EasyWay Harmonising European ITS Services and Actions

Traffic Management Services

TRAFFIC MANAGEMENT PLAN FOR CORRIDORS AND NETWORKS

Deployment Guideline

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Preamble

EasyWay is a cooperation of road authorities and road operators from 27 European countries that have teamed up to unlock the benefits of cooperation and harmonisation in the deployment of Intelligent Transport Systems (ITS) on Europe's major road network. ITS as a technology is a known contributor to sustainable mobility in terms of improved safety, efficiency and reduced environmental impact. Nevertheless, fragmented deployment on a national level will fail to deliver seamless European services and will not contribute to a coherent European Transport network. The European Member States have consequently launched the EasyWay project together with the European Commission as a platform to harmonise their ITS deployments.

This document has been drafted by EasyWay as part of the set of documents containing the 2012 version of the EasyWay Deployment Guidelines (DG 2012). These guidelines have been developed by EasyWay experts and practitioners. They have undergone a thorough review by international domain experts in an intense peer review exercise and they have been validated by the participating Member State Partners of EasyWay in an extensive formal Member State consultation process, which finally led to their adoption as basis for all deployment activities in future EasyWay phases.

EasyWay as a project is not a standardisation body, nor does it have any power to legally constrain the Member State in their national deployment activities. It is therefore crucial to understand that these documents are neither technical standards, nor are they specifications as they would be required for such cases, e.g. as currently developed by the European Commission as their part of the implementation of the ITS Directive 2010/40/EU. But since a certain level of strictness in compliance is required to achieve the intended goal of the EasyWay Deployment Guidelines – harmonisation and interoperability in Europe – the guideline documents are written in a way that clearly defines criteria that deployments have to fulfil in order to claim overall compliance with the guideline.

Although not legally binding in any sense, compliance may be required for the eligibility of deployments in future ITS road projects co-funded by the European Commission. Deviation from compliance requirements may nevertheless be unavoidable in some cases and well justified. It is therefore expected that compliance statements may contain an explanation that justifies deviation in such cases. This is known as the "comply or explain" principle.

Although not standards themselves, the EasyWay DG2012 Deployment Guidelines in some cases do mention – and sometimes require – the use of such standards. This is the case in particular regarding the use of the CEN/TS 16157 series of technical specifications for data exchange ("DATEX II"). Although standardised data exchange interfaces are a powerful tool towards harmonised services in Europe, it must be understood that real world deployments have to fit into existing – and sometimes extensive – infrastructures and investment in these infrastructures must be protected. It is therefore important to note that the use of DATEX II mentioned below as a MUST is referred to implementation of "new" data exchange systems and not the utilisation of the existing ones, unless these latter affect harmonisation of deployments or interoperability of services.

Service at a glance

SERVICE DEFINITION

"Traffic Management Plan for Corridors and Networks" means the elaboration, application and quality control of Traffic Management Plans (TMP) for the management of the European network and corridors including 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).

A TMP is the pre-defined allocation of a set of measures to a specific situation in order to control and guide traffic flows as well as to inform road-users in real-time and provide a consistent and timely service to the road user. Initial situations can be unforeseeable (incidents, accidents) or predictable (recurrent or non-recurrent events). The measures are always applied on a temporary basis.

Four spatial levels are suited to the elaboration of such complex TMPs:

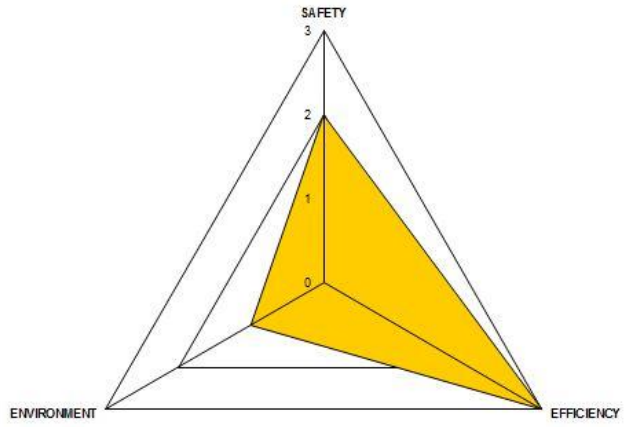
- **Regional TMPs:** for networks within areas or regions on the TERN that can be extended, under certain conditions, to link with neighbouring regions for cross-regional and cross-border levels.
- **Cross-regional TMPs:** for national networks and key corridors on the TERN covering multiple regions
- **Cross-border TMPs:** for cross-border networks and key corridors on the TERN and
- **TMPs for conurbations:** conurbations and the urban/inter-urban expressways network with relevance to long-distance traffic.

SERVICE OBJECTIVE

The vision of the European Core Service "Traffic Management Plan for Corridors and Networks" is the effective delivery of traffic control, route guidance and information measures to the road user in a consistent manner, thus increasing the performance of transport infrastructure by adding the potential of cross-border, network or multi-stakeholder co-operation, when needed. Through strengthening the cooperation and the mutual understanding of road operators in conurbations and on the cross-national/international level the provision of a co-ordinated approach for elaboration, application and quality control of traffic management measures will be achieved.

Properly developed multiple level TMPs react to various traffic situations in a timely and effective manner. They optimise the use of existing traffic infrastructure capacities and provide the platform for a cross-border seamless service with consistent information for the road user.

SERVICE BENEFIT RADAR



EUROPEAN DIMENSION
Development and application of TMPs in a co-ordinated manner across Europe allows for the effective utilisation of the European road network and delivery of an integrated service to road users using the road network at regional/conurbation, cross-regional and cross-border traffic management levels. The cooperation and collaboration of road operators and service providers across Europe ensures an appropriate level of service for TMPs for corridors and networks. It also enables the consistent and timely delivery of traffic control, guidance and information measures across corridors and allows for effective coordination across traffic modes and traffic management and traffic information stakeholders, when necessary

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List of abbreviations

CBM	Cross border management
CSM	Coordinated strategy manager
ESG	European expert and study group
HGV	Heavy good vehicle
ICT	Information communication technology
LOS	Level of Service
OE	Operating Environment
TMP	Traffic management plan
VMS	Variable message sign
TCC	Traffic Control Centre
MoU	Memorandum of understanding
LoI	Letter of Intend
FR<#>	Functional requirement <number>
OR<#>	Organisational requirement <number>
TR<#>	Technical requirement <number>
CL&FR<#>	Look and feel requirement <number>
LoSR<#>	Level of service requirement <number>

1 Introduction

1.1 The concept of the EasyWay Deployment Guidelines

1.1.1 Preliminary note

This document is one of a set of documents for the EasyWay project, a project for Europe-wide ITS deployment on main TERN corridors undertaken by national road authorities and operators with associated partners including the automotive industry, telecom operators and public transport stakeholders. It sets clear targets, identifies the set of necessary European ITS services to deploy (Traveller Information, Traffic Management and Freight and Logistic Services) and is an efficient platform that allows the European mobility stakeholders to achieve a coordinated and combined deployment of these pan-European services.

EasyWay started in 2007 and has since established a huge body of knowledge and a consensus for the harmonised deployment of these ITS services. This knowledge has been captured in documents providing guidance on service deployment - the EasyWay Deployment Guidelines.

The first iteration of the Deployment Guidelines mainly captured best practice. This strongly supported service deployment within EasyWay by:

- making EasyWay partners in deployment aware of experiences made in other European deployment programmes.
- helping to avoid making errors others had already made
- reducing risk and facilitating efficient deployment by highlighting important and critical issues to consider

Meanwhile, this best practice has already successfully contributed to ITS deployments across Europe. It is now possible to take the logical next step and actually start recommending those elements of service deployment that have proven their contribution to both the success of the local deployment, as well as the European added value of harmonised deployment for seamless and interoperable services.

1.1.2 Applying Deployment Guidelines – the “comply or explain” principle

The step from descriptive best practice towards clear recommendations is reflected in the document structure used for this generation of the Deployment Guidelines. Apart from introduction and the annexes that cover specific additional material, the Deployment Guidelines consist of two main sections:

Part A – this part covers the recommendations and requirements that are proven to contribute to successful deployment and have been agreed by the EasyWay partners as elements that should be part of all deployments of this particular service within the scope of EasyWay. Thus, the content of this section is prescriptive by nature. EasyWay partners are expected to ensure that their deployments are compliant with the specifications in this section. Wherever concrete circumstances in a project do not allow these recommendations to be followed fully, EasyWay partners are expected to provide a substantial explanation for the need for this deviation. This concept is known as the “comply or explain” principle.

Part B – this part offers an opportunity to provide more valuable but less prescriptive information. Supplementary information may be contained including – but not limited to – regional/national examples of deployment and business model aspects like stakeholder involvement or cost/benefit analysis results.

1.1.3 Use of Language in Part A

It is essential for every prescriptive document to provide specifications in a well-defined and unambiguous language. There are various definitions that clarify the use of particular words (such as those listed below) within their prescriptive texts.

For the purpose of the EasyWay Deployment Guidelines, the well-established provisions of the RFC 2119 (http://www.ietf.org/rfc/rfc2119.txt, see (1)) are used, which is used to specify the basic Internet standards:

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119.

An overview of the keywords, their meaning and the possible answers in the context of part A provides the following table. In general the keywords in brackets are possible, but their use is not recommended in order to avoid confusion which may arise as a consequence of different common linguistic usage of the terms in the different EU member states.

Requirement wording	Meaning in RFC 2119	Meaning in EasyWay	Possible checklist answers
MUST (REQUIRED, SHALL)	the definition is an absolute requirement	there may exist insurmountable reasons to not fulfill (e.g. legal regulations…)	**fulfilled: yes** **or** **Fulfilled: no - explanation of insurmountable reasons**
MUST NOT (SHALL NOT)	the definition is an absolute prohibition		
SHOULD (RECOMMENDED)	there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.	The Definition is very close to a "MUST", "MUST NOT" Meaning in EasyWay conform to RFC 2119	**fulfilled: yes** **or** **Fulfilled: no - with explanation**
SHOULD NOT (NOT RECOMMENDED)	there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label		
MAY (OPTIONAL)	The item is truly optional. One deployment may choose to include the item because of particular local circumstances or because it is felt to deliver a special added value	Meaning in EasyWay conform to RFC 2119	**fulfilled: yes - with explanation** **or** **Fulfilled: no**

Table 1: Part A - requirement wording

Note: the capitalisation of these keywords that is frequently used in Internet standards is not recommended for EasyWay Deployment Guidelines. The use of this 'requirements language' allows the direct transfer of the requirements stated in part A to a compliance checklist.

The following paragraph gives an example for a functional requirement:

Functional requirement:

- **FR2**: Data and information collected by both automatically and non-technical sources **must** be based upon both a consistent geographic reference model and a time validity model, which both must be part of data description.

Beneath "Requirement" a new semantic element "Advice" is proposed for part A, which has not the character of a hard requirement but of a "recommendation" and hence must not be listed in the compliance checklist. "Advices" are not immediately related to the three pillars of ITS-service harmonization (Interoperability, Common look & feel, Quality criteria) but to "inner features" of an ITS-service. Nevertheless such an element delivers a European added value and hence should be addressed by the deployment guidelines.

The notation for using the advice element in the text is as follows:
Organisational advice:

- Clear definitions of organisational aspects are a crucial precondition for the successful implementation of a "Forecast and real-time event information service" and should be documented and accepted of all involved parties/partners in form of a Common partner arrangement/MoU - Memorandum of understanding, which establishes the details of co-operation.

1.2 ITS-Service Profile

1.2.1 ITS-Service Strategy

1.2.1.1 General Service Description

"Traffic Management Plan for Corridors and Networks" means the elaboration, application and quality control of Traffic Management Plans (TMPs) for the management of the European network and corridors including cross-regional and cross-border aspects and multi-modal capacities.

A TMP is the pre-defined allocation of a set of measures to a specific situation in order to control and guide traffic flows as well as to inform road-users in real-time and provide a consistent and timely service to the road user. Initial situations can be unforeseeable (incidents[1], accidents) or predictable (recurrent or non-recurrent events[2]). The measures are always applied on a temporary basis. TMPs can be based upon the full range of feasible traffic control, route guidance and traveller information measures, not only depending on the initial situation but also on available facilities (see also chapter 3.2 Types of TMPs).

Deployment of TMPs ensures a higher level of service in terms of increased traffic efficiency on the network and improved safety in terms of incident response and mitigation through a consistent and effective delivery of traffic control, route guidance and information measures to the road user.

1.2.1.2 What is the Vision?

The vision of the European Core Service "Traffic Management Plan for Corridors and Networks" is the effective delivery of traffic control, route guidance and information measures to the road user in a consistent manner, thus increasing the performance of transport infrastructure by adding the potential of cross-border, network or multi-stakeholder co-operation, when needed. Through strengthening the cooperation and the mutual understanding of road operators in conurbations and on the cross-national/international level the provision of a co-ordinated approach for elaboration, application and quality control of traffic management measures will be achieved.

Properly developed multiple level TMPs react to various traffic situations in a timely and effective manner. They optimise the use of existing traffic infrastructure capacities and provide the platform for a cross-border seamless service with consistent information for the road user.

Visions on behalf of the road user are:

- to provide seamless, language independent and consistent cross-border and traffic management and traveller information,
- to consider the network as a whole, to optimise the use of existing traffic infrastructure capacities,
- to permanently enhance the level of service provided by the traffic management plan service.

Visions on behalf of the road operators are:

- to come to a harmonised understanding as well as a co-ordinated, consistent deployment and application of traffic management measures on an operational level in locations where various stakeholders such as road operators and traffic police share traffic management responsibilities
- to strengthen the cooperation and the mutual understanding of road operators in conurbations and on cross-national/ international levels,

[1] Incident: situation on the road that is not expected or foreseen which may or may not lead to an accident (collision) but impacts on the safety and/or capacity of the road network for a limited period of time.

[2] Event: situation that happens on the road, but that doesn't necessarily have negative impact on safety and/or capacity.

- to exchange knowledge experience and know-how in developing tools for the development and testing of traffic management plans between the stakeholders on a European level.

1.2.1.3 What is the Mission?

Service provision

- Different political, legal, technical and organisational basic conditions, language (even dialects) and cultural differences of partners
  → In advance of pre-defining TMPs, all partners have to have a clear understanding of each other's needs and requirements.
- In most countries, broadcasting companies cannot be forced to broadcast specific traveller information or re-routing recommendations, which leads to inconsistent information
  → Involve broadcasters and other service providers from the start and foster a good relationship with them. In some cases, broadcasting companies share databases or have their operators in the TCC.
- Inconsistent service content between publically financed road operators and private service providers. The prompt deactivation of a measure in case of an incident cancellation through private service providers seems to be a problem.
  → Involve private service providers in the TMP elaboration process and develop framework agreements between public financed road operators and service providers to share information.
- Navigation systems choose their own alternative route and can potentially give their own event, traffic condition and travel time information if they receive congestion warning information via RDS-TMC or other means. Road operators have no influence on the route selection criteria of navigation systems. Thus the recommendation of a navigation system can differ completely from the recommendation given via variable message signs.
  → Need to develop agreement frameworks with navigation system providers, taking into account specific requirements and the needs of both road operators and navigation service providers to ensure TMP consistent TMP routing advice.

Re-routing TMPs:

- Re-routing to motorways, bridges or tunnels of different toll operators leads to losses or additional incomes.
  → Need to develop cooperation frameworks for TMPs on corridors covering multiple operators and regions.
- Insufficient capacity on the alternative routes. Road organisations are unwilling to re-reroute on routes or secondary roads with limited capacities and/or limited traffic status.
  → Other measures such as information, vehicle storage areas, modal shift or access control have to be considered.
- The cost of tolls to the road user has a considerable influence in their route selection.
  → The decision criteria "price" has to be considered and eventually communicated.
- Long-distance travellers, who are unfamiliar with the country and the road network, are less likely to follow the re-routing recommendations (e.g., according to the experiences of France with holiday traffic or guest workers travelling to Northern Africa).
  → Awareness information campaigns to inform foreign road users of traffic management measures to reduce their travel times.
- Possible problems of language and/or interpretation.
  → Communication to the road user as far as possible through clear and mono-interpretable pictorial signs. Use of language only as explanation for the signs used.

Co-modality

- Insufficient consideration of public transport and rail capacities in traffic management
  → TMPs should consider the utilisation of alternative modes of transport when capacities are available (see EasyWay Deployment Guideline TIS-DG07: Co-modal traveller information services).

Technical aspects

- Different display facilities of different systems, different data collection systems, different definitions of elements and different digital mapping limit the possibility to giving consistent and comprehensive information. → Co-ordination in the elaboration and operations of TM measures on a cross-regional and cross-border basis with application of the EW DG 2012.
- Different definitions and the lack of standardised data interfaces complicate the data transfer between the partners.
  → Application of EW DG 2012. If this is insufficient, the development and acceptance of locally-harmonised definitions and standardisations is recommended.

Inter-organisational aspects

- Incidents with wide-scale impacts on multiple regions
  → A common pre-definition of prioritization between the impacted partners is necessary and agreements on how to prioritize traffic management measures to handle various incident types.
- Traffic diversions to the secondary networks imply increasing traffic (and negative effects) on the surrounding secondary road network and vice versa
  → Intense advance planning and coordination processes between the various authorities involved and co-ordinated TMP activation process on the basis of mutual confidence in event assessment and activation requests is necessary.

Evaluation

- Knowledge about driver's behaviour is still quite limited.
  → Experiences gained from of statistical data and monitoring of TMP impacts should be analysed regularly.

Operating environment

- The application of TMPs is recommended for networks where incidents with grave impacts on traffic flow, safety or environment are expected.
  → The application should always be problem-orientated and solution-orientated. The impacted network has to be clearly defined. Thus, every TMP should have its own feasibility study prior to developing the TMP. It has to answer the main questions:
  - Problem-orientated:
    - Do the spatial expansion, severity and duration of expected incidents require such a complex solution? Are various stakeholders integrated?
    - Is there a need for the cooperation to be strengthened?
    - Is a cross-border cooperation (TMP as pre-condition) long-distance or conurbation cooperation (TMP recommended) planned?
    - Are different traffic management measures applied, which have to be co-ordinated?
  - Solution-orientated:
    - Are the technical and organisational pre-conditions for the TMP given?
    - Are there any current TMP deployed in the region?
    - Are the network pre-conditions suitable?

Cross-border/cross-organisational deployment

- Different political, legal, technical and organisational basic conditions, language (even dialects) and cultural differences of partners
  → Take into account the individual backgrounds and requirements of each partner; determine a common understanding in a LoI (Letter of Intent) or a MoU (Memorandum of Understanding).
- Different responsibilities inside the organisational structure of each partner
  →Define a "single entry point" on the operational level. Avoid escalating every single operational problem to the management level.
- Different glossaries of different countries in a cross-border TMP
  →Define a common harmonised glossary and map in advance.
- Different look-and-feel of road signs and different categorization of the road network
  → Application of the EW DG 2012.

Human resources

- The human resources required are hard to estimate, because TMPs often work “on top” of existing measures. With the implementation of a TMP service the work can get more complex for the operator. Normally, organisations are not at present able to provide such a service with the human capacities currently available to them
  → Allocation of motivated and well-trained - if necessary additional - staff is essential and often crucial to the success of the service.

1.2.1.4 EasyWay harmonization focus

At present, TMPs are developed and deployed all over Europe, many of them on a regional level, some on national or even international levels.

This EasyWay Guideline focuses on the linkage of (existing) TMPs along the TERN and on the definition of new TMPs for complex tasks, which means that the duration and the severity of the initial situation requires substantial co-ordination activities. In order to handle such complex situations, various parties responsible or affected have to work together. It also assumes that the surrounding network is considered and just not the affected section of road.

1.2.1.5 Distinctiveness to other ITS-services

“Traffic Management Plan for Corridors and Networks” is not comparable to traffic management services described in other EW-TMS guidelines. Together with the Incident warning and management service (See EW-DG TMS 05-08) its nature is a management service which uses and applies other services. The principle is shown in the following figure:

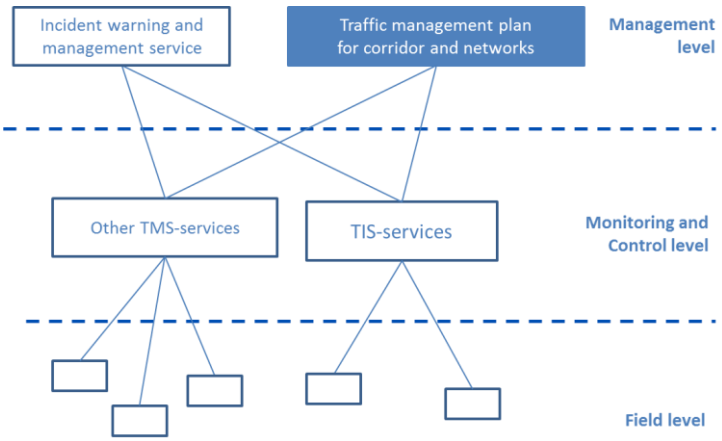


Figure 1: Allocation of Traffic management plan for corridors and networks in contrast to other ITS-services

1.2.2 Contribution to EasyWay Objectives

1.2.2.1 Service radar

The graph below provides a quantification of “Traffic management plan for corridors and network” services added value regarding the three main objectives of EasyWay which are: safety, efficiency and environment. The applied scales for the service radars are based on an expert view and not on specific scientific analysis.

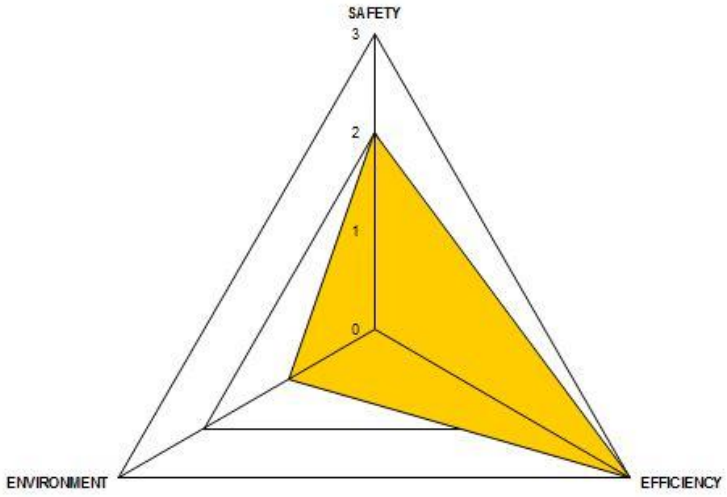


Figure 2: Traffic management plan for corridors and networks radar

1.2.2.2 Safety

Timely and effective measures in case of major incidents serve to mitigate safety impacts. The quick and consistent provision of traveller information such as "Real Time Event Information" (see TIS-DG02) and "Incident warning" (see TMS-DG05/08), as a part of the TMP measures, contribute to safety by warning travellers to reduce their speed.

1.2.2.3 Environmental impact

Reduction of environmental impacts due to re-routed vehicles can be estimated, if the additional length of the alternative route is appropriate to the congestion length. As an example, a guide value determined in Hessen is that for one km congestion length along a long-distance corridor the alternative route should not be more than 3 km additional length, assuming that both routes have similar road and environmental conditions and a high compliance rate for rerouted vehicles.

TMPs are also highly relevant in order to improve air quality in cities, e.g. by traffic information or traffic management measures.

1.2.2.4 Network efficiency

The main benefit in terms of network efficiency is the reduction in delays and travel time through the use of effective and timely control and information measures in the case of major incidents. (Up to 82-95% of total benefits were estimated in several case studies in Germany which arose from travel time savings due to co-ordinated re-routing measures).

Within TMPs not just the disrupted road section but the whole surrounding network (and sometimes even other transport modes) is taken into account. This ensures a more efficient use of existing traffic infrastructure.

Detailed evaluation results of re-routing TMPs are given in the bibliography of examples.

