                  | CS 2 Strategic Traffic Management for Corridors and Networks  
SA3 (TCC) Decision Support Systems |
|                  | CS 3 Incident Management  
SA1 (Contributions to ES 4 - Mare Nostrum) |
|                  |      |
| AD 2 Traffic management Services |  
CS 1 Access to abnormal and hazardous transport regulations  
SA1 (Contribution to ES 4 - Mare Nostrum) |
|                  | CS 2 Intelligent truck parking  
VS1 Remote freight information |
|                  |      |
| AD 3 Freight and Logistics Services | CS 1 Access to abnormal and hazardous transport regulations  
SA1 (Contribution to ES 4 - Mare Nostrum) |
|                  | CS 2 Intelligent truck parking  
VS2 Integrated freight traffic management |
|                  |      |
|                  |      |
### Activity Domains

**AD 4**
ICT Infra-structure

- **SA1**
  Road network definition

- **SA2**
  Data exchange

- **SA3**
  Optimal data quality

- **VS1**
  Speed limit data management

- **VS2**
  Cooperative system deployment plan incl. Considerations on EFC

**AD 5**
European Studies

- **ES1**
  Europe Wide Traveller Information continuity and co-modality

- **ES2**
  Europe Wide Traffic and Network management and co-modality

- **ES3**
  Freight and Logistic Services

- **ES4**
  VMS Harmonisation

- **ES5**
  DATEX II

- **ES6**
  European ITS Deployment Road Map

**AD 6**
PM Evaluation, Dissemination

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<th>Chapter</th>
<th>Interrelation with Easyway ES, Core Service, Supporting Action, Viability Study</th>
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<td>1. General framework</td>
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<td>1.1. General Service description and objectives, including co-modality</td>
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<td>1.1.1. Service definition</td>
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<td>1.1.3. Disruption / problem to consider</td>
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<td>1.1.4. Conditions for the deployment of this service: operational environment</td>
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INTERACTION BETWEEN DIFFERENT TMPs

What kind of TMPs will have priority? Aspects to consider:

Short-distance/ regional TMP ⇔ long-distance/ international TMP ⇔ conurbation TMP

Network typologies
Risk of overlapping information!

3.7. Conditions for service provision – Business model

Ensuring an efficient traffic network through traffic management is a sovereign task. An efficient traffic management implies that traffic information is given to the end user free of charge and that measures are carried out for ensuring efficiency and safety and not for earning directly money with it. Of cause, the state has a positive benefit of it but not in cash. If private motorway companies maintain the road and keep traffic flowing, they realize profit with it. But their profit results from road pricing not from traffic management tasks
themselves. (Although a flowing traffic – ensured through traffic management measures –
leads to a higher profit, because only for flowing vehicle-kilometres they can collect tolls.

Nevertheless, functions can be transferred from public authorities to private organisations
such as the incident detection, the strategy activation process or the evaluation. But even private
organisations have to be financed publicly, because their possibility to earn money with the
service is limited.

Thus, the idea of a business model can be applied only for small segments in the field of
service provision. One of them is data provision to private service providers. Conceivably,
data collected by public authorities can be passed chargeable to private service providers.
This would have the clear advantage that both services for the end user would base on the
same database.

It can be distinguished between three forms of organisation with different levels of involvement
of private organisations.

1. Public authorities as road operators provide services directly to “end users”
   (including services for use in their own organisations), often through roadside
   installations. A business model is normally easy to find, as implementation and
   operation of the service are in the hands of public authorities.

2. Where public authorities together with private actors provide services to end users,
   information from several sources is combined and distributed through various media;
   internet, radio etc. An appropriate business model is more complex as several
   stakeholders have to agree on the format of and conditions for service provision.

3. Services are provided exclusive by private actors directly to end users. Road
   operators contribute with information and regulatory measures to prevent adverse
   effects, to avoid inconsistent information and to augment quality of service. Business
   models are rather straight, as long as roles are well defined; the public authorities
   contribute at their own expense and expect the service provider to integrate the
   provided information into its service and operate it further at his own expense.

Inventory of existing TMPs relating:

Which kinds of TMPs are well suited for a private organisation?

Identification of Service providers and conditions for service provision to the end user

Identification of Information suppliers and conditions for providing information to the service
providers

If applicable: other stakeholders and their specific roles in service provision

Important: Financial aspects / Economical conditions. Who pays to whom for what? Fees for
the end user. Has traveller information to be free of charge? Political self-conception in the
different member states?

Objective: Long-lasting operation without any support from Easyway.

Identification of European Service Champion (i.e. an organisation that express its willingness
to be “the guardian of the European dimension”) for each TMP?
3.8. Adverse effects of the service
Überlastung der Alternativroute
Falsches Routing (Zielführung ungenau)
Kein Zielgruppspezifisches Routing möglich, daher unerwünschte Nebeneffekte wie Lkw (Gefahrenguttransporte) in Ortsdurchfahrten
Umleitungsroute kann nicht nach Ziel des Einzelnen definiert werden

3.9. Overview of foreseen deployment within Easyway
Potential for service implementation within EasyWay (analysis)
Proposal of methods to reach Core Service.
How to integrate in Easyway 2 Workplan?
Abfragen!!

4. Bibliography and examples of deployment
Examples: Two pages highlights
We will provide structure; partners of the ERPs shall fill them in for their project. Proposed: one or two projects for each kind of TMP => Proposed projects see table "initial situations – measures"

5. List of abbreviations
CS
ES
TMP