1.2.3 Current status of deployment

There are a lot of different services "Traffic Management Plan for corridors and networks" deployed in Europe (local, regional, national, cross-border, conurbation....). For more details, see Part B of this DG and (2).

1.2.4 European Dimension

Development and application of TMPs in a co-ordinated manner across Europe allows for the effective utilisation of the European road network and delivery of an integrated service to road users using the road network at regional/conurbation, cross-regional and cross-border traffic management levels. The cooperation and collaboration of road operators and service providers across Europe ensures an appropriate level of service for TMPs for corridors and networks, it also enables the consistent and timely delivery of traffic control, guidance and information measures across corridors and allows for effective coordination across traffic modes and traffic management and traffic information stakeholders, when necessary.

2 Part A: Harmonization Requirements

2.1 Service Definition

"Traffic Management Plan for Corridors and Networks" means the elaboration, application and quality control of Traffic Management Plans (TMP) for the management of the European network and corridors including 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).

A TMP is the pre-defined allocation of a set of measures to a specific situation in order to control and guide traffic flows as well as to inform road-users in real-time and provide a consistent and timely service to the road user. Initial situations can be unforeseeable (incidents[3], accidents) or predictable (recurrent or non-recurrent events[4]). The measures are always applied on a temporary basis.

Four spatial levels are suited to the elaboration of such complex TMPs:

- **Regional TMPs:** for networks within areas or regions on the TERN that can be extended, under certain conditions, to link with neighbouring regions for cross-regional and cross-border levels.
- **Cross-regional TMPs:** for national networks and key corridors on the TERN covering multiple regions
- **Cross-border TMPs:** for cross-border networks and key corridors on the TERN and
- **TMPs for conurbations:** conurbations and the urban/inter-urban expressways network with relevance to long-distance traffic.

2.2 Functional Requirements

2.2.1 Overview

The whole functionality of Traffic management plan for corridors and networks service can be divided into three different phases which by their nature strongly differ:

- **TMP elaboration phase:** generally the service is a common management task of various organisations involved, not only in combining other different TMS and TIS services, but also with the effects on networks of different authorities. Hence a thorough preparation of the service and documentation by means of intermediate deliverables is a MUST to create and agree upon a clear common understanding between all stakeholders involved
- **TMP operation phase**: this is the phase where the actual service is provided to the end user
- **TMP evaluation phase:** generally traffic and traffic conditions change rapidly, particularly if end users change their behaviour when confronted with traffic management measures. Hence a thorough analysis of the service impacts and – if necessary - revision of the service organisation is also a MUST and should be undertaken recurrently. The evaluation results must be documented and, in-turn, provide input for improving the service.

Setting up a service Traffic management plan for corridors and networks normally leads to high costs, not only in the elaboration phase but most importantly with regard to operation and evaluation, which are recurrent costs. To prevent incorrect decisions, particularly in the elaboration phase, different process steps must be run through and each concluded with resulting documentation as an intermediate deliverable which then provides decision possibilities for the next step.

[3] Incident: situation on the road that is not expected, foreseen, and which may or may not lead to an accident (collision) but impacts on the safety and/or capacity of the road network for a limited period of time.

[4] Event: Unexpected situation that happens on the road, but doesn't necessarily have a negative impact on safety and/or capacity.

The phase concept of the service is depicted in the following figure:

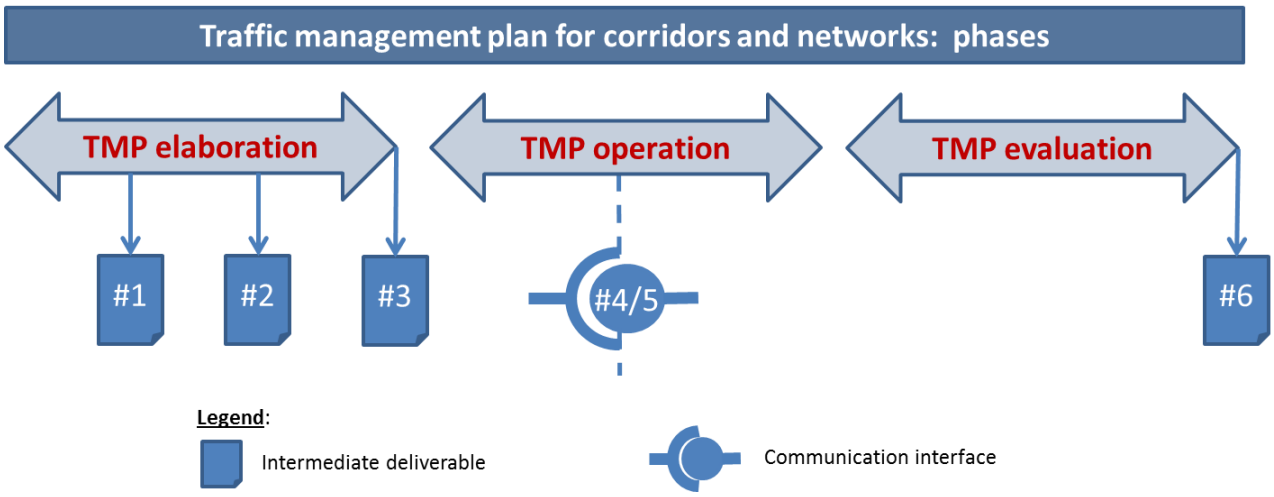


Figure 3: Traffic management plan for corridors and networks – phase concept

2.2.2 TMP elaboration phase

2.2.2.1 Functional architecture

The following figure shows the functional architecture of a service "Traffic Management Plan for Corridors and Networks" in the elaboration phase as a generic approach. This model is used to identify where it is appropriate to segment the whole functionality of the service into sub-phases (see vertical lines) and to provide intermediate deliverables to create and ensure a common understanding between the different parties involved.

Functional requirement:

- **FR1**: Decomposition of the TMP elaboration phase into sub-phases (process steps) with the provision of intermediate deliverables **must** be carried out in those cases where the service is carried out by two or more (not closely related) organisations (and decomposition is recommended in any case to be prepared to involve yet further parties as may be the case in the future)

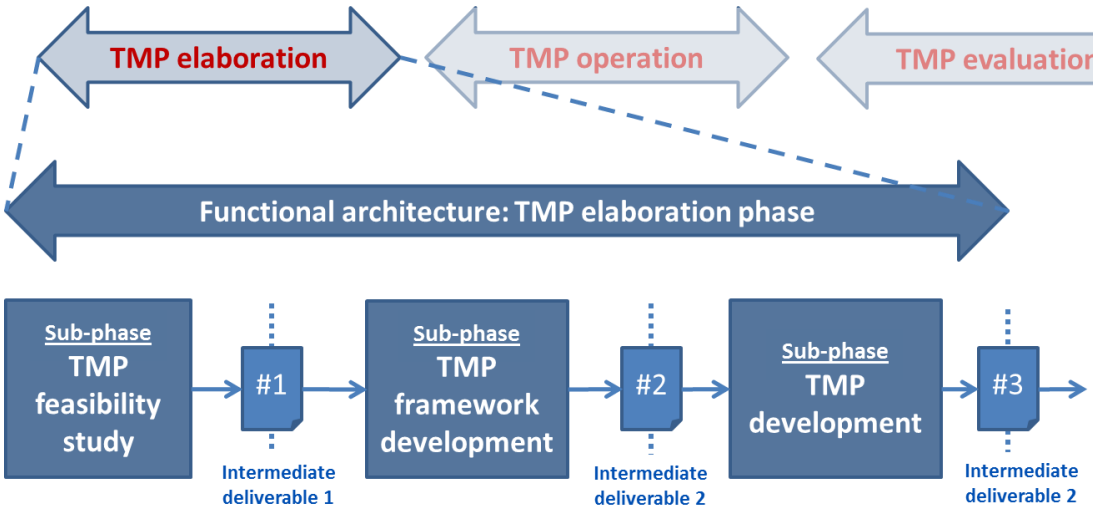


Figure 4: Functional architecture: TMP elaboration phase

2.2.2.2 Sub-phase 1 "TMP feasibility study"

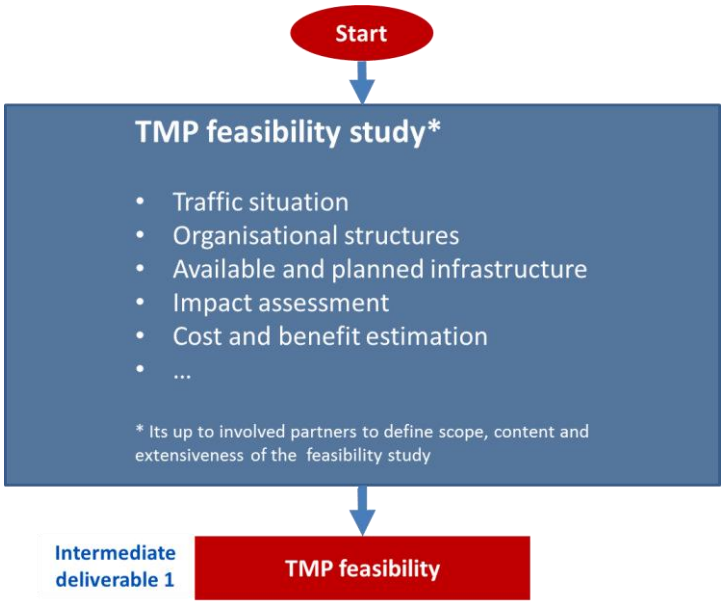


Figure 5: Functional architecture: sub-phase "TMP feasibility study"

Functional requirement:

- **FR2**: A TMP feasibility study **must** be processed and a TMP feasibility document as intermediate deliverable 1 **must** be delivered as input for the next sub-phase (TMP framework development).

2.2.2.3 Sub-phase 2 "TMP framework development"

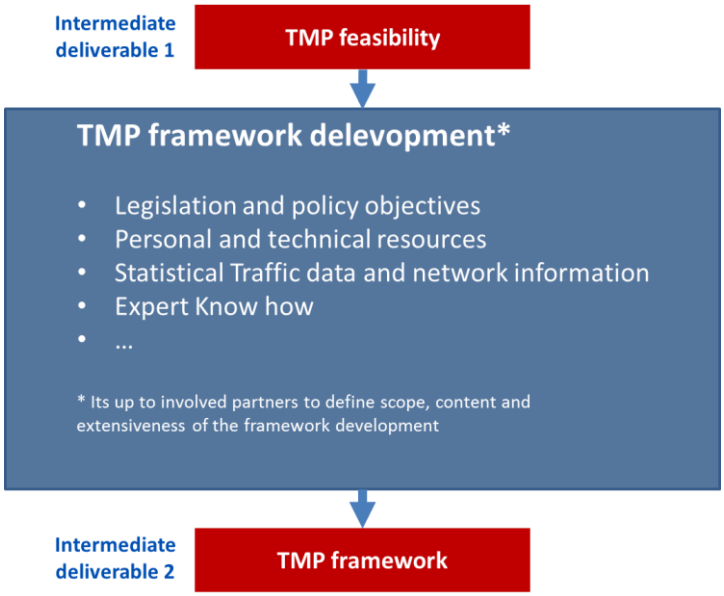


Figure 6: Functional architecture: sub-phase "TMP framework development"

Functional requirement:

- **FR3:** Based on the input of sub-phase TMP feasibility study (intermediate deliverable 1) a sub-phase TMP framework development **must** be processed and a TMP framework document as intermediate deliverable 2 **must** be delivered as input for the next sub-phase (TMP development).

2.2.2.4 Sub-phase 3 "TMP development"

Note: Concerning the information structure of TMPs there exist different wordings in Europe (see also chapter 3.1 TMPP terminology wording). For the purpose of unambiguous understanding in part A of this guideline, only the following wording is used:

- Incident, event - initial situation which causes the application of measures
- Measure - possible reaction to respond to the impact of the initial situation
- Strategy - set of measures appropriate to respond to the impact of the initial situation
- Scenario - one initial situation combined with a set of measures
- Action - one measure can consist of various actions

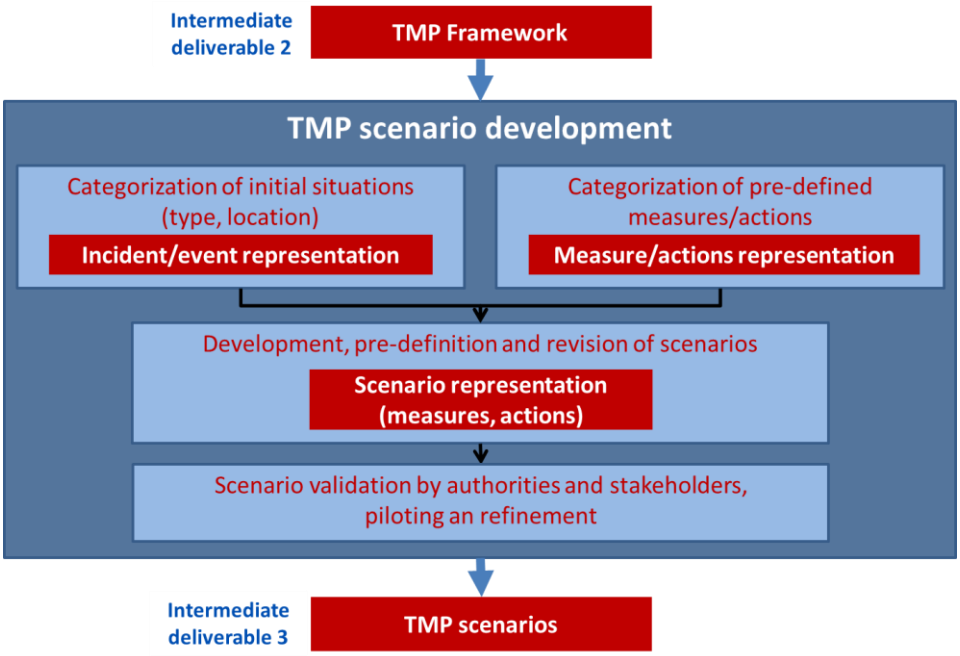


Figure 7: Functional architecture: sub-phase "TMP development"

Note: in Europe, different methods for detection, verification and reporting of incidents are used. These methods are not covered by this DG.

Functional requirement:

- **FR4:** Based on the input of sub-phase TMP framework development (intermediate deliverable 2) a sub-phase TMP scenario development **must** be processed and a TMP scenarios document as intermediate deliverable 3 **must** be delivered as input for the next phase (TMP operation).

Interface requirement:

- **FR5:** As long as appropriate DATEX II profiles are not available, TMP-scenarios **should** be profiled in the following information structure (if no information is available for an element, value can be omitted):
  - List of incidents/events
    - Incident/Event name
    - Incident/Event type
    - Incident/Event Location (section, direction)
    - Expected duration, traffic impact or congestion length if available

- Spatial dimension (area and network affected by)

o List of measures

- Name of measure
- Implementing organisation(s)
- List of actions (Name of action, Definition of action)

o List of scenarios (to respond)

- Scenario name
- spatial application (area and network)
- Thresholds for activation/deactivation
- List of associated measures
- expected maximum response times
- organisational chain (list of involved organisations and competences)
- Prioritization

2.2.3 TMP operation phase

2.2.3.1 Functional architecture

The following figure shows the typical functional architecture of a service "Traffic Management Plan for Corridors and Networks" in the operation phase. The vertical lines show, where it is appropriate to segment the whole functionality of the service into sub-functions.

Functional requirement:

- **FR6**: Functional decomposition of the TMP operation phase into two sub-functions with the provision of interfaces 4 and 5 **must** be carried out to ensure interoperability in those cases where the service is carried out by two or more (not closely related) organisations (and functional decomposition is recommended in any case to be prepared to involve yet further parties as may be the case in the future)

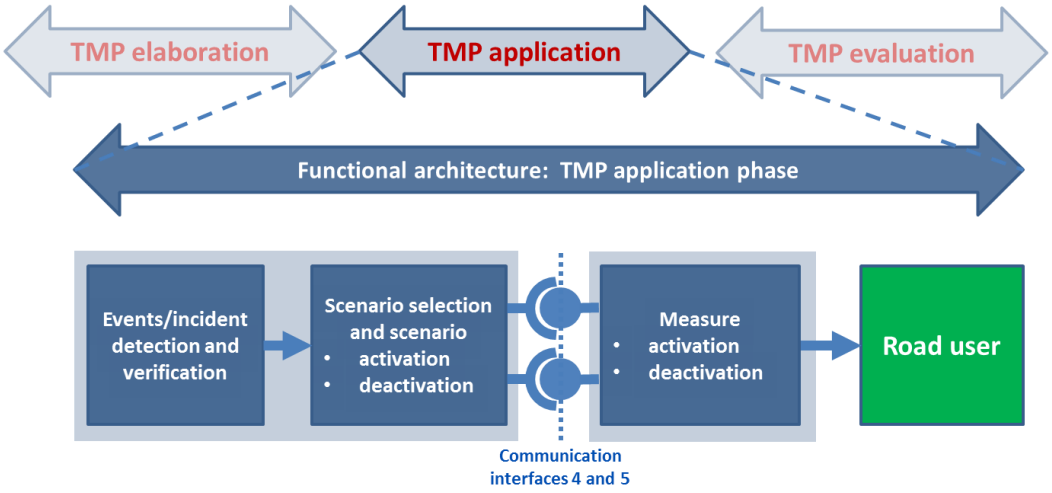


Figure 8: Functional architecture: TMP operation phase

2.2.3.2 Sub-function 1 "Scenario/measure activation"

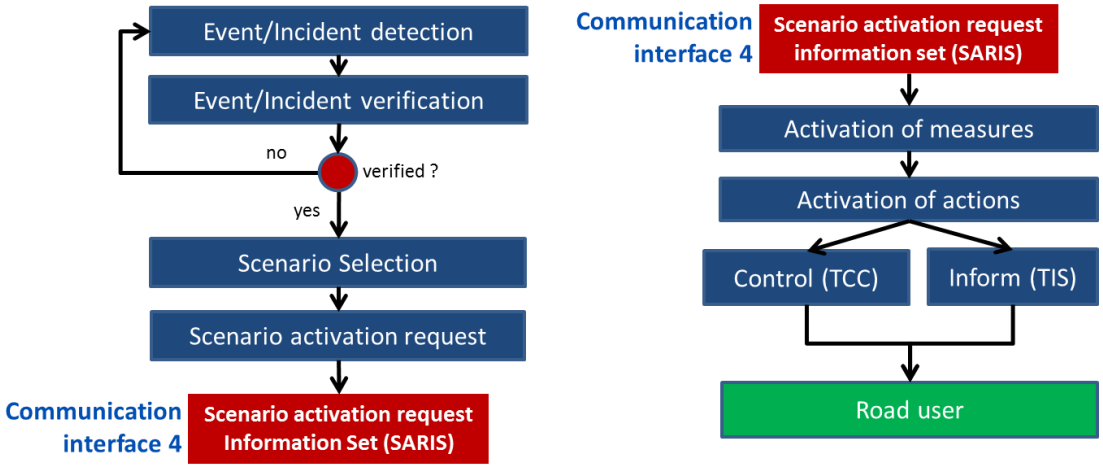


Figure 9: Functional architecture: Sub-function 1 "Scenario/measure activation" and interface 4

Functional requirement:

None

Interface requirement interface 4:

- **FR7:** As long as appropriate DATEX II profiles are not available, the sub-functions scenario activation/measure activation **should** require/provide an interface 4 profiled in the following information structure (if no information is available for an element, value can be omitted):
  - SARIS – Scenario activation request information set
    - Time stamp of request
    - Incident/event type and location
    - Name of requesting organisation and person contact details
    - Name of organisation requested
    - Scenario name or ID
    - Current status of scenarios on network (active/inactive)
    - Description of requested scenario
    - List of organisations who have to be involved
  - Optional Information to include in SARIS, when available:
    - Description of incident/event duration and gravity
    - Time stamp of incident/event detection/reporting
    - Normal route/alternative route
    - Spatial application (area and network)
    - Traffic situation on network
    - Thresholds for activation
    - Thresholds for deactivation
    - Maximum response times (time-out procedures)
    - Prioritization

2.2.3.3 Sub-function 2 “Scenario/measure deactivation”

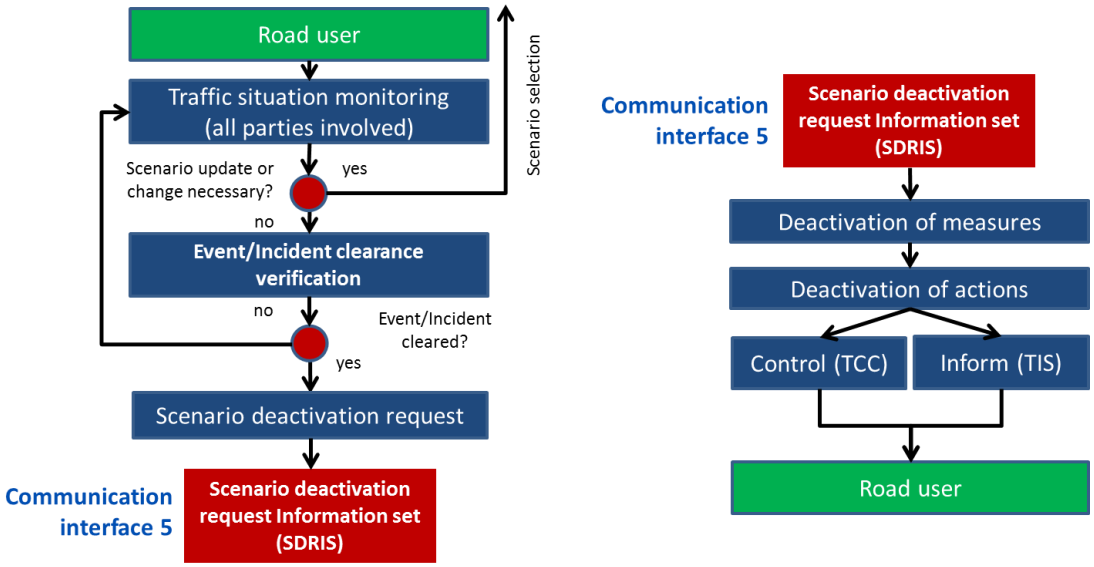


Figure 10: Functional architecture: Sub-function 2 “Scenario/measure deactivation” and interface 5

Functional requirements:

None

Interface requirement interface 5:

- **FR8:** As long as appropriate DATEX II profiles are not available, the sub-functions scenario/measure deactivation **should** require/provide an interface 5 profiled in the following information structure (if no information is available for an element, value can be omitted):
  - SDRIS – Scenario deactivation request information set
    - Time stamp of request
    - Incident/event type and location
    - Name of requesting organisation and person contact details
    - Name of organisation requested
    - Scenario name or ID

2.2.4 TMP Evaluation phase

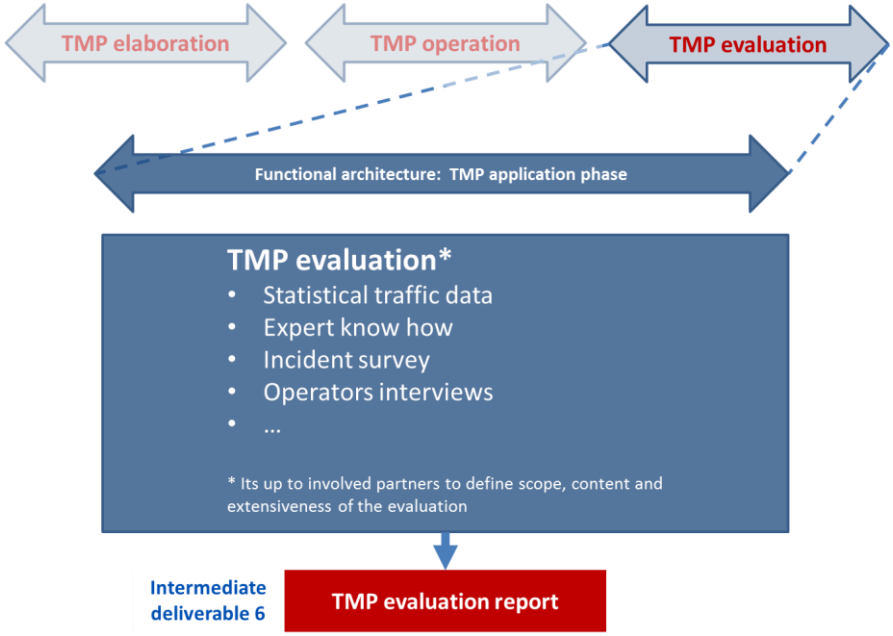


Figure 11: Functional architecture of "TMP evaluation"

Functional requirements:

- **FR9:** Important and frequently applied TMPs **must** be assessed and preferably periodically adjusted and a TMP evaluation document as intermediate deliverable 6 **must** be delivered as input for a possible necessary improvement of the TMP operation. Hence an evaluation model and an evaluation process **must** be defined.
- **FR10:** The TMP evaluation process **should** compile various sources of information like:
  - Statistical traffic data
  - Experiences of road authorities and operators
  - Survey of incidents with Scenarios (and measures) activated
  - Interviews and questionnaires with operators and road users
  - …

2.3 Organisational Requirements

2.3.1 Stakeholders roles to respect and to involve

Typical TMP-stakeholders-roles are:

- Primary Stakeholders (motorway TMPs)
  - Road Operators: public/private road organisations and companies in charge of management of road links and networks
  - Enforcement: national and regional traffic police
  - Service Providers: broadcasting companies, public and private traveller information service providers
  - Emergency Services: fire and emergency services
  - Border authorities (customs and border guard)
  - National and Regional Organisations: Ministries and regional administrations (e.g. ministry of transport, ministry of the interior, ministry of civil works, ministry of environment, ministry of public administrations), national, federal State, regional road organisations and municipalities
- Additional primary stakeholders in case of conurbation TMPs:
  - Local traffic control centre and other involved departments of cities and municipalities
  - Local police / local forces of law and order
  - Local public transport organisation
  - Car park operators
  - Event organisers (e.g. fairs)
  - Maritime port and inland port authorities
  - Railway authorities
  - Airport authorities
  - Local press and broadcasting companies
- Additional Stakeholders in the context of future strategic alignment of TMPs:
  - Automotive industries
  - Telecom operators sector
  - Association of freight and logistics traffic
  - ASECAP (European Association of Operators of Toll Road Infrastructures)
  - IT-infrastructure industries
  - Consultants and consultant associations

Organisational requirement:

- **OR1:** All different Stakeholder roles needed to be involved in the three phases of the service **must** be considered and defined (role concept)

2.3.2 TMP elaboration phase processes

TMP Feasibility study process

Possible initial situations are:

- Existing (traffic) situations including type, number and distribution of incidents,
- Potential emergencies and expected incidents (preventative)
- General (political) objectives

Organisational requirement:

- **OR2**: For the TMP Feasibility study process the following (or comparable) process steps **should** be executed:
  - Definition of common policy goals and common interests
  - Definition of the involved partners and their scope of responsibility
  - Consideration of legal bases, regulatory framework
  - Identification and analysis of the influence area (geographic area) which is often variable and dependent on the incident type and duration (capacity reduction) and the affected resource (network capacity)
  - Identification and analysis of bottlenecks, in accordance with the OE-classification (sections of an acceptable route with a traffic capacity substantially below that characterizing other sections of the same route).
  - Inventory of existing (road rail harbour and other) infrastructure (capacity, technical control and equipment packages, communication, topology, traffic ability for different vehicles, planned extensions)
  - Statistical surveys of traffic volumes and speeds (if possible including aspects of travel behaviour)
  - Survey of traffic characteristics (share of vehicle types, share of local, regional and long-distance traffic, destination of traffic etc.)
  - Approach for detecting incidents:
  - Preliminary detection of problems / incidents (possible proceedings: interviews with experts, analysis of traffic messages, incident database, calculation of the estimated occupancy, control tours, analysis of system data)
  - Manual / Real-time detection
  - Inventory of existing and planned monitoring systems, control systems and information systems
  - Definition of current, planned and necessary additional technical infrastructure

TMP development process

Organisational requirement:

- **OR3:** For the TMP development process the following (or comparable) steps **should** be executed:
  - TMP development
    - Categorisation of incidents, definition of incident thresholds for activation of a TMP
    - Definition of other thresholds / conditions for TMP activation at the local and cross-organisational levels
    - Development of methods for detection / control
    - Location codes and geo-referencing frameworks
    - Development of measures and actions

- Strategy prioritization in case of overlapping strategies / interests
- Strategy transitional phases, if needed
- Thresholds / conditions for activation and deactivation
- Development of computerised decision support tools such as traffic situation and impact modelling and strategy selection advisor, when necessary
- Organisational / technical aspects of evaluation / quality management
- Update and refinement of developed TMPs
- Formal approval of strategies and measures
- Set up of organisational structure for full-scale elaboration and monitoring
- Full-scale elaboration of TMPs

- TMP validation by stakeholders, piloting refinement
  - Formal approval of strategies and measures
  - Set up of organisational structure for full-scale elaboration and monitoring
  - Field testing of TMPs (if possible)
  - Update and refinement of developed TMPs
  - Full-scale elaboration of applicable TMPs

2.3.3 TMP regulatory framework

Common partner arrangement/MoU - Memorandum of understanding

Clear definitions of organisational aspects are a crucial precondition for the successful implementation of a TMP service and should be documented and agreed by all involved parties/partners in the form of a Common partner arrangement/MoU (Memorandum of understanding) which fixes the co-operation.

However, due to the fact that the partners are public or private road organisations who are legally autonomous to varying degrees and, in the international context, sometimes even work on different national laws, it is not required to define organisational aspects on a legal and binding basis.

The documents should define the modes of co-operation and must contain operation instructions for the afore-mentioned aspects. Thus they should be thoroughly verified before signature. Both documents are a declaration of intent to fulfil them but are not legally binding. The appointment should be concluded in written form, on the one hand because it requires a clear common understanding of the cooperation and on the other hand because the signing of the contract can be seen as a milestone with appropriate media savvy. For an example, see Annex B.

As content of the Common partner arrangement/ MoU - Memorandum of understanding rules of procedure should be determined answering the following questions:

- Who are the points of contact within the participating TCCs?
- What media (incl. fall back) is used for Systems for scenario / strategy co-ordination?
- Which language is used for scenario / strategy co-ordination?
- Who is allowed (and bound) to request a strategy under which conditions?
- What degree of flexibility is allowed under each pre-defined strategy?
- Who is allowed to accept or reject 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 procedure)

- Do the partners have to justify their decision?
- Is it desired that partners get insight into the traffic situation of each other?
- 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?

Through a detailed technical annex the Common partner arrangement/MoU (Memorandum of understanding) should contain the list of scenarios, activation and de-activation thresholds, organisational structure, communication templates, operating protocols, etc., to be evaluated and updated on a regular basis.

Organisational requirement:

- **OR4:** For the successful implementation of a "Traffic management plan for corridors and networks service" all necessary organisational aspects **should** be documented and agreed by all involved parties/partners to fix the co-operation

Organisational advice:

- Preceding the finalisation of the documents and the agreement upon the co-operation extensive off-line and on-line testing of proposed TM strategies and measures should be executed to refine and validate the process, prior to agreeing a formal long-standing process.

Public-private partnerships

A new challenge is the ever increasing number of public-private partnerships in the field of traffic management. Here, where private stakeholders execute sovereign tasks or receive data, binding contracts should be developed and closed. Another relevant aspect is the use of privately generated data for traffic management. A contract (with service level agreement) should be a MUST wherever the TMP relies on receiving privately generated data.

Organisational requirement:

- **OR5**: In the case of involving private partners for the delivery of privately generated data for a "Traffic management plan for corridors and networks service", a service level agreement **should** be developed and closed wherever a TMP relies on receiving privately generated data

2.3.4 Forms of service operational organisation

Different organisational structure principles exist to manage the service operation:

Centralised operational organisational structure

In this structure the coordinator is obliged to decide about the activation and deactivation of the TMP. According to specific conditions, the partner has to carry out the actions under his command.

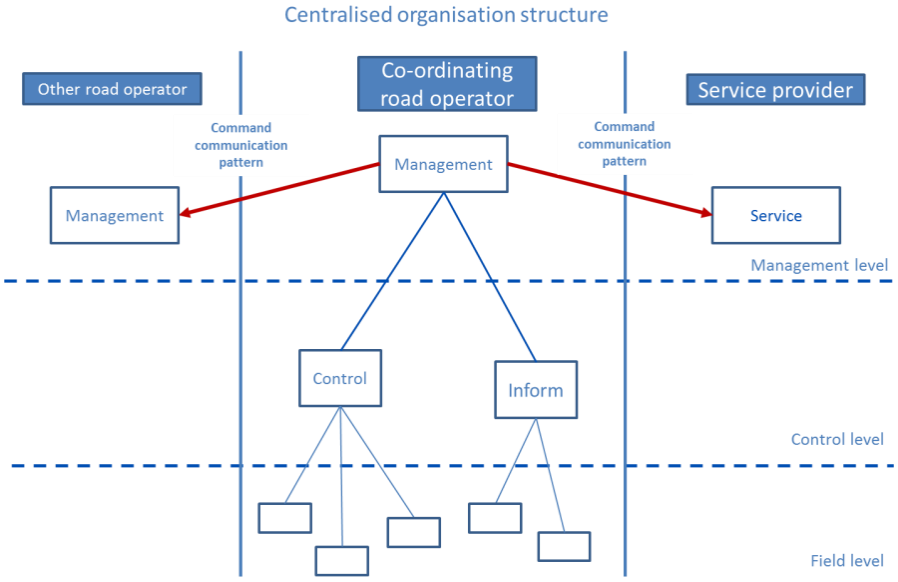


Figure 12: Centralised service value chain organisation

Decentralised operational organisational structure

In this organisational structure TMPs are applied in close collaboration between legally autonomous partners. The scenario is requested from the partner affected by the incident. It can be accepted or rejected from every collaboration partner with varying rights according to the MoU agreement.

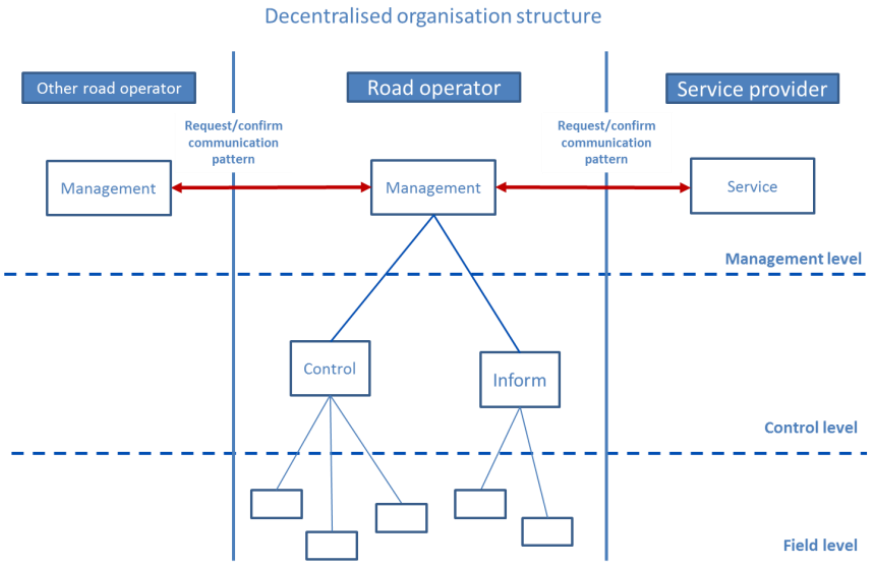


Figure 13: Decentralised service organisation

Mixture of centralised and decentralised operational organisational structure

Several organisations involved are structured differently at various levels of event information and TMP activation/deactivation communication. This also includes special forms of organisations in which private parties are contractually included to manage TMPs.

Organisational requirement:

- **OR6**: Stakeholders involved in service operation **must** agree on one of the following operational organisational structures applying the corresponding communication pattern to carry out scenario activation/deactivation:
  - centralized structure applying the “Command” communication pattern (see TR1)
  - decentralized structure applying the “Request/confirm” communication pattern (see TR2)
  - mixture of centralised and decentralised structure applying a combination of the “Command” and “Request/confirm” communication pattern

2.4 Technical Requirements

2.4.1 ICT Infrastructure requirements

No specific requirements or advice.

2.4.2 Standards and Agreements: Existing and Required

2.4.2.1 DATEX II-Profiles

Interoperable interfaces between systems are essential for many EasyWay objectives like continuity of services and cross-border traffic management cooperation. Hence, EasyWay has itself decided to actively contribute to the establishment of the required standardisation efforts by launching its dedicated working group ESG5 and liaising with the relevant European standardisation body, namely with CEN TC278 WG8 (“Road Traffic Data”). The result of this cooperation is the “DATEX II” specification for interoperable machine-to-machine communication of ITS services, available as European Standard CEN/TS 16157. This specification is used throughout EasyWay for interoperable access to dynamic traffic and travel data.

Note: At present, a DATEX II profile for Interface 3 - Scenario (measure, Action) representation and interfaces 4 and 5 - Scenario activation/deactivation request Information sets (SARIS/SDRIS) are not available. As in the framework of EasyWay, there are cross-border pilots (Spain/France, Netherlands/Germany, Spain/Portugal) dealing with the elaboration and testing of DATEX II models for TMPs, where DATEX II profiles are expected in the near-future. The current status is:

- A draft extension of a DATEX II model for TMP has been created.
- A cross-border TMP (Spain and France) was modelled using the new extension which fulfils all of the requirements for TMP
- Currently, a cross border TMP for rerouting (Netherland and Germany) is being modelled.
- A Pilot will be done between Spain and Portugal (it starts in January 2012)
- Several further agreements are needed before the final extension to model a TMP is available
- A new exchange mechanism is needed (elaboration in process)

Technical advice:

- As long as DATEX II profile standards for the representation of TMP scenarios (see FR5) and Scenario activation/deactivation (FR7/FR8) are not available own interface-specifications should be used, which correspond to the information structure outlined in chapter 2.2 "Functional requirements" and which are agreed by all parties involved.

2.4.3 Need for Additional Specifications

2.4.3.1 Scenario activation/deactivation communication patterns

TMP partners use a variety of communication platforms to communicate scenarios. See Part B Examples of deployment.

Centralised organisation structure

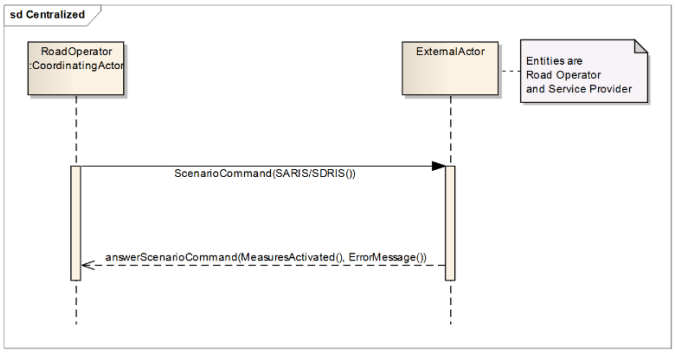


Figure 14: Command communication pattern

Decentralised organisation structure

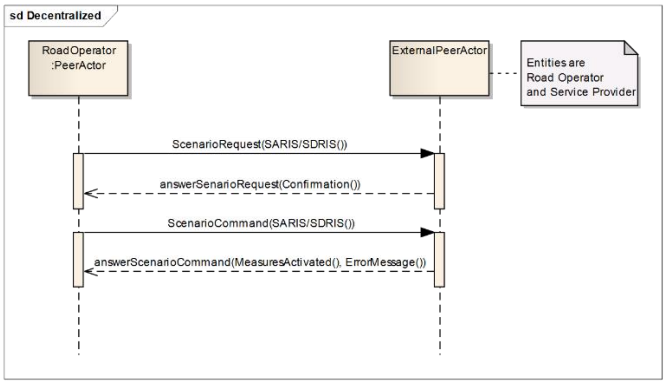


Figure 15: Request/confirm communication pattern

Technical requirement

- **TR1**: Independent of specific communication media, the following communication patterns **must** be applied for scenario activation/deactivation communication between TMP partners:
  - In case of a centralised service value chain organisation (see figure 12) requiring interoperability between two or more different organizations the “Command” communication pattern **must** be applied in the communication protocol as depicted in the UML-diagram5 in figure 14.
  - In case of a decentralised service value chain organisation (see figure 13) requiring interoperability between two or more different organizations the “Request/confirm” communication pattern **must** be applied in the communication protocol as depicted in the UML-diagram in figure 15.
  - In case of a mixture of centralised and decentralised service value chain organisation requiring interoperability between two or more different organizations a combination of the “Command” and “Request/confirm” communication pattern **must** be applied

[5] Unified Modelling Language (UML) is a standardized general-purpose modelling language in the field of object-oriented software engineering. The standard is managed, and was created, by the Object Management Group. It was first added to the list of OMG adopted technologies in 1997, and has since become the industry standard for modelling software-intensive systems

2.5 Common Look & Feel

2.5.1 Re-routing signage

Common Look & feel requirements:

- **CL&FR1**: The core message of information provided for the end user **should** always be consistent whatever the media or end user device used for distribution.
- **CL&FR2**: The display of signs/pictograms on VMS or other end-user devices **should** be in accordance with prevailing national road codes and where applicable in line with the requirements of the EW-DG for Variable Message Signs Harmonisation VMS-DG01:
  - MS which ratified the 1968 Convention MUST respect the 1968 Convention and SHOULD consider the Consolidated Resolution on Road Signs and Signals (R.E.2);
  - MS which did sign but not ratify the 1968 Convention SHOULD follow the 1968 Convention and also consider the R.E.2.

It is up to the deploying road operator to ensure that real signs are well and widely understood by the road users.

- **CL&FR3:** In the case of cross-border re-routing arrow signs on VMS located at a the choice point or exit point as complementary icon to the explanatory VMS text information in order to indicate the rerouting road to follow choice point rerouting signs according to the Vienna Convention, Rev.2 27 May 2010, Annex 10, G23, **should** be used.

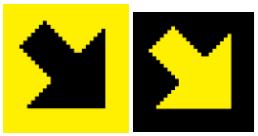


Figure 16: Choice point re-routing signs, Vienna Convention, Rev.2 27 May 2010

- **CL&FR4:** In the case of cross-border re-routing signs along the alternative road to confirm to the user he is on the right re-routing road confirmation rerouting signs according to the Vienna Convention, Rev.2 27 May 2010, Annex 10, G23, **should** be used:
  - on VMS (when VMS are available on the alternative road)
  - as static signs in order to mark the rerouting all along the alternative road (at the intersections and along links, to confirm e.g. every 5 km)

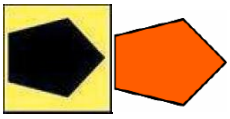


Figure 17: Confirmation re-routing signs, Vienna Convention, Rev.2 27 May 2010

2.5.2 TMP elaboration document structure

Common Look & feel requirement:

- **CL&FR5:** In order to facilitate the comprehension of TMP documents between various bodies they **should** respect the common structure of the TMP framework document (intermediate deliverable 2):

Chapter	Objectives	Content
1. Objectives and territorial TMP area	Define TMP Objectives and TMP area	• Main TMP Objectives. • TMP area, identification of network covered by the TMP and associated rerouting network.
2. TMP generalities	Provide a synthetic TMP view in order to facilitate the comprehension.	• Authorities involved. • Operational Organisation • Main issues regarding: o User's information, o Traffic management measures to be implemented.
3. Operational organisation	Describe the operational organisation to put in place for the operational TMP running.	• Authorities and actors. • TMP activation responsible and procedures. • TMP running. • TMP deactivation procedure.
4. Organisation of user's information dissemination	Describe the organisation to put in place for the dissemination of user's information.	• Main entities in charge of elaboration of the information to be displayed in case of crisis situation. • Media to be used (VMS, radio, broadcaster…) • Transmission means.
5. TMP technical management	Provide technical decision tool to authorities and actors involved in order to facilitate the choice of the adapted scenarios, measures and actions to be taken face to a specific situation.	• Technical Guide. • Map, location of events... • Decision table. • List of scenarios, measures and actions. • Main alternative roads. • Actors to be contacted.
6. Contact list	Provide an updated actors' TMP contact list.	• Details of actors (tel, email, fax…).
7. Annexes	Provide any other complementary information	• Memorandum of Understanding • Technical data….

Table 2: TMP elaboration document structure

2.6 Level of Service Definition

2.6.1 Preliminary remark

The scope of EasyWay is to provide Core European Services to the European road users. These services are harmonized in content and functionality, but also in their availability: The road users shall be able to expect a certain services offer in a specific road environment. In order to provide a basis for the harmonization process EasyWay needs a tool to define such environments in an agreed manner. This tool is the Operating Environments – a set of pre-defined road environments combining physical layout of the road and network typology with traffic characteristics.

In essence, EasyWay has agreed on a set of 18 pre-defined Operating Environments (OE) where each OE is a combination of three criteria:

- Physical characteristics – Motorways, other 3/4 lane roads or 2-lane roads
- Network typology – Corridor, Network, Link or Critical spot
- Traffic characteristics – Traffic flow and road safety situations (with optional additions)

For more information and details, visit http://www.easyway-its.eu/document-center/document/open/490/ and download the Guidance for Classifying the EasyWay Network into OE ver 1.0.

2.6.2 Level of Service Criteria

Level of Service: Traffic Management Plan for Corridors and Networks			
Core Criteria	**A**	**B**	**C**
Coverage	Critical spots coverage	Spatial expansion of the service, linkages	Total network coverage (all critical spots)
Availability to time	Service periodically ensured during critical periods	Extended availability, when required	Service 24/7 ensured
System* availability	One sole system available	Diverse systems	Diversity of systems: consistent information and traffic management measure support
Consistency	Consistent local road user guidance	Consistent road user guidance along the routes	Global consistency of road user information through any media along the route
European network approach	Knowledge and scenario sharing between neighbouring regions	Cross-border scenario consistency	Coordinated deployment of common measures, including conurbation areas
* Traffic control und guidance systems, event and traffic condition and travel time information systems			

Table 3: Level of Service Criteria

2.6.3 Level of Service Criteria related to Operating Environment

LoS requirement:

- **LoSR1**: In the case that pre-deployment surveys / evaluations provide the necessary evidence to proceed with the deployment of the ITS-service "Traffic Management Plan for Corridors and Networks", the minimum and optimum LoS **should** respect the following Level of Service to Operating Environment mapping table.

ELEMENT OF TRAFFIC MANAGEMENT PLAN SERVICE FOR CORRIDORS AND NETWORKS Criteria for the Levels of Service [reference TMS - DG07]			EasyWay OPERATING ENVIRONMENT																	
			C1	T1	T2	T3	T4	R1	R2	R3	R4	R5	R6	R7	R8	S1	S2	N1	N2	P1
Coverage	C	Total network coverage (all critical spots on the network)														O	O	O	O	O
	B	Spatial expansion of the service, linkages			O	O	O		O	O	O			O	O		M		M	
	A	Critical spots coverage	OM	OM	M	M	M	NA	M	M	M	NA	OM	M	M	M		M		M
Availability to time	C	Service 24/7 ensured															O		O	
	B	Extended availability	O			O	O							O	O	O		O	M	OM
	A	Service periodically ensured during critical periods	M	OM	OM	M	M		OM	OM	OM		OM	M	M	M	M	M		
System Availability	C	Diversity of systems: consistent information and traffic management measure support														O		O		O
	B	Diverse systems	O		O	O	O		O	O	O		O	O	O		O		O	
	A	One sole system available	M	OM	M	M	M	NA	M	M	M	NA	M	M	M	M	M	M	M	M
Consistency	C	Global consistency of road users information through any media along the routes														O	O	O	O	
	B	Consistent road user guidance along the routes																		O
	A	Consistent local road user advice along routes	OM	OM	OM	OM	OM	NA	OM	OM	OM	NA	OM	OM	OM	M	M	M	M	M
Level of Coordination	C	Coordinated deployment of common measures, including conurbation areas																		
	B	Cross-border scenario consistency		O	O	O	O									O	O	O	O	O
	A	Knowledge and scenario sharing between neighbouring regions	NA	M	M	M	M	NA	OM	OM	OM	NA	OM	OM	OM	M	M	M	M	M

Recommendations for LoS per OE:				
	M	Minimum LoS recommended	O	Optimum LoS recommended
	OM	Minimum = Optimum	NA	Non applicable

Table 4: Level of Service to Operating Environment mapping table

OE	Explanation
C1	critical or black spots, local flow-related traffic and/or safety problems
T1	motorway (link), no flow-related traffic problems and no critical safety problems
T2	motorway (link), no flow-related traffic problems, safety problems
T3	motorway (link), daily flow-related traffic problems, no critical safety problems
T4	motorway (link), daily flow-related traffic problems, safety problems
R1	two-lane roads, no flow-related problems, no critical safety problems
R2	two-lane roads, no flow-related traffic problems, safety problems
R3	two-lane roads, seasonal or daily flow-related problems, no critical safety problems
R4	two-lane roads, seasonal or daily flow-related traffic problems, safety problems
R5	three-/four-lane roads, no flow related problems, no critical safety problems
R6	three-/four-lane roads, no flow related traffic problems, safety problems
R7	three-/four-lane roads, seasonal or daily flow related traffic problems, no critical safety problems
R8	three-/four-lane roads, seasonal or daily flow related traffic problems, safety problems
S1	motorway corridor or network, seasonal flow-related problems
S2	motorway corridor or network, daily flow-related traffic problems
N1	road corridor or network, seasonal flow-related problems
N2	road corridor or network, daily flow-related problems
P1	peri-urban motorway or road interfacing urban environment

OE type	Number	Flow-related traffic impact				Potential safety concerns	
		NO	SEASONAL	DAILY		NO	YES
Critical spots							
C	1		X	X	and/or		X
Motorway links							
T	1	X			and	X	
	2	X			and		X
	3		X	X	and	X	
	4		X	X	and		X
Road links							
R	1	X			and	X	
	2	X			and		X
2 lanes	3		X	X	and	X	
	4		X	X	and		X
R	5	X			and	X	
	6	X			and		X
3/4 lanes	7		X	X	and	X	
	8		X	X	and		X
Motorway corridor or network							
S	1		X		and		(X)
	2			X	and		(X)
Road corridor or network							
N	1		X		and		(X)
	2			X	and		(X)
peri-urban motorway or road							
P	1		X	X	and		(X)

Table 5: Legend - EasyWay Operating Environments for Core European ITS Services.

3 Part B: Supplementary Information

EasyWay Deployment Guidelines are twofold:

- *Part A elaborates on the content of the ITS service addressed, including the entire deployment framework including Requirements and Levels of Services.*
- *Part B is an appendix of educational content. Its objective is to illustrate part A with examples and feedback from deployments in the field.*

This lively chapter is subject to continuous development and update. It consists in a database of national practices and experiences which, as cross-fertilisation material, can benefit any road operator in Europe.

Bearing in mind the cyclic nature of the elaboration of EasyWay Deployment Guidelines, one can assume that the first edition of the 2012 Guidelines will not yet include users' experience on its content. Forthcoming ITS deployments based on part A of this Deployment Guideline will generate feedback which will in-turn be integrated into the next revised version of part B.

3.1 TMP terminology wording

Concerning TMP terminology there are existing different wordings in Europe.

In connection with re-routing TMPs (mainly applied in the northern European states (e.g. Germany, Austria)), the categorization of an initial incident is named scenario. The allocation of a set of measures to a defined scenario is called a strategy. Each of the measures describes, who does what and who is responsible for what.

In connection with multi-measure TMPs (mainly applied in the southern states and France), a strategy is considered to be objectives on a more general / political level. The correlation between the defined incident and the set of measures is called a scenario. Each of the measures is composed of different actions for each involved partner. The table of measures helps to determine all possible and applicable measures of traffic regulation, control and management which might help to solve or minimize it effect of the incident.

Because of these different definitions, in the following the correlation between a defined incident and the set of measures is named "scenario / strategy".

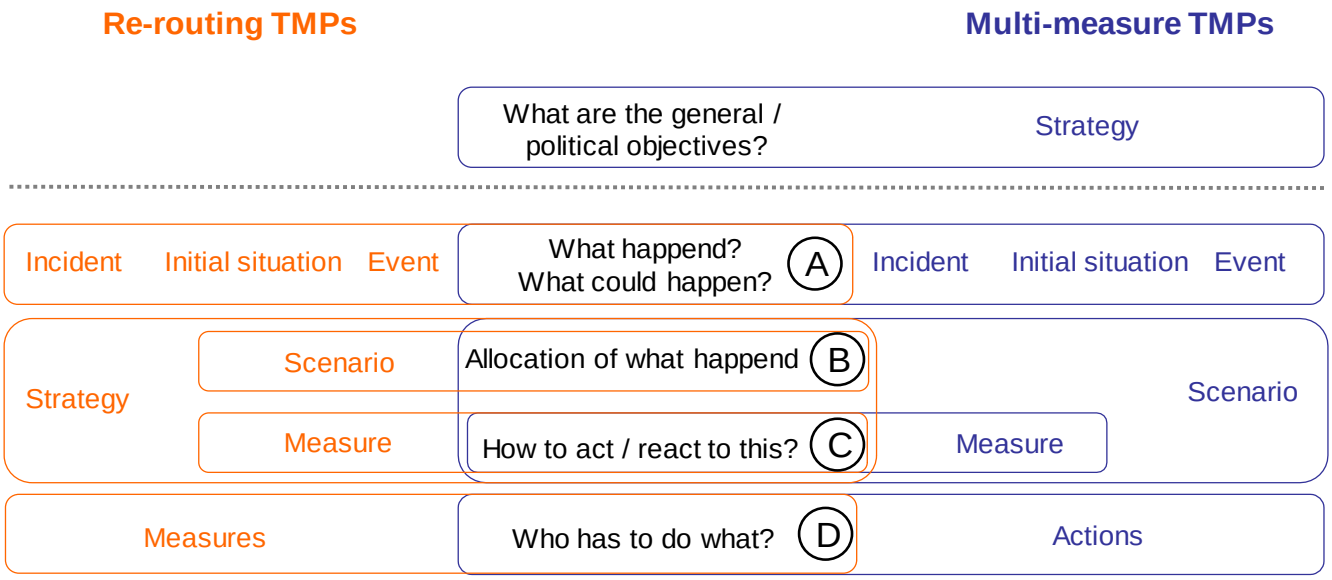


Figure 18: Wordings of TMP typology in Europe

A) What happened / what could happen?

Initial situations/incidents/events that negatively affect traffic flow, traffic safety or environment can be:

Accidents, road works, adverse weather conditions (thick fog, heavy snow, glace, floods), natural disasters (earthquakes, landslides, overflows), strikes, demonstrations, major public events, sport events, holiday traffic peaks, exceeding air pollution, emergencies (such as evacuations of public events, evacuation of ports of airports, closures of tunnels) or capacity overload on the road network or of public transport.

A main aspect of incidents is the location and duration and capacity reduction of the incident. A consistent definition of these parameters is essential for effective information and intervention.

B) Allocation of what happened can be done according to the

Severity, affected network, traffic flows and traffic density, (expected) duration (hard to define shortly after occurring the incident), probability of incidence, forecast reliability of the incident, current and expected traffic impacts based on observations or historic data

C) How to act / react to this?

Potential measures that apply to the initial situations are shown in figure 2. A set of those measures composes a TMP, the combination always varies. An additional supporting element is the estimation of traffic impacts of selected strategies.

D) Who has to do what?

Operational tables show the detailed application of the measures in terms of actions. Furthermore, they contain all the relevant information concerning the affected area according to a specific scenario for the correct implementation of this action.

3.2 Types of TMPs

3.2.1 Long-distance TMPs

A pre-defined and co-ordinated strategic traffic management is a proven concept applied all over Europe, in particular on routes with specific complex demands. The most common initial situations are winter problems, a generally high traffic volume, long-lasting road works, emergencies, typical main routes of holiday traffic, cross-border traffic, a close interrelation between long-distance and regional traffic in conurbations, air pollution problems in conurbation areas.

The initial situations are as manifold as the traffic management measures applied.

In the North-West of Europe re-routing and traveller information measures outweigh. The reason for it is the dense highway network in this area combined with a high traffic volume in relatively small states. Besides, various alternative sea crossing possibilities (such as bridges, tunnels, ferries) require re-routing TMPs in case of bad weather conditions or strikes.

In some areas as the Alpine regions, re-routing possibilities are limited due to capacity and environment problems on alternative routes and secondary networks and are only activated in extreme incidents as long duration closures requiring regional and cross-border intervention. The issue is to rapidly respond and manage the incident on a local level before it propagates to a major scale requiring significant re-routing measures.

In South Europe, other main aspects are emergencies and weather problems (snow, floods, etc). Thus, here HGV (storage, driving ban, overtaking ban) play a key role (besides re-routing of cross-border traffic).

Great diversity is also recognisable regarding organisational and technical aspects. Whereas France has a more or less centralised organisational structure with one responsible for the TMP, other states as Germany are organised on a federal level, all partners are equal in their rights and responsibilities. This decentralised approach is also applied in case of cross-border TMPs.

Different carriers and financing concepts for highways (public, private) have strong impact on investments in technical equipment on highways as well as possibilities and reservations concerning TMPs. In some areas, re-

routing involves more than one motorway operator on the corridor, with traffic police solely responsible for closure and opening of motorways.

Some national guidelines for traffic management exist. They describe the entire process of traffic management, from the initial intent to improve a local traffic situation right up to an integrated traffic management concept. Some of them focus on the evaluation of TMPs. They are applied on a national, regional and local level resulting in a highly structured and user oriented approach of traffic management.

All the named aspects should be harmonised step-by-step on a European level. Not with the aim to define one overall valid technical and organisational approach, but with the aim to simplify the connection of existing TMPs along corridors and/or within neighbouring regions, to transfer experiences and to avoid double development work and conflicting strategies.

Objectives for future work on a European level concerning TMPs are

- A stronger link up of national or regional TMPs and thus establishing new international TMPs
- To assist new member states in Eastern Europe establishing appropriate TMPs.
- To strengthen the cooperation between “old” and ‘’new’’ member states in order to harmonise strategies and establish cross-border TMPs, when needed, between the various regions in Eastern and Western Europe.
- To harmonise international TMP- and system-approaches and structures on a European level.
- To implement a more dense network of ITS systems to enhance the efficiency of TMP (VMS, traffic information services, parking areas, etc.).

3.2.2 TMPs in conurbation areas

TMPs for conurbations are in many regions a relatively different field of work with a different scope of measures ranging from traffic signals, parking and interurban rerouting to public transport measures in addition to interaction with motorways. First of all they are initiated in case of pre-planned events (sports events etc., or road works) but also unplanned events or recurrent congestion caused by commuter traffic, but also due to air pollution or due to the strong impairment of the conurbation area brought by the long-distance and urban traffic.

There is a need to address the interface between the TERN and local feeder and distributor roads in urban areas. Since the quality of traffic flow on the TERN can impact and be impacted by the surrounding urban environment, comprehensive traffic management plans are required between the relevant urban road and motorway organisations. A number of regions have already the organisation and technical mechanisms for such a process.

3.2.3 TMPs for freight transportation

The stakeholders of freight transportation differ completely from those of the strategic traffic management on the European road network and thus the influence of road organisations on this aspect is limited. In the long term they can be influenced through political decisions.

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

- Dynamic ban of driving for HGV / dynamic overtaking ban for HGV
- Dynamic access control for HGV (in the context of passage through sensitive or limited capacity areas as tunnels and mountain passes)
- Dynamic access control for HGV (in the context of air pollution) and
- Temporary HGV storage areas (e.g. temporary hard shoulder usage for HGV storage)

3.2.4 Co-modality

TMPs have a co-modality aspect if applied measures include actions with the aim of modal shifting of traffic.

On the cross-border level co-modality (between road, rail, sea, waterways, air) currently affects only freight transportation (HGV transportation). Measures are applied permanently in order to optimise existing infrastructure capacities or temporarily in case of an incident (TMP).

In conurbations the main aspect of co-modality is the combination of road and public transport for individual traffic in case of a plan able or long-lasting incident.

As in road TMPs, the forecast reliability of the incident is an important element for co-modal TMP elaborations. For predictable incidents, such as congestion due to commuter traffic or fairs, co-modal TMPs can be developed. Spontaneous modal shifting on a large scale, particularly in conurbations, often fails because of lacking capacities of the public transport.

Nevertheless, the increasing traffic demand and the increasing interrelation of transport modes require a very close cooperation between the stakeholders of different transport modes.

3.2.4.1 Traffic management measures according to initial solutions

Note: The table is a general, but not necessarily complete overview of possible feasibilities.

					Initial situation										
					forecast reliability										
long-distance/ cross-border TMP	cross-regional TMP	TMP in conurbations	Target group	**Traffic management measures acording to prospective initial situations**	accidents	emergencies (e.g. floodings)	strikes	weather conditions	air pollution	capacity overload on the road network	capacity overload of public transport	overload or loss of parking areas	road works	major public events	holiday traffic peaks
TRAVELLER INFORMATION															
	x	x	RU	real time event and warning information	x	x	x	x	x	x	x	x	x	x	x
x	x	x	RU	traffic conditions (predictive and real time)			x						x		x
x	x	x	RU	travel time information	x		x		x	x	x	x		x	
x	x	(x)	RU	weather information			x	x	x	x		x	x	x	
x	x	(x)	RU	speed limit information				x							
x	x	x	RU	co-modal travel planning services, traveller planning				x	x	x	x	x	x	x	x
RE-ROUTING															
x	x	x	RU	of all road users	x	x	x	x	x	x			x	x	x
x	(x)	x	HGV	of HGV-traffic	x	x	x	x	x	x		x	x	x	x
(x)	(x)	x	RU	of other specific groups (e.g. public transport)	x	x	x	x	x	x			x	x	x
CHANGE OF INFRASTRUCTURE CAPACITY															
	(x)	x	RU	lane control/ dynamic lane management	x			x		x			x	x	x
	x	x	RU	hard shoulder running	x					x			x	x	x
		x	RU	Ramp metering	x					x			x	x	x
		x	RU	temporarily used bus-lanes					x	x			x	x	
x			HGV	temporarily HGV-storage areas			x	x				x			
x	x	x	RU	Dynamic speed control	x			x	x	x			x	x	x
x			HGV	Dynamic overtaking ban for HGV	x			x		x			x		x
		x	RU	change of traffic light control	x				x	x			x	x	
CO-MODALITY															
		x	CO	temporary P+R area					x	x			x	x	
x		x	PT	extra- or additional public transport capacity					x		x		x	x	x
x	x	x	CO	co-modal traveller information		x		x	x				x	x	
ACCESS CONTROL															
x	x	x	HGV	Ban of driving for HGV				x	x						
x	x		RU	Access control by toll stations		x				x					x
	x	x	HGV	Dynamic access control (in the context of air pollution)					x						
	x	x	HGV	Dynamic access control (for limited capacity areas (tunnels, passes))				x	x	x			x		x

RU = Road User *HGV = Freight transportation*
CO = Co-modal *PT = Public transport*

Figure 19: Potential measures that apply to different initial situations

3.2.4.2 Required Infrastructure

Incident Detection

Note: The table is a first general overview of feasibilities.

					Incident detection								
long-distance/ cross-border TMP	cross-regional TMP	TMP in conurbations	Target group	**Traffic management measures acording to prospective initial situations**	Inductive loops	Road user, Patrollers	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 / environmental sensors
TRAVELLER INFORMATION													
	x	x	RU	real time event and warning information	x	x	x	x	x	x		x	
x	x	x	RU	traffic conditions (predictive and real time)	x	x	x	x	x	x	x	x	
x	x	x	RU	travel time information	x		x				x	x	
x	x	(x)	RU	weather information				x	x				x
x	x	(x)	RU	speed limit information									
x	x	x	RU	co-modal travel planning services									
x	x	x	RU	co-modal traveller planning									
RE-ROUTING													
x	x	x	RU	of all road users	x	x	x	x	x	x	x	x	
x	(x)	x	HGV	of HGV-traffic	x	x	x	x	x	x	x	x	
(x)	(x)	x	RU	of other specific groups (e.g. public transport)				x	x				
CHANGE OF INFRASTRUCTURE CAPACITY													
	(x)	x	RU	lane control/ dynamic lane management	x	x	x	x	x	x	x	x	
	x	x	RU	hard shoulder running	x	x	x	x	x	x	x	x	
		x	RU	Ramp metering	x	x	x	x	x	x	x	x	
		x	RU	temporarily used bus-lanes				x	x			x	
x			HGV	temporarily HGV-storage areas				x	x			x	x
x	x	x	RU	Dynamic speed control	x	x	x	x	x	x	x	x	
x			HGV	Dynamic overtaking ban for HGV	x	x	x	x	x	x	x	x	
		x	RU	change of traffic light control	x			x	x	x		x	
		x	CO	temporary P+R area				x	x			x	
x		x	PT	extra- or additional public transport capacity				x	x			x	
ACCESS CONTROL													
x	x	x	HGV	Ban of driving for HGV				x	x				x
x	x		RU	Dynamic access control on highways in case of capacity overload	x	x	x	x	x	x	x	x	
	x	x	HGV	Dynamic access control (in the context of air pollution)				x	x				x
	x	x	HGV	Dynamic access control (for limited capacity areas (tunnels, passes))		x		x	x	x			

RU = Road User
CO = Co-modal
HGV = Freight transportation
PT = Public transport

x = applicable
(x) = applicable to only a limited extend
x^1 = middle-term target: applicable

Figure 20: Infrastructure for incident detection

Scenario implementation - Traffic management systems/Traveller Information systems

Note: The table is only a general overview of feasibilities.

					Strategy implementation - Traffic management systems							Strategy implementation - Traveller information systems								
long-distance/ cross-border TMP	cross-regional TMP	TMP in conurbations	Target group	Traffic management measures acording to prospective initial situations	Variable Message signs (VMS), dynamic route information panels, traveller information panels	(adding) Variable direction signs	Traffic control systems; line direction control signals	ramp meter, ramp signal	Patrollers, Police, (Toll stations)	Static signage on the secondary network	Traffic lights (TMPs for conurbations)	Radio broadcast (spoken message)	RDS-TMC	Online-systems (PC or PTA with internet-access)	Teletext	Route guidance systems, Navigation systems	Road side terminals, Screens at rest areas	Print media	Phone-based systems (call-centre, audio text, SMS, WAP, PTA)	Mobility service centres
TRAVELLER INFORMATION																				
	x	x	RU	real time event and warning information	x							x	x	x	(x)	x	(x)	(x)	x	
x	x	x	RU	traffic conditions (predictive and real time)	x							x	x	x	(x)	x	x		x	(x)
x	x	x	RU	travel time information	x									x		x	(x)		x	x
x	x	(x)	RU	weather information	x							x	(x)	x	(x)	x	(x)	(x)	x	(x)
x	x	(x)	RU	speed limit information	x									(x)		x				
x	x	x	RU	co-modal travel planning services										x		(x)			x	x
x	x	x	RU	co-modal traveller planning										x		(x)			x	x
RE-ROUTING																				
x	x	x	RU	of all road users	x	x				x		x		(x)	(x)	x	(x)		(x)	
x	(x)	x	HGV	of HGV-traffic	x	x				x		(x)		x		x	x		x	
(x)	(x)	x	RU	of other specific groups (e.g. public transport)	x					x		x				x	(x)		(x)	
CHANGE OF INFRASTRUCTURE CAPACITY																				
	(x)	x	RU	lane control/ dynamic lane management			x													
	x	x	RU	hard shoulder running	(x)		x													
		x	RU	Ramp metering				x												
		x	RU	temporarily used bus-lanes	(x)		x													
x			HGV	temporarily HGV-storage areas	x				x							x^1				
x	x	x	RU	Dynamic speed control			x									x^1				
x			HGV	Dynamic overtaking ban for HGV			x									x^1				
		x	RU	change of traffic light control							x									
		x	CO	temporary P+R area	(x)	(x)										x^1				
x		x	PT	extra- or additional public transport capacity												x^1				
ACCESS CONTROL																				
x	x	x	HGV	Ban of driving for HGV	x	(x)	(x)		x							x^1				
x	x		RU	Dynamic access control on highways in case of capacity overload	x				x							x^1				
	x	x	HGV	Dynamic access control (in the context of air pollution)	x	(x)			x			x	x			x^1				
	x	x	HGV	Dynamic access control (for limited capacity areas (tunnels, passes))	x	(x)	(x)		x			x	x			x^1				

RU = Road User
CO = Co-modal
HGV = Freight transportation
PT = Public transport

x = applicable
(x) = applicable to only a limited extend
x^1 = middle-term target: applicable

Figure 21: Infrastructure for scenario/strategy implementation

3.3 Examples of deployment

3.3.1 Cross-border TMPs

3.3.1.1 Example 01- Winter problems at the Spanish-French border

GENERAL INFORMATION ON THE PLAN	
Euroregion:	ARTS
Name of the plan:	Cross-border TMP for weather problems
Status:	Operation of a TMP
Date of Implementation:	12/2006 (revision: 08/2008)
Initial Situation:	Weather conditions
Traffic management measures are applied:	Information Exchange; Re-routing (of lorries, articulated vehicles and busses); Traveller information; Dynamic speed control; Dynamic overtaking ban for HGV; Dynamic ban of driving for HGV; HGV storage
PLAN DESCRIPTION	
The study area is the Atlantic corridor from Bordeaux (France) to Valladolid (Spain), specifically at Irún border. This border is one of the most important borders to cross the Pyrenees Mountains. Several public traffic organizations are involved in the TMP. This plan intends to establish the performance lines for the traffic Management in case of possible weather problems. This is a management plan for winter weather problems which develops several possible scenarios and the measures to implement each one.	
SPATIAL ASPECTS	
Expansion:	Cross-regional; International; cross-border
Network involved:	A8, A1, AP1, A15, N1, A63, RN10
Influence area:	
ORGANISATIONAL ASPECTS	

Stakeholders involved:	DGT (Valladolid TCC), DT (Euskadi TCC), ASF, Traffic Police (Spain, France), and CRICR-SO
Regulatory framework concerning the TMP:	Administrative Agreement, Cooperation Agreement
TECHNICAL ASPECTS	
Communication between the partners:	Phone, Fax, email
Decision support system used?	no
Road-side systems and systems to inform the traveller:	Variable message signs, Radio, RDS-TMC, Internet, Television, Teletext
CURRENT STATE	
Has the plan ever being activated?	Yes
How often per time period:	Depending on the number of winter viality problems (once or twice per year)
How is the plan currently?	Being used
FUTURE FIELDS OF WORK	
Activity:	Revision, extension of an existing TMP. Planned regulatory framework, agreements
Expansion:	International, cross-border
Network involved:	A1, AP1, A63, A8
Key stakeholders, involved partners:	DGT/DT, CRICR SO
FUTURE FIELDS OF WORK	
Activity:	Revision, extension of an existing TMP. Planned regulatory framework, agreements
Expansion:	International, cross-border
Network involved:	A1, AP1, A63, A8
Key stakeholders, involved partners:	DGT/DT, CRICR SO
USEFUL EXAMPLES	

Example for a decision table:

Scenario table for snowfall situation in Spain

GREEN LEVEL		
	Weather Forecast	
Traffic Density	Improve	Continue/Worsen
Weak (<750)	S1	S1
Strong (>750)	S1	S2

YELLOW LEVEL		
	Weather Forecast	
Traffic Density	Improver	Continue/Worsen
Weak (<750)	S2	S2
Strong (>750)	S2	S3

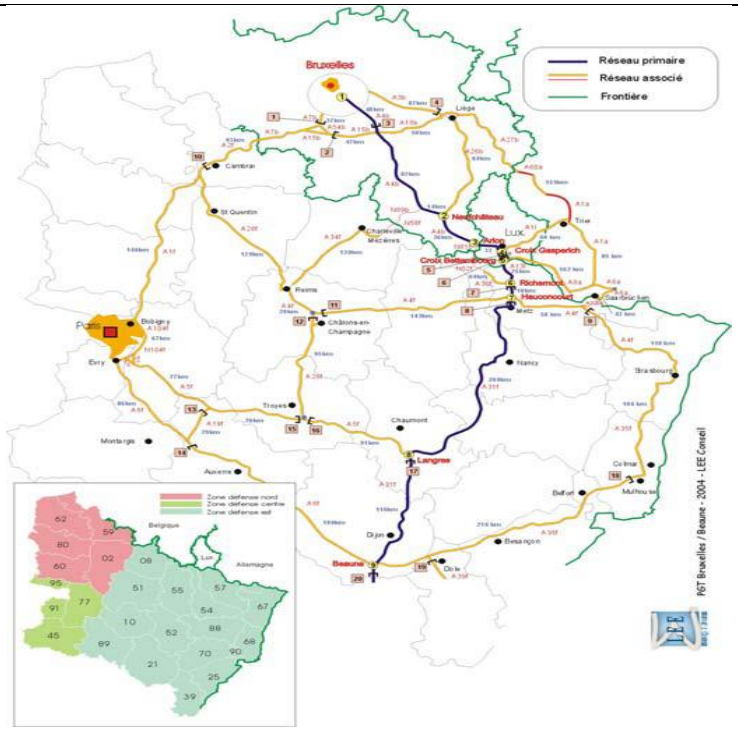
RED LEVEL		
	Weather Forecast	
Traffic Density	Improve	Continue/Worsen
Weak (<750)	S4	S4
Strong (>750)	S4	S5

BLACK LEVEL		
	Weather Forecast	
	Improve	Continue/Worsen
	S5	S6

Example of the definition of scenarios and measures

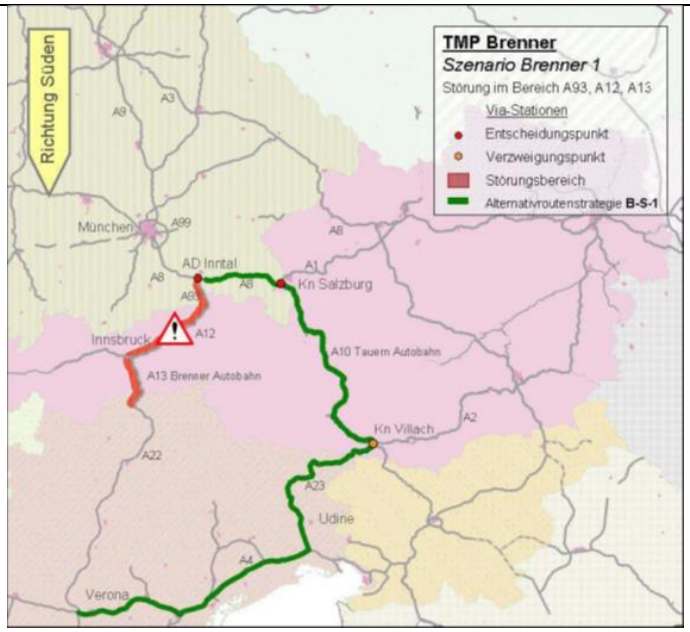
SCENARIOS	ACTION MEASURES
S0	
⇒	Points of information: setup
⇒	Control Points: dispatch of human resources
⇒	VMS Information
	Corrective winter traffic actions (melting products) [Min. of Civil Works]
S1	
⇒	Ban on lorries to overtake
	VMS Information
⇒	Speed limits: recommended 100 Km/h on motorways and dual carriageways, 80 Km/h on the remaining roads.
⇒	Information Points: updating
⇒	Control points: situation of human ressources
	Corrective winter traffic actions (cleaning) [Min. of Civil Works]
S2	
⇒	Ban on the movement of lorries and articulated vehicles
⇒	Stocking of lorries and articulated vehicles
⇒	Dispatching of alternative routes (for lorries and articulated vehicles)
⇒	Speed limit 60 Km/h on all road categories
	VMS Information
	Points of information: updating
⇒	Control Points: activation
	Corrective winter traffic actions (cleaning) [Min. of Civil Works]
S3	
⇒	Ban on the movement of lorries, articulated vehicles and buses
⇒	Stocking of lorries, articulated vehicles and buses s
⇒	Dispatching of alternative routes (for lorries, articulated vehicles and buses)
	Speed Limits: 60 Km/h on all categories of road
	VMS information
	Points of information: updating
	Control Points: activation
	Corrective winter traffic actions (cleaning) [Min. Of Civil Works]
S4	

3.3.1.2 Example 02- Re-routing Corridor Bruxelles-Beaune (Luxemburg – Belgium – France)

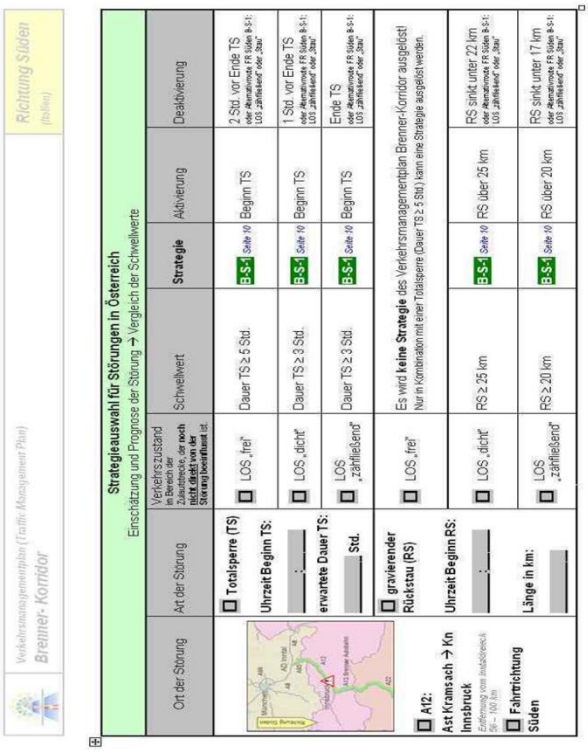
GENERAL INFORMATION ON THE PLAN	
Euroregion:	CENTRICO
Name of the plan:	Brussels-Beaune
Status:	Operation of a TMP
Date of Implementation:	21/01/2008
Initial Situation:	Full closure, Congestion on the road
Traffic management measures are applied:	Information Exchange, Re-routing, Traveller information
PLAN DESCRIPTION	
The plan deals with traffic disruptions on the Brussels-Beaune motorway corridor.	
SPATIAL ASPECTS	
Expansion:	International, cross-border
Network involved:	Brussels-Luxembourg-Beaune motorway.
Influence area:	
ORGANISATIONAL ASPECTS	
Stakeholders involved:	for the Eastern zone (primary network) : the « préfet » of the eastern zone for the Luxembourg (primary network) : the CITA for the Wallonia (primary network) : PEREX for the Germany (secondary network) : the Police of Neunkirchen for the Saarland, the Police of Mainz for the Rheinland-Pfalz

	When there is an incident on a road, which needs to use the Brussel-Beaune TMP, the single entry point of the country deals with the different singles entry point of the other countries. And those singles entry point are responsible for the coordination of all the actors of their own countries.
Regulatory framework:	Administrative Agreement
TECHNICAL ASPECTS	
Communication between the partners:	Phone, Fax, email
Decision support system used?	Yes, integrated into the plan
Road-side systems and systems to inform the traveller:	Variable message signs, Radio, RDS-TMC, Internet, Television
CURRENT STATE	
Has the plan ever being activated?	Yes
How is the plan currently?	Being used

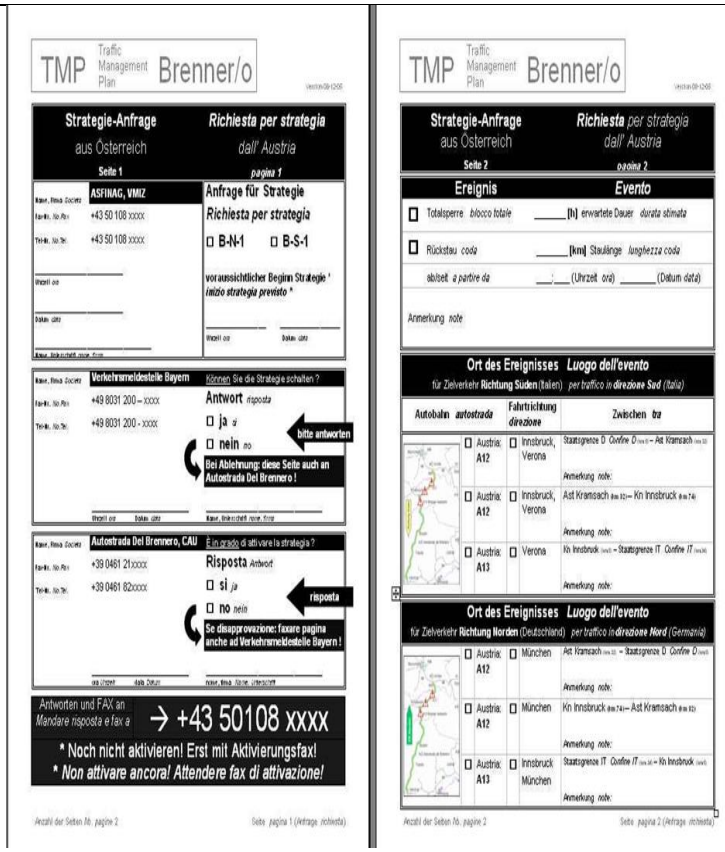
3.3.1.3 Example 03- Brenner Corridor (Austria, Germany, Italy)

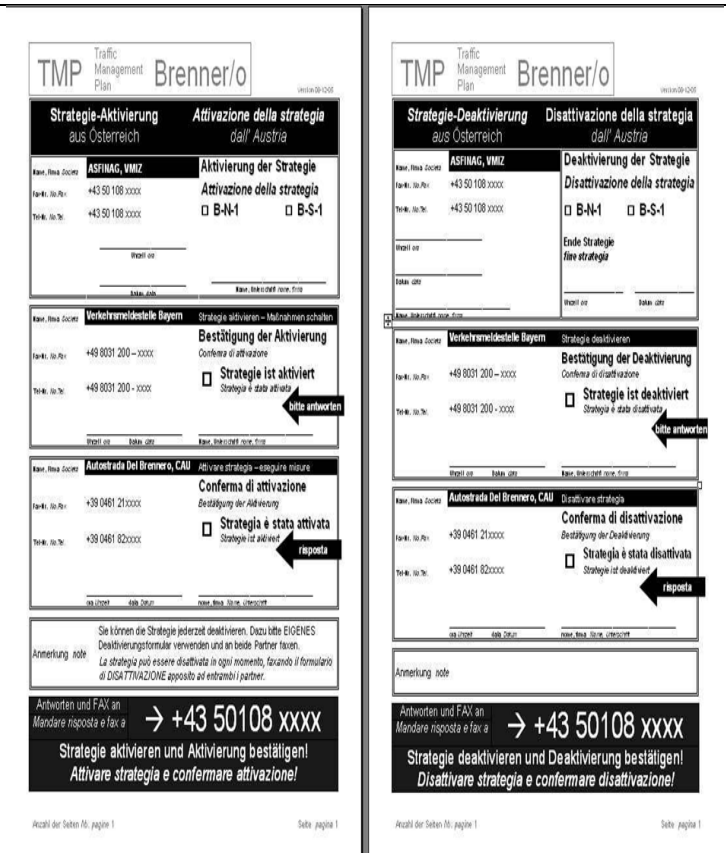
GENERAL INFORMATION ON THE PLAN	
Euroregion:	CORVETTE
Name of the plan:	Cross-border TMP for severe incidents
Status:	Operation of a TMP
Date of Implementation:	2008
Initial Situation:	Full mountainous area, extreme weather conditions
Traffic management measures are applied:	Information Exchange, Re-routing, Traveller information
PLAN DESCRIPTION	
Each of the partners Bavaria, Autostrada del Brennero und ASFINAG has the possibility to request a rerouting for the Brenner-Corridor via the Tauern-Corridor. Communication (multilingual fax forms and telephone) is prepared. Rerouting will be active and issued to the road user only if all partners agree to that measure.	
SPATIAL ASPECTS	
Expansion:	International, cross-border
Network involved:	Motorways only. Normal route: München - A8/Ost (D) – AD Inntal -A93 (D) – A12 (A) – Innsbruck – A13 (A) – A22 (I) Alternative route: München - A8/Ost (D) – Salzburg - A10 (A) – Villach - A2 (A) – Udine A23 (I) – Verona A4 (I)
Influence area:	
ORGANISATIONAL ASPECTS	
Stakeholders involved:	Coordination in Italy (rerouting there affects other operators as opposed to Germany and Austria) is carried out by Autostrade del Brennero
Regulatory framework:	(1) Memorandum of Understanding (A-I) (2) Interchange Agreement (A-I)

	(3) Fax communication forms (4) Internal work instructions for the operators (per partner)
TECHNICAL ASPECTS	
Communication between the partners:	Fax, Phone
Decision support system used?	no
Road-side systems and systems to inform the traveller:	Variable message signs, Radio, RDS-TMC, Internet, (Television), (Teletext)
CURRENT STATE	
Has the plan ever being activated?	Not since 2008
How is the plan currently?	Operational test phase
FUTURE FIELDS OF WORK	
a) TMP Tauern-Pyhrn Austria, Slovenia, Croatia	
Aims at the corridor Salzburg-Zagreb, which offers a good alternative route: Normal route: Salzburg – A10 (A) – Villach – A11 (A) – A2 (SLO) - Ljubljana – A2 (SLO) – A3 (HR) – Zagreb Alternative route: Salzburg – A1(A) – intersection Voralpenkreuz – A9 (A) – Graz – A9 (A) – A1 (SLO) – Maribor – secondary road nr. 1 – Macelj – A2 (HR) – Zagreb Includes a section of secondary road network (motorway under construction)	
Key stakeholders, involved partners:	ASFINAG, DARS, HAC
An important peculiarity is given by border waiting times and the fact, that Croatia is participating without EC funding.	
b) Cross-border TMPs for network Italy, Slovenia, Austria (not corridors only)	
Network involved (Name, section, typology of roads):	t.b.d.
Key stakeholders:	DARS (SLO), Autovie Venete (and probably other Italian operators, t.b.d.), ASFINAG
USEFUL EXAMPLES	
Example for a decision table:	Definition of scenarios and strategies

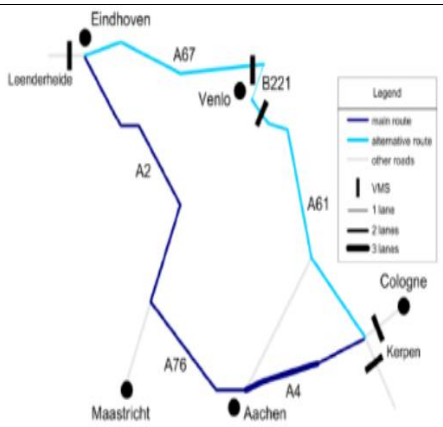


Example for a bi-lingual fax-template




TMP Traffic Management Plan Brenner/o
Strategie-Aktivierung aus Österreich
Attivazione della strategia dall' Austria
ASFINAG, VMIZ
Aktivierung der Strategie
Attivazione della strategia
B-N-1
B-S-1
+43 50 108 xxxx
Verkehrsmeldestelle Bayern
Strategie aktivieren – Maßnahmen schalten
Bestätigung der Aktivierung
Strategie ist aktiviert
+49 8031 200 – xxxx
+49 8031 200 - xxxx
bitte antworten
Autostrada Del Brennero, CAU
Attivare strategia – eseguire misure
Conferma di attivazione
Strategia è stata attivata
+39 0461 21xxxx
+39 0461 82xxxx
risposta
Anmerkung note
Sie können die Strategie jederzeit deaktivieren. Dazu bitte EIGENES Deaktivierungsformular verwenden und an beide Partner faxen.
La strategia può essere disattivata in ogni momento, faxando il formulario di DISATTIVAZIONE apposito ad entrambi i partner.
Antworten und FAX an
Mandare risposta e fax a
→ +43 50108 xxxx
Strategie aktivieren und Aktivierung bestätigen!
Attivare strategia e confermare attivazione!
TMP Traffic Management Plan Brenner/o
Strategie-Deaktivierung aus Österreich
Disattivazione della strategia dall' Austria
Deaktivierung der Strategie
Disattivazione della strategia
Ende Strategie
fine strategia
Strategie deaktivieren
Bestätigung der Deaktivierung
Strategie ist deaktiviert
Disattivare strategia
Conferma di disattivazione
Strategia è stata disattivata
Strategie deaktivieren und Deaktivierung bestätigen!
Disattivare strategia e confermare disattivazione!

3.3.1.4 Example 04- Re-routing corridor Köln (Cologne)/Eindhoven (Germany/Netherlands)

GENERAL INFORMATION ON THE PLAN	
Euroregion:	CENTRICO
Name of the plan:	Re-routing corridor Köln (Cologne) -Eindhoven
Status:	Operation of a TMP
Date of Implementation:	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.
Initial Situation:	Full closure, Congestion, road works, holiday traffic
Traffic management measures applied:	Information Exchange, Re-routing, Traveller information
PLAN DESCRIPTION	
In case of a congestion / full closure the road user will be re-routed via variable message signs, variable direction signs, radio, internet, teletext.	
SPATIAL ASPECTS	
Expansion:	Cross-regional, cross-border
Network involved:	The Netherlands: Highway A67/E34 from junction Leenderheide to Venlo, A2/E25 from Eindhoven to junction Kerensheide and A76/E314 from junction Kerensheide to the German border. Germany: Highway A61 from Venlo to Kreuz Kerpen and A4/E314/E40 from the Dutch border to Kreuz Kerpen. Regional road B221 between highway A67 and A61 near Venlo. (The trajectories have a similar travel time and a similar distance)
Influence area:	 
ORGANISATIONAL ASPECTS	

<table>
<tr><td>Stakeholders involved:</td><td>
<table>
<tr><th colspan="2">The Netherlands</th></tr>
<tr><td>■ VCNL = The Dutch Department for Traffic Management and Information (Verkeers Centrum Nederland)</td><td>■ VCNL is responsible for communication between the Dutch and German participants (like RVC ZWNL and TMC Köln) and for collecting and distributing traffic information.</td></tr>
<tr><td>■ RVC Zuid West Nederland (RVC ZWNL)</td><td>■ RVC ZWNL is responsible for the operational aspects of the CBM</td></tr>
<tr><td>■ KLPD = Dutch National Police (Korps Landelijke Politie Diensten)</td><td>■ KLPD was responsible for the operational aspects of the CBM in the pilot phase. KLPD indicated when a CBM procedure might be needed.</td></tr>
<tr><td>■ RWS district office St. Joost</td><td>■ St Joost is responsible for the operational aspects of the CBM</td></tr>
<tr><td>■ RWS district office Venlo roads</td><td>■ Venlo is responsible for the operational aspects of the CBM</td></tr>
<tr><td>■ RWS district office motorways Eindhoven</td><td>■ Eindhoven is responsible for the operational aspects of the CBM</td></tr>
<tr><th colspan="2">Germany</th></tr>
<tr><td>■ TMC Köln</td><td>■ TMC Köln is responsible for the operational aspects of the CBM</td></tr>
</table>
</td></tr>
<tr><td>Regulatory framework:</td><td>Memorandum of Understanding, Specifications</td></tr>
<tr><td colspan="2">TECHNICAL ASPECTS</td></tr>
<tr><td>Monitoring:</td><td>inductive loops with additional police observation</td></tr>
<tr><td>Communication between the partners:</td><td>Phone, fax, e-mail</td></tr>
<tr><td>Decision support system used?</td><td>no</td></tr>
<tr><td>Road-side systems and systems to inform the traveller:</td><td>Variable message signs, Traffic control systems, Text cars, Variable direction signs, Radio, RDS-TMC. Internet, Teletext, Navigation Systems</td></tr>
<tr><td colspan="2">CURRENT STATE</td></tr>
<tr><td>Has the plan ever being activated?</td><td>Yes</td></tr>
<tr><td>How often per time period:</td><td>Every year a meeting is held between all partners to discuss the current status and possible adjustments.</td></tr>
<tr><td>How is the plan currently?</td><td>Being used</td></tr>
<tr><td colspan="2">EXPERIENCES</td></tr>
<tr><td colspan="2">Eindhoven – Cologne is the first operational cross border corridor in Europe. In 1998 the CBM corridor became operational. Several improvements have been made since then.</td></tr>
<tr><td colspan="2">EVALUATION</td></tr>
<tr><td colspan="2">In 1998 a first evaluation was performed by Goudappel & Coffeng. The second evaluation was performed in 2001 by Arcadis. In 2008 and 2009 a CBM evaluation took place for the corridors Eindhoven – Cologne, Rotterdam – Antwerp and Arnhem – Oberhausen by Witteveen & Bos. The evaluation objective was to define the status quo of CBM on the three corridors and determine methods for CBM improving in general and specifically on the three corridors. The evaluation consists of qualitative and quantitative analyses. In 2009 the road signs at these CBM corridors were audited by the Dutch Department for Traffic management and Information (VCNL).</td></tr>
<tr><td colspan="2">EVALUATION RESULTS</td></tr>
<tr><td colspan="2">CBM was activated 85 times for Eindhoven - Cologne in 2007. In general the response to re-routing measures is good. The response rate is roughly 50 % of the target group (the target group is long-distance traffic on the corridor) and approximately 100 to 200 vehicles per hour. All together they save about 300 vehicle loss hours per CBM event. The calculated monetary benefit was EUR 510,000 / year for 2007. Most of these benefits consist of travel time benefit. Operational and environmental benefits are less than 10 % of the total</td></tr>
</table>

(monetary) benefit. Other benefits of CBM that are not quantified for this evaluation include comfort enhancement and reliability due to drivers awareness of delay and alternative routes, and traffic safety increase due to prevented congestion. Operational costs of a CBM corridor are about EUR 30,000 a year. Implementation costs depend highly on Variable Message Signs costs, they are about EUR 200,000€. Modifications to central traffic systems or other technical systems are not included in these costs.

FUTURE FIELDS OF WORK

Activity	The main activities will be focussed on improvements to uniform the criteria in the traffic centres, to improve the criteria for starting and ending a CBM, to describe the procedures when a CBM is active, to investigate the possibilities of a reversed CBM when there is congestion on the alternative route, to improve the logging procedures at the traffic centres and to improve the road signs on the alternative route.
Expansion:	In the near future the CBM Eindhoven – Cologne might be connected with the German LDC-project.
Key stakeholders, involved partners:	Rijkswaterstaat, Department for Traffic management and Information (VCNL), KLPD, Ministerium für Bauen und Verkehr NRW, Landesbetrieb Strassenbau NRW

USEFUL EXAMPLES

centrico USING ITS TO MANAGE EUROPE'S BUSIEST ROADS

CENTRICO 2005

Memorandum of Understanding

Cross Border Management on Corridor Eindhoven – Köln

Preamble
Cross Border Management (CBM) is one of the key activities of CENTRICO, the Euro-regional co-ordination project for traffic management using ITS. Therefore all countries/regions involved have agreed to arrange CBM measures on a number of corridors specified by CENTRICO.

Signatories
This memorandum of understanding applies to
Bundesministerium für Verkehr, Bau- und Wohnungswesen, represented by Mr. W. Hahn, Head of Department Roads
Rijkswaterstaat, represented by Mr. L.H. Keijts, Director-General Rijkswaterstaat

Objective of this Memorandum of Understanding
The objective of this Memorandum of Understanding is to confirm the mutual arrangement to reroute traffic on the Cross Border Corridor Eindhoven - Köln if significant congestion occurs on the motorway(s) in this corridor. This arrangement includes:
- Installation of equipment which will both guide and inform road users
- Implementing and operating the CBM measures will be incorporated in tasks of the organisation of both signatories
- Operating CBM measures will follow mutually concluded criteria and decision schemes
- Every CBM-action will be recorded in a logbook

Corridor
The arrangement concerns parts of the motorway network managed by the signatories as shown in the appendix.

Rerouting system
In case of incidents on route 1 traffic will be advised to take route 2 according to the attached map.

Rerouting operation
The road user will be advised to take an alternative route at the motorway junctions/decision points by information shown at Variable Message Signs, including the CENTRICO rerouting sign. Between decision points road users can be guided by fixed CENTRICO rerouting signs.

Attunement and evaluation
An operational evaluation meeting will take place between the involved parties at least once a year. However each party can call a meeting in between if necessary. During these meetings the following subjects will be discussed:
- Experiences during the preceding period.
- Procedures.
- Decision plan.
- Logbook.

Title: CBM and Memorandum of Understanding | Status: Final | Version: V2.0
Author: Henk Jan de Haan | Distribution: SC/CT
Doc: 1 | Date produced: 01-06-05

Contact persons

Every party involved will assign a staff member who is responsible for implementation and operation of the mutual arrangement:

On behalf of the Bundesministerium für Verkehr, Bau- und Wohnungswesen: Mr. Rene Usath
Ministerium für Bauen und Verkehr des Landes Nordrhein-Westfalen,
For Rijkswaterstaat: Theo Savelkoul, relation manager for NRW and regional traffic manager Limburg

Parties involved

Under co-ordination of the signatories the following parties are involved in the implementation and operation of the mutual arrangement:

For Landesbetrieb Straßen NRW, Branch Office Köln: Mr. Bernd Bartelt
For Bezirksregierung Köln: Mr. Frank Bohlander
For Rijkswaterstaat VCNL: Ary Koot, head of operations (Meldkamer)

Description of signatory and intent

We, the undersigned organization, participate in the CBM Eindhoven – Köln project and intend to:

- Live up to each of the objectives referred to above
- Collaborate with other parties involved in the project as well as we are able
- Be attuned and keep to the evaluation requirements

Timescales

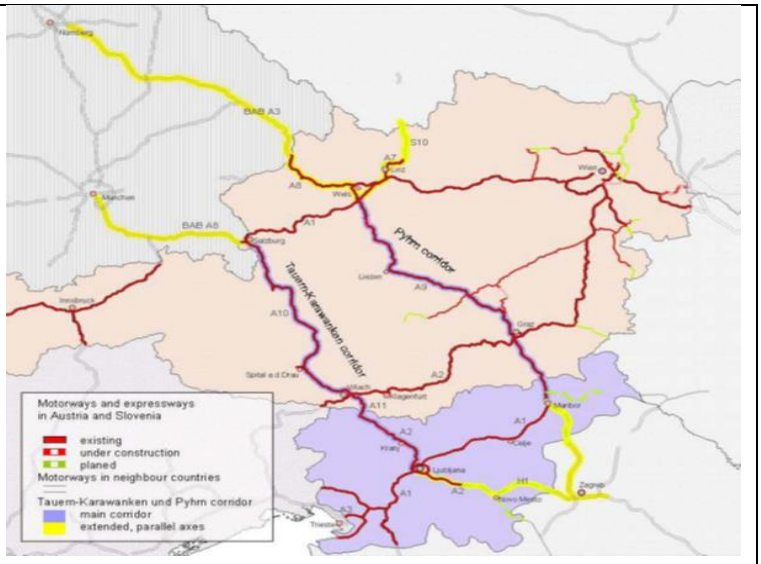
This Memorandum of Understanding will remain effective for 5 years. By the end of that term it will be automatically prolonged by a year if it has not been ended formally with a three-month term of notice.

Organisation: **Bundesministerium für Verkehr, Bau- und Wohnungswesen** **Name: Mr. W. Hahn (MDirig)** **Date: 25 August 2005** **Signature:**	**Organisation:** **Ministerie van Verkeer en Waterstaat Rijkswaterstaat** **Name: Mr. L.H. Keijts (DG RWS)** **Date: 25 August 2005** **Signature:**

3.3.1.5 Example 05- Tauern-Karavanke Corridor and TMP Pyhrn Corridor (Austria, Slovenia, Croatia)

GENERAL INFORMATION ON THE PLAN	
Euroregion:	CONNECT
Name of the plan:	Tauern-Karavanke Corridor and TMP Pyhrn Corridor (Austria, Slovenia, Croatia)
Status:	Developed TMP, test operation planned for mid 2009
Date of Implementation:	mid 2009
Initial Situation:	• unexpected total blockage caused by an accident or severe weather conditions, etc. • planned total blockage like demonstration, road works, etc. • congestion (stop-and-go under e.g. 10 km/h) of a certain degree, which is estimated through the length of the tailback • different waiting/delay-times between the SLO/HR corridor-borders
Traffic management measures are applied:	traffic control and information measures, information exchange between the partners
PLAN DESCRIPTION	
Traffic management in the eastern European Alpine region, especially for Austria, and Slovenia, is particularly important due to the characteristics of the area being a mountainous region that serves as a central point for transportation within Europe. Issues include inclement weather conditions and cross-border passes (e.g. the Karavanke path between at the Austrian-Slovenian border) and several tunnels, with limited alternative routes. There are also seasonal traffic peaks and occasional major incidents. A high proportion of the traffic travelling on long-distance relations through Austria, Slovenia, and Croatia is made up of HGV transit traffic. Both corridors, Tauern-Karavanke (TK) corridor and Pyhrn corridor, run nearly parallel. Both belong to the main road network in Austria, in Slovenia and in Croatia. Thus each could serve as alternative road, if the other were affected by a “TMP incident”. The precondition is that the alternative corridor offers remaining capacity for extra/diverted traffic. The exchange of traffic messages between the various regions for the corridor could be done as a first step with conventional media like fax or e-mail.	
SPATIAL ASPECTS	
Expansion:	Cross-border
Network involved:	Tauern-Karawaken-Corridor: Germany BAB8, Austria A10/ A11, Slovenia A2 Pyhrn-Corridor: Germany BAB3, Austria A8/ A9, Slovenia A1

Influence area:

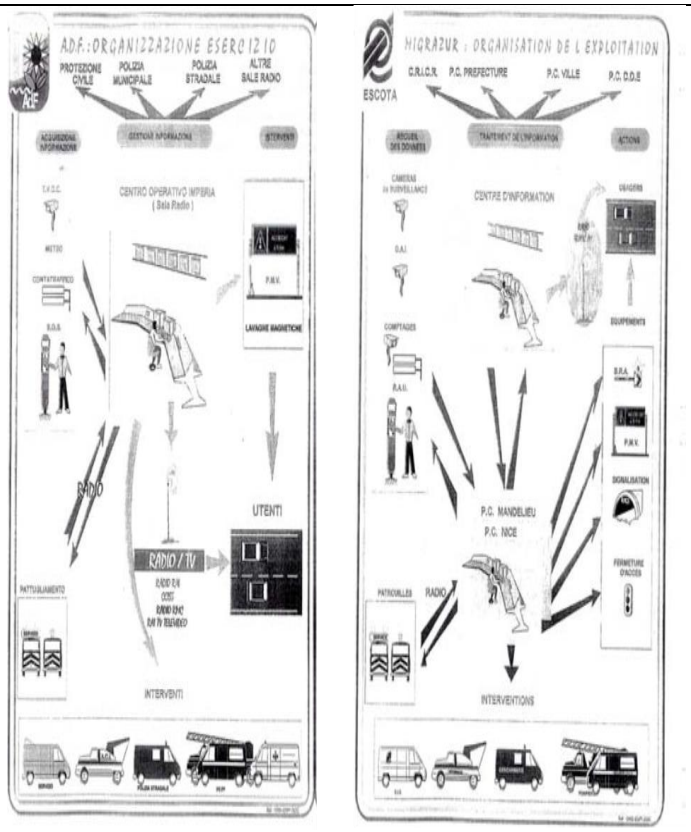


Routes on the Tauern-Karavanke and the Pyhrn corridor

	
ORGANISATIONAL ASPECTS	
Regulatory framework:	operator guidelines, Fax communication protocols
TECHNICAL ASPECTS	
Communication between the partners:	fax, (e-mail)
CURRENT STATE	
Has the plan ever being activated?	Activation planned
How is the plan currently?	Under development

3.3.1.6 Example 06- TMP for southern corridor Italy-France

GENERAL INFORMATION ON THE PLAN	
Euroregion:	CONNECT
Name of the plan:	TMP for southern corridor Italy-France
Status:	Implemented TMP
Initial Situation:	The traffic management plan developed take into account some typical examples of situations that require coordinate measures: • highway closure between border state and toll barrier of Ventimiglia (direction France – Italy) • highway closure between toll barrier of Ventimiglia and Bordighera (direction France – Italy) • highway closure between toll barrier of Ventimiglia and border state (direction Italy - France) • highway closure between Roquebrune and La Turbie (direction Italy - France) • highway closure between Nizza and St. Laurent du Var (direction Italy - France) • ban of driving for HGV in France • ban of driving for HGV in Italy • highway closed for snow between Mentone and Nice • highway closed for snow between border state and Ventimiglia For each of the events listed above a set of measures is provided, including information to users and effective traffic management. For each measure, a responsible for the action to be implemented is identified (AdF or Escota). When an event occur, causing the blocking of traffic for a time interval less than 1 hours, the communication between the operating centres of AdF and Escota will have only informative value. In cases of a traffic interruption of more than 1 hour, the stated measures are officially applied. Operating centres also will exchange information relating to events which, although not involving the blocking of traffic, may have implications on traffic flows: adverse weather conditions, customs strikes, extraordinary measures with effect on heavy traffic circulation, sports events, lack of fuel in several service areas, etc. Communications between the operating centres must include the key elements that characterize the event, namely: • type of event (accident, fire, snow, ice, fog, ban of driving for HGV, strikes, etc.) • location of the event • possibility of diverting traffic on the opposite carriageway • expected residual duration of the event

	
PLAN DESCRIPTION	
Autostrada dei Fiori (Italy) and Escota (France), in order to cooperate for the regulation of traffic on the cross-border highway network (in particular in case of exceptional events), established a Working Group composed of representatives of the two companies, to define a “Procedure for the operational coordination in the field of traffic management” and to agree on the modalities of data transfer between the respective operational data centres. This protocol also takes into account the particular problems of storage of heavy goods vehicles, in the case of exceptional events.	
SPATIAL ASPECTS	
Expansion:	
Network involved:	Motorway E80 (A10 Autostrada dei Fiori - Italy and A8 Escota -France) tmp including cross-border cooperation
ORGANISATIONAL ASPECTS	
Partners involved:	Autostrada dei Fiori (I) www.autofiori.it - Escota (F) www.escota.fr

3.3.1.7 Example 07- Hannibal traffic management plan

GENERAL INFORMATION ON THE PLAN	
Spot of deployment:	T4 (Frejus) - T1 (Mont Blanc) tunnels, Montgenèvre pass and north western part of Italian road network
Type of deployment:	Service implemented
Operating environment:	T4 (Frejus) - T1 (Mont Blanc) tunnels, Montgenèvre pass and north western part of Italian road network - TMP including cross-border cooperation
Road operator contact:	Sina S.p.A. (Alessandro Javicoli) alessandro.javicoli@sina.co.it

PLAN DESCRIPTION

HANNIBAL (High Altitude Network for the Needs of Integrated Border-Crossing Applications and Links) was a major European demonstration project aimed at improving cross-border trans-alpine traffic management and providing information along a major motorway corridor. With border crossings in the region between France and Italy limited to the Mont-Blanc and Fréjus tunnels and the Montgenèvre pass, optimal management of this road network was needed to make full use of capacity, relieve congestion and limit adverse environmental effects. One of the main activities was the development of a cross-border traffic management plan as a decision support tool for traffic re-routing and user information provision.

The plan is conceived to:

- classified information to be diffused, and subjects on an increasing seriousness base
- define possible actions to be adopted, depending on emergency situations
- list some suggested detours in each fork
- list possible scenarios; for each one the following are displayed:
- description of the scenario
- activation and deactivation times
- actions to be activated
- cartography
- alternative routes length

On June 2005 the TMP was updated, by SINA S.p.A. with the technical collaboration of the Laboratory for Mobility and Transport of the Politecnico of Milan, with the following activities:

1) Update of the TMP including the scenario of a simultaneous closure of the Fréjus and Mont Blanc tunnels; with respect to the 1997's TMP version, location of the new PMVs installed, new parking areas, update of the telephone numbers of the involved subjects.
2) Definition of new alternative itineraries from those considered in the first edition of the TMP Hannibal, for example the diversion to the tunnel of the Gran St. Bernard, to the passes of the Monginevro and the Moncenisio and eventually to the Simplon Pass and to the Gotthard tunnel.
3) Verification of the diffusion of the information to an appropriate distance with respect to the expected time of closure. This activity has been developed with the aid of the traffic model TRANS-ALPS.
4) New structure and interface on the Plan (more similar to the A4-A21 TMP) for a better and quicker understanding.

The events included in the plan are the following:

- Access to Mont-Blanc tunnel closed to heavy vehicles (E1)
- Access to Mont-Blanc tunnel closed for all vehicles (E2)
- Access to Fréjus tunnel closed to heavy vehicles (E3)
- Access to Fréjus tunnel closed for all vehicles (E4)
- Access to Mont-Blanc and Fréjus tunnels closed to heavy vehicles (E5)
- Access to Mont-Blanc and Fréjus tunnel closed to all vehicles (E6)

The identification of the scenario, once the event is selected, is performed by assessing the conditions at the

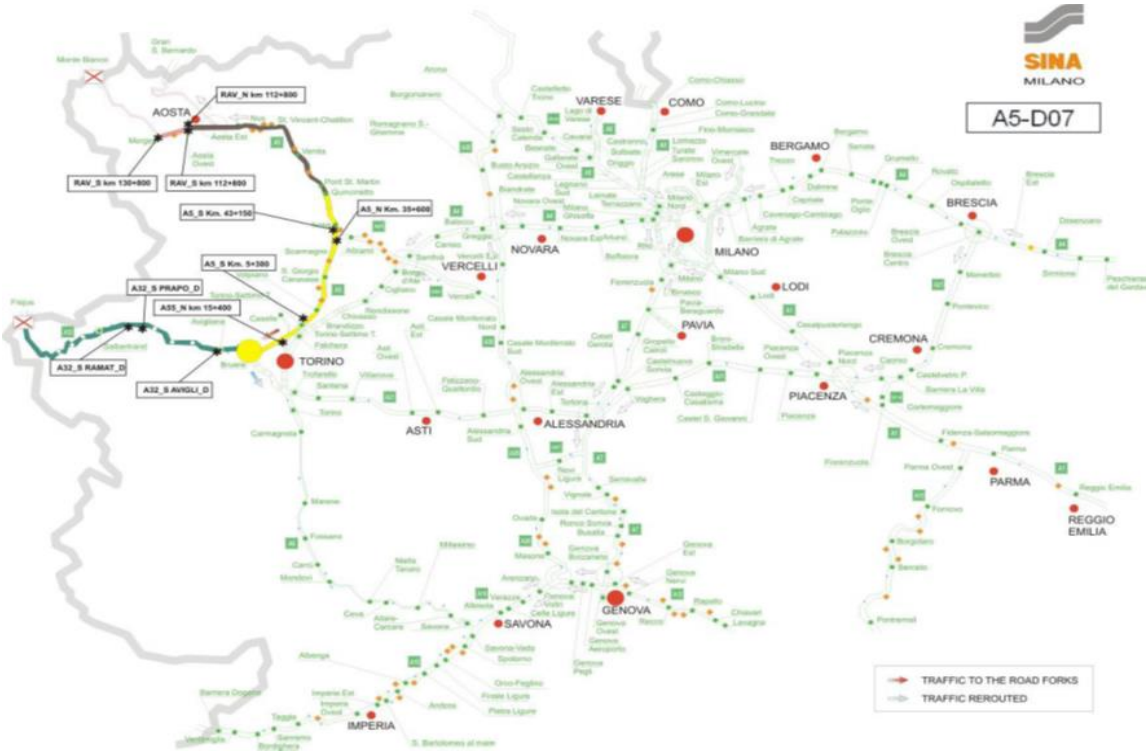
contour:

In the event of activation of the plan, the scenario is identified on the basis of the estimated time for resolution of the event, taking into account pre-determined time intervals In the scheduled deactivation of the plan the correct scenario is determined by taking into account the estimated time necessary to dispose the queues of heavy vehicles.

SCENARIO POSSIBILE							
EVENTI	ATTIVAZIONE DEL PIANO			DISATTIVAZIONE PROGRAMMATA			
	t<2h	2h<t<8h	t>8h	Riapertura program. entro 1h	Aperto smaltim. VP>1h	Aperto smaltim. VP<1h	Aperto e libero
Accesso al tunnel MONTE BIANCO chiuso per i mezzi pesanti **AA-E1**	S1	S2	S2	S3	S4	S5	S6

The possible measures included in the scenarios are:

- authorization by Road Police
- information to the users and partners
- service information to the partners
- parking (storage) of heavy vehicles
- re-routing



SINA MILANO

A5-D07

Snodo Bruere
direzione consigliata SV-XXMIGLIA

Progetto HANNIBAL

Criteri di attivazione	Criteri di sospensione	Criteri di disattivazione
GRAN SAN BERNARDO (T2) E MONGINEVRO (SS24) APERTI E LIBERI		

Azioni da implementare	Durata dell'operazione
1-Informazione agli utenti (PMV o bacheche alle barriere)	

Enti responsabili delle azioni			
azione	1	SAV	☎ 0165/767845
		ATIVA	☎ 0125/739595
		RAV	☎ 0165/522301
		SITAF	☎ 0122/654762

Punti di regolazione e sorveglianza del traffico

Sorveglianza del traffico		
Punti di misura	Telecamere	

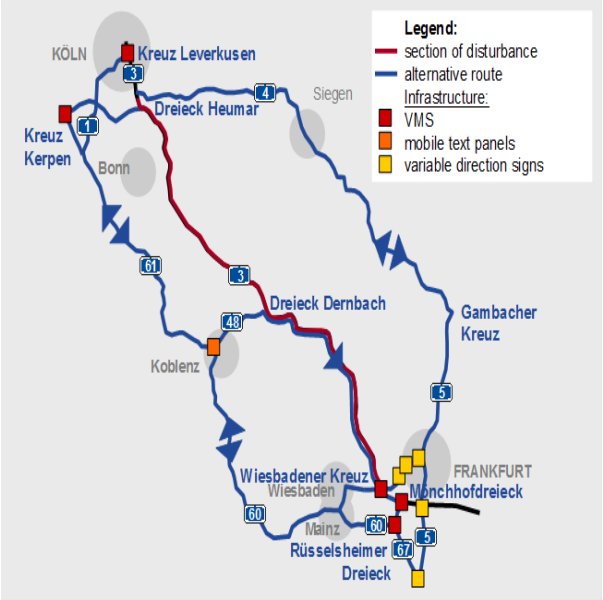
Riferimenti degli Enti

Lunghezza dell'itinerario

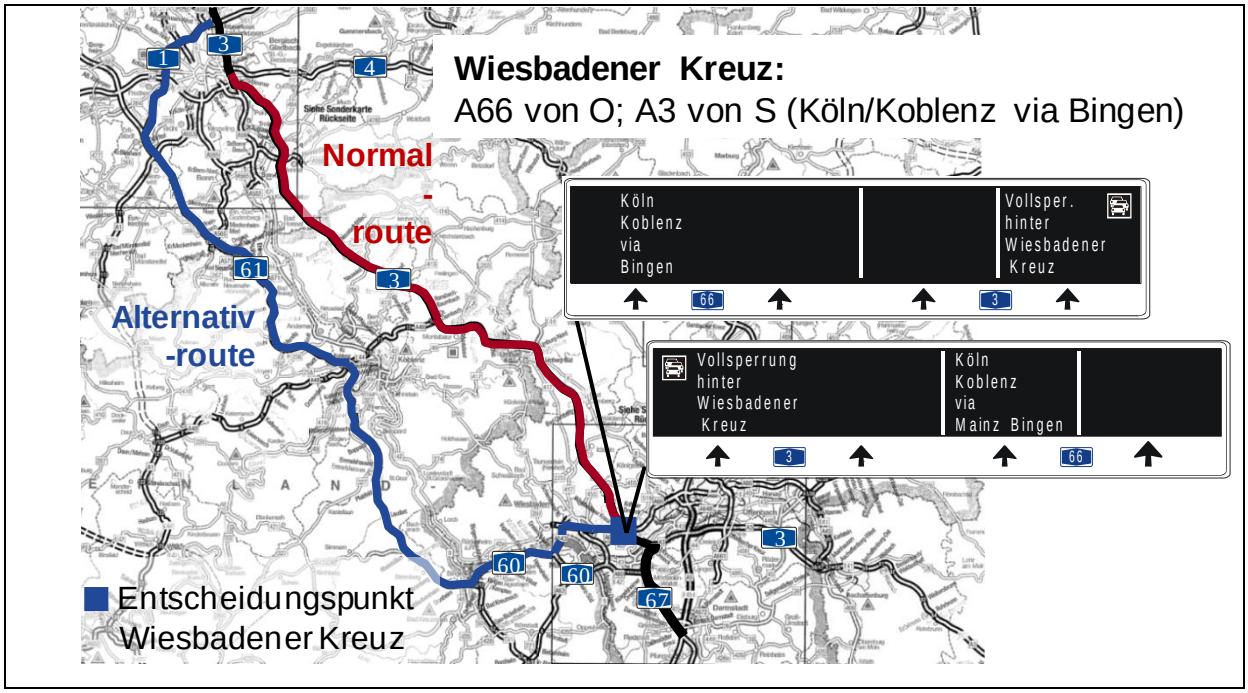
Commenti
SVINCOLI INTERESSATI PER INFORMAZIONI IN ACCESSO SALBERTRAND - AVIGLIANA - BRUERE - TORINO-SETTIMO T. - VOLPIANO - S. GIORGIO CANAVESE - SCARMAGNO - IVREA - ALBIANO - QUINCINETTO - PONT ST.MARTIN - VERRES - ST.VINCENT-CHATILLON - NUS - AO EST - AO OVEST - MORGEX MESSAGGIO DA TRASCRIVERE MONTE BIANCO E T.FREJUS CHIUSI PER VEICOLI PESANTI, SEGUIRE G.S. BERNARDO (T2) E SS24 MONGINEVRO OPPURE SEGUIRE SAVONA-XXMIGLIA MESSAGGIO PMV A6_S km 5+300, A6_S km 43+150 - M.B.IANCO E T.FREJUS CHIUSI VEIC.PESANTI SEGUIRE SS24 O GE-XXMIGLIA RAV_S km 112+800, RAV_S km 130+800, RAV_N km 112+800, A6_N km 35+600 - M.B.IANCO E T.FREJUS CHIUSI VEIC.PESANTI SEGUIRE T2 O GE-XXMIGLIA A32_S AVIGLI_D, A32_S PRAPO_D, A32_S RAMAT_D - M.B.IANCO E T.FREJUS CHIUSI VEIC.PESANTI SEGUIRE SS24 O GE-XXMIGLIA

3.3.2 Cross-regional TMPs

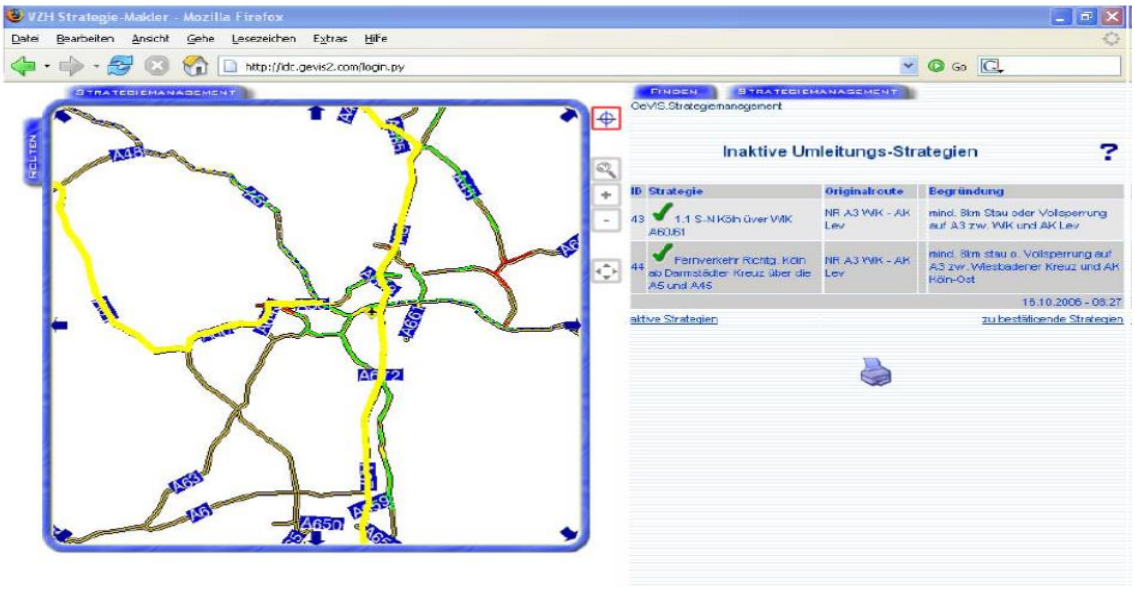
3.3.2.1 Example 08 - Re-routing corridor west, Germany

GENERAL INFORMATION ON THE PLAN	
Euroregion:	CENTRICO
Name of the plan:	Re-routing corridor West (LISA)
Status:	Operational
Date of Implementation	1st November 2006
Initial Situation:	Full closure, Congestion
Traffic management measures are applied:	Information Exchange, Re-routing, Traveller information
PLAN DESCRIPTION	
In case of a disturbance on the defined section the road user will be re-routed via VMS and radio	
SPATIAL ASPECTS	
Expansion:	Cross-regional
Network involved:	Main route: A3 between Frankfurt and Cologne (in both directions) Section of disturbance:A3 between Interchange Wiesbaden and interchange Dernbach or A3 between interchange Dernbach and interchange Cologne Alternative route: A60/ A61 or A5/A45/A4 
ORGANISATIONAL ASPECTS	
Stakeholders involved:	Verkehrszentrale Hessen (Traffic Centre Hessen, VZH), Landesmeldestelle Rhineland-Palatinate, Traffic Centre Northrhine-Westphalia.
Regulatory framework	Technical standard, regularly meetings
TECHNICAL ASPECTS	

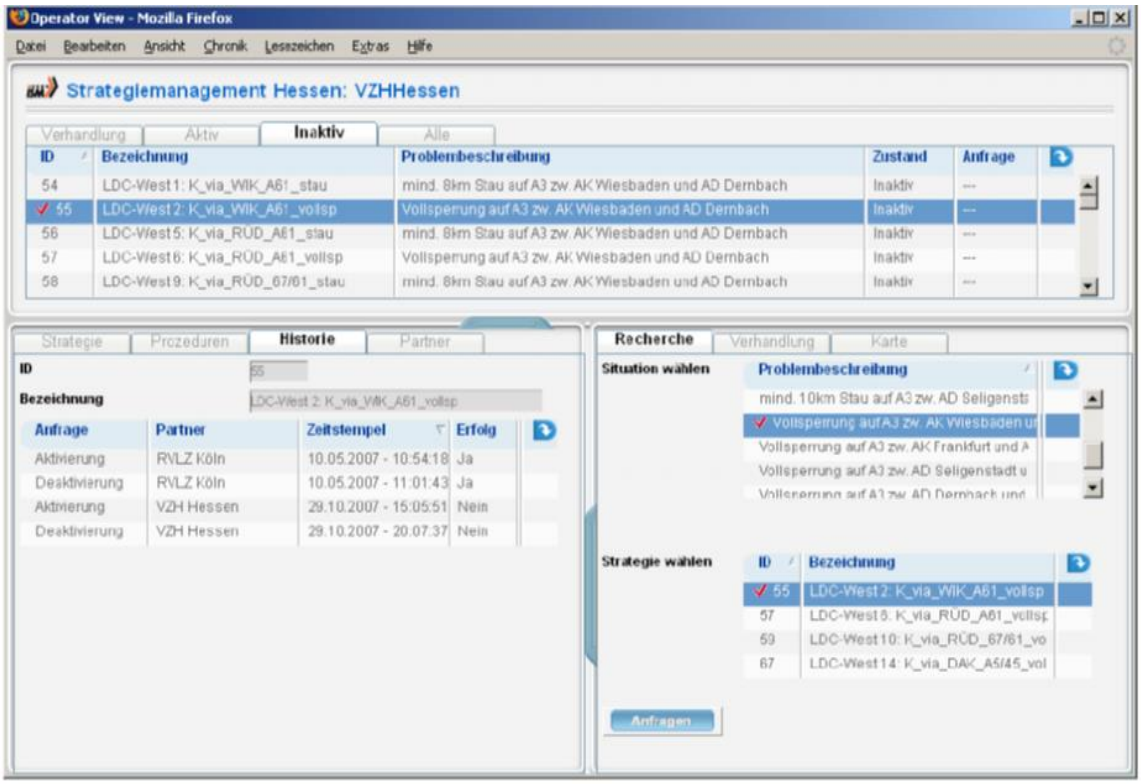
Communication between the partners:	Phone, Web-based
Decision support system used?	no
Road-side systems and systems to inform the traveller:	Variable message signs, Variable direction signs, Radio broadcsts
CURRENT STATE	
Has the plan ever being activated?	Yes
How often per time period:	11 strategy activations during 11 month of field trial.
Average duration of activation:	2:05 h
How is the plan currently?	In operation.
EXPERIENCES	
The development and maintenance of an agreed upon list of pre-defined strategies and procedures based on an assessment of needs and resources is the essential element of the success and fast practicability of the project. In future stages coordination with concurrent TMPs on local or conurbation level may be included. Due to the integration of the strategy negotiation software into the varying systemic and organisational environments of a multitude of Traffic Control Centres, initial challenges regarding the swiftness of usage/reaction had to be overcome. It should be noted that the increase of communication between the TCCs lead to a more frequent and intense exchange of experience about traffic management overall and therefore created positive side effects.	
EVALUATION	
Due to the high variance of traffic events during the initial pilot phase a long-term observation was deemed necessary. Currently each of the German LISA-Corridors holds two workshops a year, evaluating the preceding events and effectiveness of measures ensued.	
FUTURE FIELDS OF WORK	
Activity	Extension of existing TMP in case of availability of new traffic management infrastructure. Creating connections of existing / planned TMPs. Optimisation. Possibly integration into European-wide corridor MONA-LISA.
USEFUL EXAMPLES Example of VMS-display during the strategy activation:	


Wiesbadener Kreuz:
A66 von O; A3 von S (Köln/Koblenz via Bingen)
Normal
-
route
Alternativ
-route
Köln
Koblenz
via
Bingen
Vollsper.
hinter
Wiesbadener
Kreuz
Vollsperrung
hinter
Wiesbadener
Kreuz
Köln
Koblenz
via
Mainz Bingen
Entscheidungspunkt
Wiesbadener Kreuz

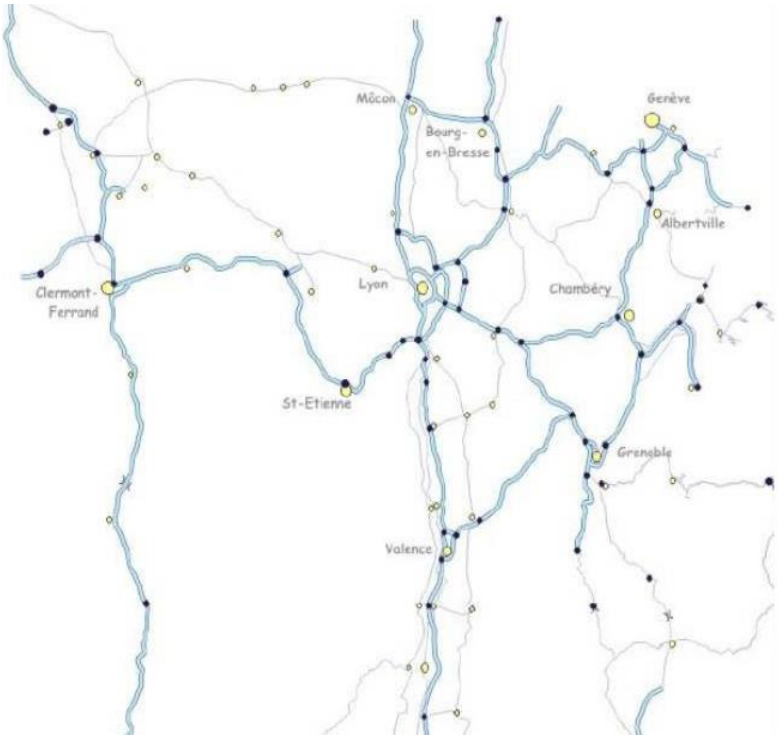
Example for strategy coordination via e-mail. Strategy overview of the TMP corridor west on the interface of the strategy client (marked in red: icon for strategy coordination)



Example of web-based communication tool: CSM approach of Hessen,Germany



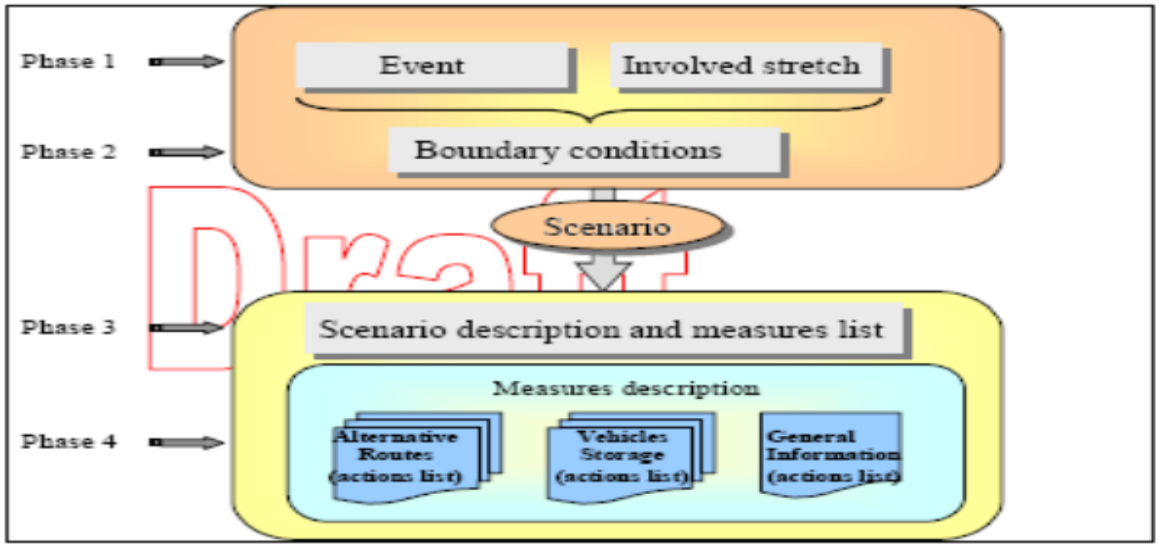
3.3.2.2 Example 09 - TMP for holiday traffic in France

GENERAL INFORMATION ON THE PLAN	
Euroregion:	SERTI
Name of the plan:	Palomar- Holiday traffic in France
Status:	Operation of a TMP
Date of Implementation	26th June 2003
Initial Situation:	Full closure, congestion, holiday traffic
Traffic management measures are applied:	Information exchange, re-routing, Traveller Information
SPATIAL ASPECTS	
Expansion:	Cross-regional
Network involved:	Motorway network in the south-east (South- East "Zone de Défense") 
ORGANISATIONAL ASPECTS	
Stakeholders involved:	Prefectures, network operators (DIR, motorway companies), DREZ, DDE, police forces;
Regulatory framework	Administrative Agreement
TECHNICAL ASPECTS	
Communication between the partners:	Phone, fax, e-mail
Decision support system used?	Yes, integrated into the plan
Road-side systems and systems to inform the traveller:	Variable message signs, Variable direction signs, Radio, RDS-TMC, Internet, Television

CURRENT STATE	
Has the plan ever being activated?	Yes
How often per time period:	very often in summer
How is the plan currently?	Being used, needs updating
FUTURE FIELDS OF WORK	
Activity	Revision, extension of an existing TMP.

3.3.2.3 Example 10 - SATAP A4 Turin-Milan and SATAP A21 Turin-Piacenza (Italy)

GENERAL INFORMATION ON THE PLAN	
Euroregion:	E64 (A4) and E70 (A21) SATAP Motorways – Italy – SERTI/ CORVETTE regional area
Status:	Experimentation
Network involved:	The A4 Turin – Milan and A21 Turin – Piacenza, managed by SATAP S.p.A., are the main motorways in the north-western part of Italy. The TMP for these two motorways is considering punctually located events
Road operator contact:	Sina S.p.A. (Alessandro Javicoli) alessandro.javicoli@sina.co.it
Description of the plan:	The TMP clearly aims at minimizing the possible negative effects on mobility and on the whole economic system by means of "network" measures and solutions. Operations coordination procedures as far as traffic management are tend to guarantee users a proper information level, thus promoting the best possible use of infrastructures and the maximum reduction of social costs and inconveniences on the part of travellers. The A4 Turin – Milan and A21 Turin – Piacenza, managed by SATAP S.p.A., are the main motorways in the north-western part of Italy. The TMP for these two motorways is considering punctually located events. 
System implemented:	The developed TMP can be considered a dynamic plan because the measures are defined taking into account the real conditions of the network (with real time information). The basic scheme of the Plan is structured in four phases. The four phases correspond to the logical sequence of the operations that the operator, in charge of the activation of the Plan, should carry out in order to define the measures and the actions to implement.



phase 1: identification of "the event" and of the motorway stretch involved

In order to manage traffic, several initial situations/incidents are grouped based on their consequences on road conditions, thus defining three main events:

- Total closing of a road section
- Partial closing (only some lanes of a carriageway) of a road section
- Reopening of a carriageway after a total or partial closing (considered as a specific event. In fact the restoration of normal conditions on an infrastructure requires the implementation of specific measures to end the emergency phase and to quickly allow traffic to return to its ordinary conditions

The road network where the TMP is to be applied has been divided into segments defined as " homogeneous section". The homogeneous section may be considered as the minimum unit between two points of the infrastructure that allow to intervene with traffic detours. These points are:

- Motorway entries/exits
- Intersections with other roads

A21 | **Identificazione evento e tratta omogenea** | **Fase 1**

Identificazione evento

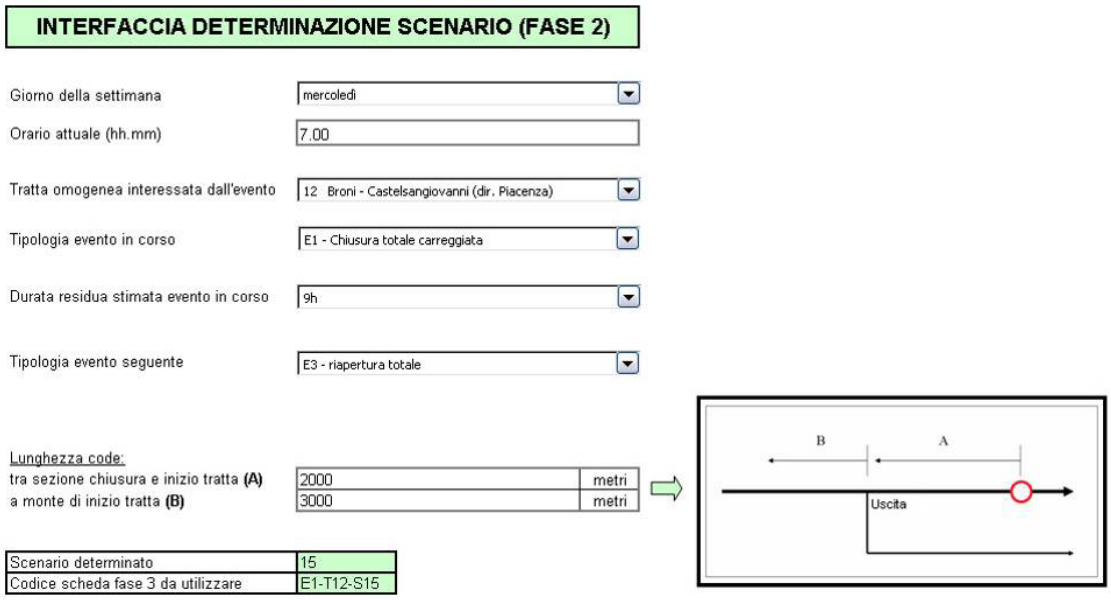
TIPOLOGIA EVENTO	CODICE EVENTO
Chiusura totale della carreggiata	E1
Chiusura parziale della carreggiata	E2
Riapertura carreggiata	E3

Identificazione tratta omogenea

	Numero tratta	Descrizione	Progressive (km)	Evento 1 (E1)	Evento 2 (E2)	Evento 3 (E3)
Direzione Piacenza	1	Santena - Villanova	0,0 – 10,3	E1 - T1	E2 - T1	E3 - T1
	2	Villanova - Asti Ovest	10,3 – 32,5	E1 - T2	E2 - T2	E3 - T2
	3	Asti Ovest - Asti Est	32,5 – 38,5	E1 - T3	E2 - T3	E3 - T3
	4	Asti Est - Felizzano	38,5 – 51,6	E1 - T4	E2 - T4	E3 - T4
	5	Felizzano - Innesto A26	51,6 – 65,0	E1 - T5	E2 - T5	E3 - T5
	6	Innesto A26 - Alessandria Ovest	65,0 – 65,8	E1 - T6	E2 - T6	E3 - T6
	7	Alessandria Ovest - Alessandria Est	65,8 – 76,0	E1 - T7	E2 - T7	E3 - T7
	8	Alessandria Est - Innesto A7	76,0 – 87,4	E1 - T8	E2 - T8	E3 - T8
	9	Innesto A7 - Voghera	87,4 – 101,3	E1 - T9	E2 - T9	E3 - T9
	10	Voghera - Casteggio Casatisma	101,3 – 114,9	E1 - T10	E2 - T10	E3 - T10
	11	Casteggio Casatisma - Broni Stradella	114,9 – 127,0	E1 - T11	E2 - T11	E3 - T11
	12	Broni Stradella - Castelsangiovanni	127,0 – 141,0	E1 - T12	E2 - T12	E3 - T12
	13	Castelsangiovanni - Piacenza Ovest	141,0 – 157,7	E1 - T13	E2 - T13	E3 - T13
Direzione Torino	14	Piacenza Ovest - Castel San Giovanni	157,7 – 141,0	E1 - T14	E2 - T14	E3 - T14
	15	Castel San Giovanni - Broni Stradella	141,0 – 127,0	E1 - T15	E2 - T15	E3 - T15
	16	Broni Stradella - Casteggio Casatisma	127,0 – 114,9	E1 - T16	E2 - T16	E3 - T16
	17	Casteggio Casatisma - Voghera	114,9 – 101,3	E1 - T17	E2 - T17	E3 - T17
	18	Voghera - Interconnessione A7	101,3 – 87,4	E1 - T18	E2 - T18	E3 - T18
	19	Interconnessione A7 - Alessandria Est	87,4 – 76,0	E1 - T19	E2 - T19	E3 - T19
	20	Alessandria Est - Alessandria Ovest	76,0 – 65,8	E1 - T20	E2 - T20	E3 - T20
	21	Alessandria Ovest - Interconnessione A26	65,8 – 65,0	E1 - T21	E2 - T21	E3 - T21
	22	Interconnessione A26 - Felizzano	65,0 – 51,6	E1 - T22	E2 - T22	E3 - T22
	23	Felizzano - Asti Est	51,6 – 38,5	E1 - T23	E2 - T23	E3 - T23
	24	Asti Est - Asti Ovest	38,5 – 32,5	E1 - T24	E2 - T24	E3 - T24
	25	Asti Ovest - Villanova	32,5 – 10,3	E1 - T25	E2 - T25	E3 - T25
	26	Villanova - Santena	10,3 – 0,0	E1 - T26	E2 - T26	E3 - T26

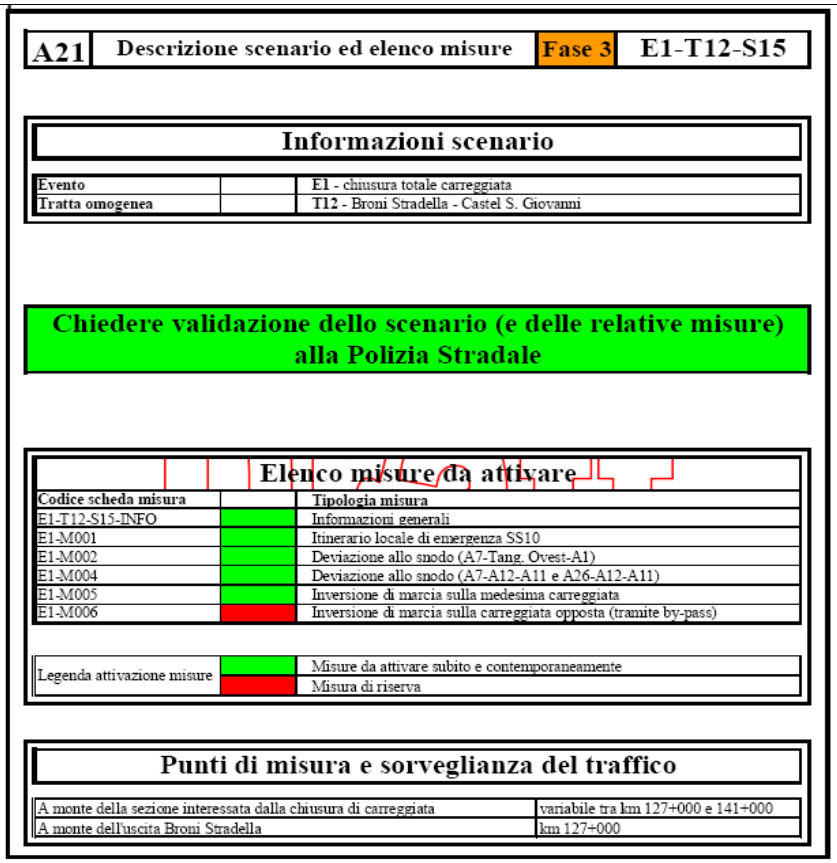
phase 2: information on the involved motorway stretch and definition of "the scenario"

The final definition of the scenario is carried out with the evaluation of some boundary conditions, known only during the activation of the Plan. The scenario is determined with the use of a special application able to consider automatically all collected input parameters and boundary conditions. The scenario, defined by the sequence event – involved motorway stretch - boundary conditions, allows to determine all the measures that should be implemented



phase 3: description of the scenario and measures

List of the measures to implement (belonging to the selected scenario) and procedure for scenario validation from Road Police



A21	Descrizione scenario ed elenco misure	Fase 3	E1-T12-S15

Informazioni scenario

Evento		E1 - chiusura totale carreggiata
Tratta omogenea		T12 - Broni Stradella - Castel S. Giovanni

Chiedere validazione dello scenario (e delle relative misure) alla Polizia Stradale

Elenco misure da attivare

Codice scheda misura		Tipologia misura
E1-T12-S15-INFO		Informazioni generali
E1-M001		Itinerario locale di emergenza SS10
E1-M002		Deviazione allo snodo (A7-Tang. Ovest-A1)
E1-M004		Deviazione allo snodo (A7-A12-A11 e A26-A12-A11)
E1-M005		Inversione di marcia sulla medesima carreggiata
E1-M006		Inversione di marcia sulla carreggiata opposta (tramite by-pass)

Legenda attivazione misure		Misure da attivare subito e contemporaneamente
		Misura di riserva

Punti di misura e sorveglianza del traffico

A monte della sezione interessata dalla chiusura di carreggiata	variabile tra km 127+000 e 141+000
A monte dell'uscita Broni Stradella	km 127+000

phase 4: measures

Different kind of measures are planned, depending on to the type of action considered; the main measures are:

- general information to the users regarding the occurred event and his evolution;
- planning of alternative routes on the primary network;
- planning of emergency alternative routes on the secondary network;
- planning of detours at intersections (junctions);
- closing and/or control of motorway entries;
- clearing of blocked-up vehicles by means of a U-turn;
- clearing of blocked-up vehicles by changing carriageway;
- planning of forced exits;

Tables correspondent to this phase show the detailed application of the measures in terms of actions to be implemented.

A21	Misura - itinerario locale di emergenza	Fase 4	E1-M001

Itinerario locale di emergenza stabilito		
Caratteristiche itinerario		
Lunghezza itinerario		18,5 km
Incremento di percorrenza		4,5 km

Descrizione itinerario

L'itinerario locale di emergenza percorre il tratto della statale SS10 "Padana inferiore" compreso tra i comuni di Stradella e Castel San Giovanni, attraversandone i centri abitati. Giunti nell'abitato di Castel San Giovanni è necessario percorrere le vie "Emilia Pavese" e "Fratelli Bandiera". Al termine di quest'ultima, alla rotonda, girare a sinistra in "Via Allende" e seguire le indicazioni "Autostrada" per reimmettersi nell'autostrada A21 Torino - Piacenza all'altezza del casello "Castel San Giovanni".

A21	Misura - itinerario locale di emergenza	Fase 4	E1-M001

Criteri di attivazione
SS10 percorribile
SS10 non congestionata

Azioni di attivazione
1 - SATAP: informare enti responsab. delle azioni
2 - SATAP: informare Comuni Stradella e Castel San Giovanni
3 - SATAP: predisporre segnaletica su itinerario alternativo
4 - SATAP: attivare PMV specifici
5 - POL.STRAD.: istituire uscita obbligatoria Broni
6 - SATAP: attivare monitoraggio per verifica criteri sospensione e disattivazione

Criteri di sospensione
SS10 congestionata

Azioni di sospensione
7 - SATAP: bloccare temporaneamente uscita veicoli al casello Broni
8 - SATAP: mantenere segnaletica su itinerario alternativo

Criteri di disattivazione
SS10 non percorribile in modo permanente
Misura non contemplata dallo scenario rivalutato

Azioni di disattivazione
9 - SATAP: informare enti coinvolti
10 - POL.STRAD.: rimuovere uscita obbligatoria
11 - SATAP: disattivare PMV specifici
12 - SATAP: rimuovere segnaletica su itinerario alternativo

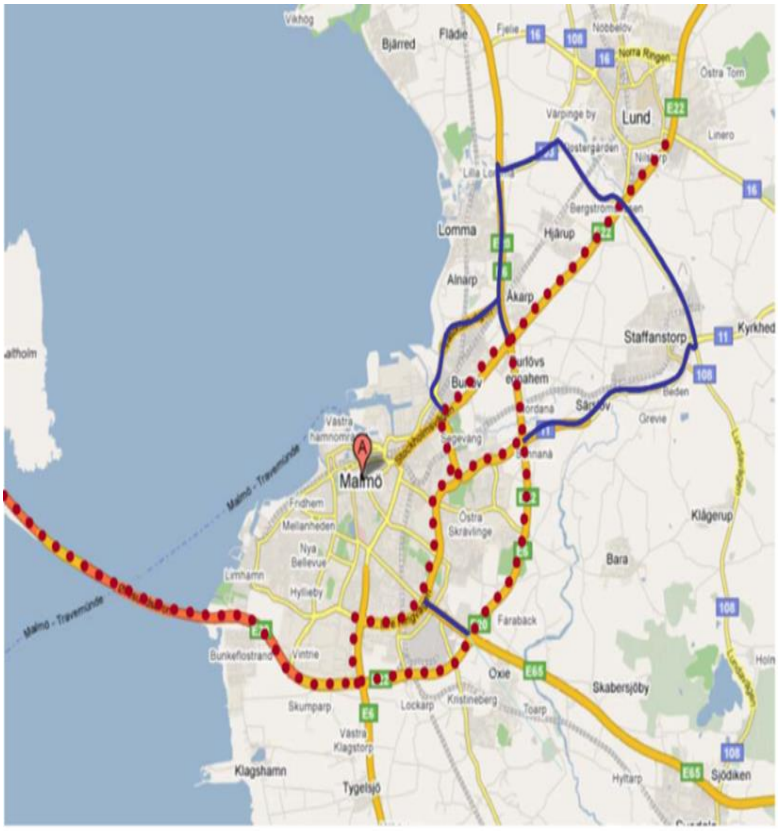
Informazioni specifiche da comunicare in aggiunta a quelle già contenute nella scheda *"Informazioni generali"*

PMV da attivare	Messaggio tipo
A21 113+077	A21 chiusa km 135; uscita obbligatoria Broni
A21 ingr. Casteggio	A21 chiusa km 135; uscita obbligatoria Broni
A21 ingr. Broni - Stradella	A21 chiusa direzione Piacenza; utilizzare entrata Castel San Giovanni

Riferimenti enti coinvolti		
SATAP		
Polizia Stradale		
Comune di Stradella		
Comune di Castel San Giovanni		

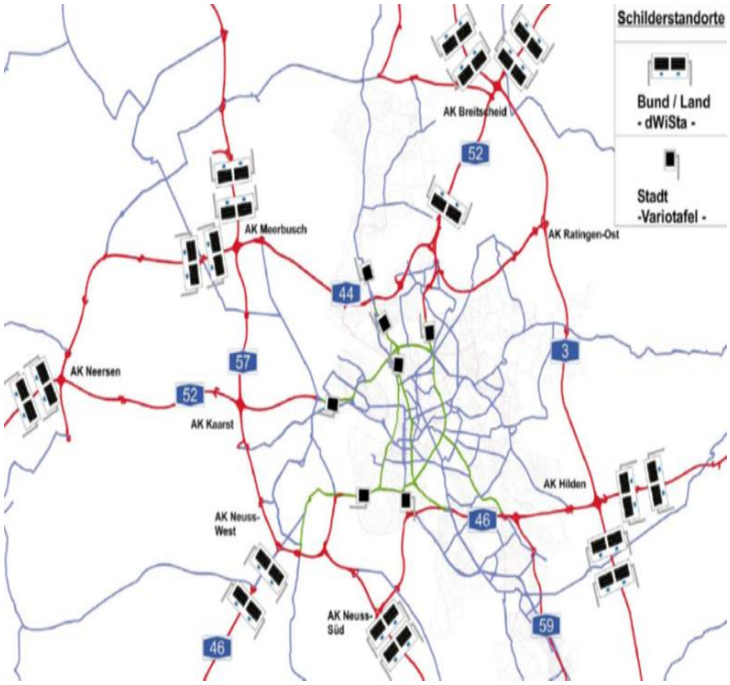
3.3.3 TMPs for conurbations

3.3.3.1 Example 11 - Conurbation Malmö, Sweden

GENERAL INFORMATION ON THE PLAN	
Euroregion:	VIKING
Name of the plan:	TMP Malmö, Sweden
Status:	Operational
Date of Implementation	2001
Initial Situation:	Congestion, Road works, others
Traffic management measures are applied:	Re-routing, Traveller information
SPATIAL ASPECTS	
Expansion:	conurbation, cross-border
Network involved:	Ring roads around Malmö, E22 Lund-Malmö and the Öresund Bridge. Affected roads: E6 (outer ring road), E20 (Öresund Bridge), E22 and E6.01 (Inner ring road). 
ORGANISATIONAL ASPECTS	
Stakeholders involved:	Swedish Road Administration Skåne Region, City of Malmö and the Öresund Bridge.
Regulatory framework	Cooperation Agreement
TECHNICAL ASPECTS	

Communication between the partners:	Phone
Decision support system used?	no
Road-side systems and systems to inform the traveller:	Variable message signs, Variable direction signs, Radio, RDS-TMC, Internet
CURRENT STATE	
Has the plan ever being activated?	Yes
How often per time period:	Approximately used 10-20 times/year
How is the plan currently?	Being used
EXPERIENCES	
Too few characters on the VMS have made it difficult to formulate good messages. To combat this, all VMS are now being upgraded or replaced.	
FUTURE FIELDS OF WORK	
Activity	Revision, extension of an existing TMP, evaluation
Detailed description of planned activities:	The most important activities are these: • New TMPs and messages due to VMS system upgrading (new VMS expected to be installed towards the end of 2009) • New TMPs to handle road works affecting traffic towards the city centre. Study the need of additional TMPs due to expansion of the city to the south. (expected early 2010) • Expansion along E6, both southwards to Trelleborg and northwards towards Helsingborg.
Expansion:	“medium-distance” motorway focus together with the current conurbation-focussed TMPs
Network involved:	Same as above plus links to city centre
Key stakeholders, involved partners:	Swedish Road Administration, City of Malmö.

3.3.3.2 Example 12 - Düsseldorf Dmotion, Germany

GENERAL INFORMATION ON THE PLAN	
Euroregion:	CENTRICO
Name of the plan:	Dmotion
Status:	Operational
Date of Implementation	27th February 2008
Initial Situation:	Congestion on the highway. Congestion on the secondary network
Traffic management measures are applied:	Re-routing, Traveller information
Plan description:	In case of effecting traffic conditions on the main in leading roads or the city ring road, the road user will be re-routed via VMS and video panels already on the motorways. The traffic lights will be switched corresponding. Assumption: operating between equitable partners with own highness of decisions.
SPATIAL ASPECTS	
Expansion:	conurbation
Network involved:	strategic network and infrastructure in conurbation Düsseldorf, Germany 
ORGANISATIONAL ASPECTS	
Stakeholders involved:	City of Düsseldorf, Department for traffic management; State of NRW, Ministry for Building and Transport; Landesbetrieb Straßen.NRW; Regional government Köln
Regulatory framework	Binding definition of interfaces = Approach of a common and portable solution of traffic management strategies under comprehension of different authorities
TECHNICAL ASPECTS	

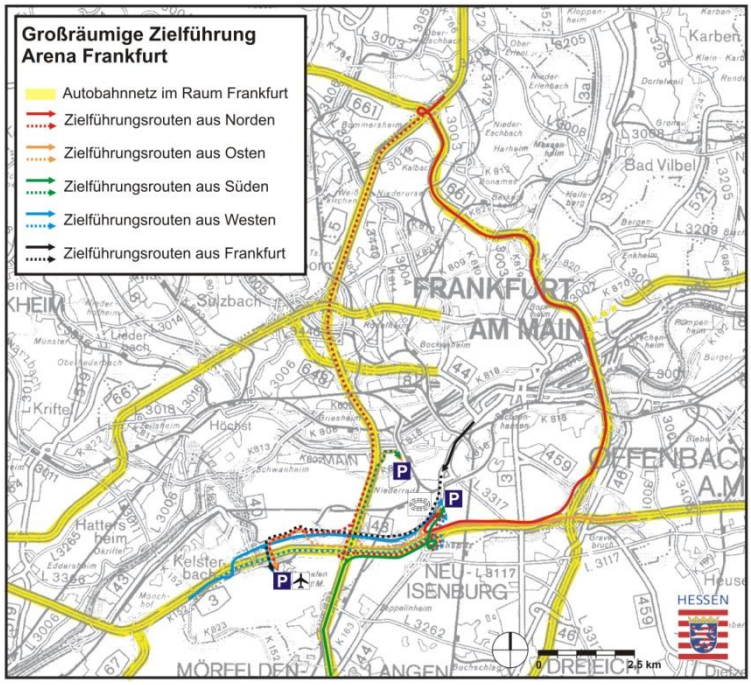
Communication between the partners:	e-mail
Road-side systems and systems to inform the traveller:	Variable message signs, video panels, switched traffic lights
CURRENT STATE	
Has the plan ever being activated?	Yes
How often per time period:	between 27th February and 20th June 2008 (4 month) 191 activations
How is the plan currently?	Being used
EXPERIENCES	
• Building up of strategic management is a very complex task accompanied by intensive planning and a round table. • During planning and implementation process flexibility within own highness big advantage. <u>Experiences during operation:</u> • High complexity of overlapping and interlocking of strategies and its provision • Full potential during incidents outside peak hours and within peak hours with misaligning times of tailbacks • Level of compliancy outside peak hours 11.5% to 22.5% • During peak hours balanced conditions between main and alternative route	
FUTURE FIELDS OF WORK	
Deployment of new TMPs:	related cooperation's between cities and the state of Northrhine Westphalia are planned for Cologne and Dortmund.

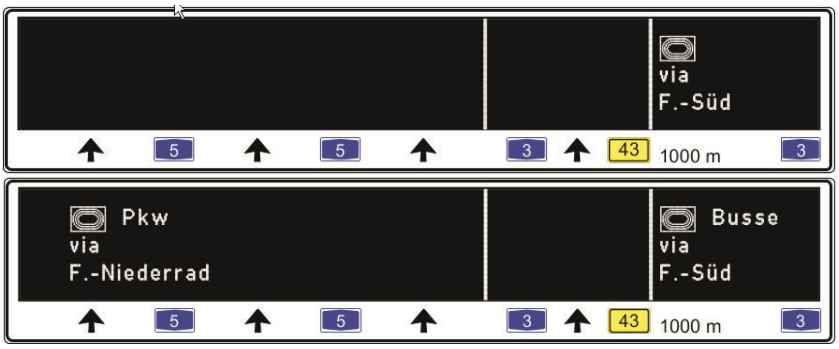
3.3.3.3 Example 13 - Groene Golf (Green Wave), Netherlands

GENERAL INFORMATION ON THE PLAN	
Euroregion:	CENTRICO
Name of the plan:	Groene Golf
Status:	Operational
Date of Implementation	2006
Initial Situation:	-
Traffic management measures are applied:	At the request of (regional) road authorities, a team of specially trained technicians analyse traffic regulation systems on through roads, with a view on an effective flow.
Plan description:	-
SPATIAL ASPECTS	
Expansion:	Netherlands
Network involved:	more than 1,100 crossings
ORGANISATIONAL ASPECTS	
Stakeholders involved:	Rijkswaterstaat, road authorities

Regulatory framework	-
TECHNICAL ASPECTS	
Communication between the partners:	-
Road-side systems and systems to inform the traveller:	switched traffic lights
CURRENT STATE	
Has the plan ever being activated?	Yes
How often per time period:	always
How is the plan currently?	Being used
EXPERIENCES	
As a result of independent, objective and highly valued advice on more than 1,100 crossings with traffic lights and support to local, regional and central government, this team has helped to reduce the number of hours lost waiting. The average reduction achieved is 8,000 hours per annum per crossing with traffic lights. Total benefits to society amount to at least 75 million euros. 	
FUTURE FIELDS OF WORK	
Deployment of new TMPs:	-

3.3.3.1 Example 14 – Verkehrsmanagement bei Großveranstaltungen in der Arena Frankfurt a.M., Germany

GENERAL INFORMATION ON THE PLAN	
Euroregion:	CENTRICO
Name of the plan:	traffic management in case of events in the arena of Frankfurt a.M.
Status:	Operational
Date of Implementation	last stage of expansion 2006
Initial Situation:	High traffic volume due to an event in the arena of Frankfurt a.M.
Traffic management measures are applied:	Re-routing, Traveller information
Plan description:	Additional event-referred traffic is directed as a function of the filling degree of the parking lots and the traffic conditions on the feeder routes by VMS.
SPATIAL ASPECTS	
Expansion:	Region Frankfurt RheinMain
Network involved:	
ORGANISATIONAL ASPECTS	
Stakeholders involved:	Hessen Mobil Road and Traffic Management, City of Frankfurt a.M., Police departments, operators of parking lots
Regulatory framework	Technical standard, regularly meetings
TECHNICAL ASPECTS	
Communication between the partners:	Phone

Road-side systems and systems to inform the traveller:	Variable message signs, variable direction signs, radio broadcasts
CURRENT STATE	
Has the plan ever being activated?	Yes
How often per time period:	three times per month
How is the plan currently?	Being used
EXPERIENCES	
Due to the before co-ordinated guidance routes and on it based strategies can at short notice reacted to the current traffic conditions and the rate of utilization of the available parking lots. In particular with larger events parking lots can be used which are not directly close to the arena. The event-referred traffic can be better distributed in the traffic network so that serious traffic congestions can be avoided.	
FUTURE FIELDS OF WORK	
An automation of communication between the traffic centre Hessen and the traffic centre of the city of Frankfurt is planned.	
USEFUL EXAMPLES	
Example of VMS-display during the strategy activation: 	

3.4 Business Model

3.4.1 Conditions for service provision

The tasks of TMPs are very limited suited for business models in terms of earning directly money; the business is more of socio-economical character.

Ensuring an efficient traffic network and increasing road safety by means of traffic management is a sovereign task, normally ensured by the road organisations or private motorway companies (system optimum). They are supported by enforcement and incident management stakeholders. Both aspects imply that basic traffic information is given to the end user free of charge.

The private motorway companies, who maintain the road network and earn user fee, have another perception. On the one hand flowing traffic – ensured through traffic management plans – leads to a higher profit, because only for flowing vehicle – kilometres they can collect tolls. Another appropriate instrument to enforce the road network equipment with ICT infrastructure is to interlink the toll rate with the level (quality and denseness) of the road side ICT infrastructure.

Private navigation operators are concerned with optimising the level of service for the subscribing user (user optimum) which can sometimes conflict with the system optimum requirements of public authorities and motorway companies.

3.4.2 Adverse effects of the service

Inconsistent traffic information and guidance

Traffic information and guidance that are not timely and consistent on traffic routes lead to low degrees of compliance from road users. In addition, priorities have to be developed for traffic information to display on VMS. Well-tested and co-ordinated control and information measures are key to ensuring valid TMP elaboration.

Re-routing TMPs

- If the degree of compliance gets too high, it can lead to overload on the alternative route. A systematic monitoring and communication of traffic situation on the original and alternative routes will allow for timely intervention to mitigate the effects of capacity overload on the alternative route.
- Target group-specific routing is not possible. Adverse effects as HGV in sensible residential areas or vehicles with hazardous goods on cross-town links cannot be avoided.

HGV-storage

- If TMPs get deactivated, the share of HGV on the subsequent road can be up to 30 % – 40%.
- Not enough capacities in designated HGV parking areas, forcing many HGVs to park on road-side. Some cargo types require on-time transport and delivery.

3.4.3 Cost / Benefit Analysis

3.4.3.1 End user orientation

This guideline focuses on experiences made with re-routing TMPs as they are a main aspect of TMPs and not described in a specific guideline.

- Re-routing measures seem to be better accepted, if at least two systems (e.g. VMS and radio) give the same advice within common time frames.
- The display of a longer congestion length or travel time on the main route leads to a higher level of compliance.
- The time of day has no impact on the traveller behaviour.

- By contrast, the location of the sign had a very great influence. => In conurbation areas, where –through to the dense infrastructure- there are various possibilities, the course of the long-distance traffic has to be considered while developing the TMP.
- Variable message signs, which can display information about the incident, congestion length or travel time losses, lead to a high acceptance.
- Conflicting advices of different service chains lead to a lower acceptance.

In addition, travel information advice on other measures as incident information, parking options for HGVs and modal shift options are important elements for informing and guiding users. Consistent and timely travel information increases the acceptance of end users. More information can be found in the guidelines for traffic information and freight and logistics core services.

3.4.3.2 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 type and distribution of incidents and traffic flows and 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 assuming that the data base is proper. They are used as part of the quality management to optimise strategies permanently. Sometimes they can give an indication about the effects of planned infrastructure at other locations, but the transferability of results is limited (see below “Challenges of cost-benefit-analysis”.)

Investment costs (depending if existing systems can be used for the TMP or if additional systems are necessary)	Operation costs
Technical infrastructure	Staff
Maintenance of the systems	Maintenance
Planning costs, studies	Data transfer
	Software-update
	Technical modernisations

calculable Benefit components	Incalculable Benefit components
Increasing safety	Improved traffic information
Reduction of climatic damage	=> Additional Service for drivers
Travel time savings	=> Important contribution to road safety
Increasing comfort and reliability	speed up of strategy activation
Increasing operating efficiency	=> Reduction of the congestion spread
Economic aspects	=> Avoidance of resulting accidents
Increasing safety	Strategically and operational benefit due to the cooperation

	=> New possibilities of cross-border network management
	=> Optimised operation inside the traffic management centres

Challenges of cost-benefit-analysis:

- Clear definition and forecasts of incident types, location and duration, in addition to secondary events that can arise from primary incidents.
- 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 and according to elaboration context. Calculated benefits can only give a reference value, they are not easily transferable to other situations.
- Statistical data are very unsteady, great variances appear. Investment costs can often not be assigned to one specific measure / TMP.
- Cost rates for fuel, CO2-emission or time-losses are very unsteady within Europe and not up-to-date. => Need for Europe-wide harmonized cost criteria and regularly update of values.
- Travel time losses are calculated based on average travel times, which are hard to be measured with loops => automatic plate recognition and floating car data can give more precise data
- Statistical data about destination allocations is rare; destinies vary with every road user => the additional length of alternative routes can only be calculated approximately.

3.4.3.3 Criteria and methods for the evaluation

Ex-ante evaluations should be carried out in order to define the validity of TMP elaboration and expected benefit of different concepts.

- “Before” data should be captured in order to have reference values for the ex-post evaluation. With ex-post evaluation the real effect can be determined. Evaluations could be carried out in line with relevant TEMPO criteria.
- Ex-post socio-economic evaluations should be carried out to come to know the impact of a measure / TMP and to have a basis for TMP optimisation.
- Regularly tests/exercises of the operational feasibility should be carried out, especially on new TMPs, adjusted TMPs and TMPs which are applied seldom.

Appropriate Parameters for ex-post socio-economic evaluations

Appropriate parameters to be considered are:

- Road section characteristics: number of lanes, accident rates, accident characteristics
- Time-variation curves during the incident [veh/ h] (recorded in the network at the section shortly behind the point of decision); share of HGV
- Comparable time-variation curves as reference [veh/ h]; share of HGV
- Origin-destination traffic patterns, if available.
- 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 (alternative: traffic conditions).
- Time point of the activation/ deactivation of the measure (switching printout of the VMS)

- Road user acceptance surveys.

Appropriate Parameters for Regularly tests/exercises of the operational feasibility the actors/ applied Techniques

- the level and quality of incident detection (e.g. contradictions concerning the incident detection of different data sources), forecast reliability
- the level of conformance to activation thresholds.
- the quality of information exchange (Time of strategy request, strategy confirmation or cancel. Communication with other partners, such as broadcast companies and service providers)
- the respect of the activation of the measures (reasons for - a refusal of strategy activation - a strategy cancel (technical reasons, time-outs..))
- the time to detect an incident
- the time to take a decision
- the time to apply a decision
- the time to inform the end users
- the reliability of the equipment (detection and broadcast)
- the time and lapse of strategy deactivation
- Technical problems and their causes

4 Annex A: Compliance Checklist

4.1 Compliance checklist "**must**"

#	Requirement	Fulfilled?		If no – quote of insurmountable reasons
		Yes	No	
Functional requirements				
FR1	Decomposition of the TMP elaboration phase into sub-phases (process steps) with the provision of intermediate deliverables **must** be carried out in those cases where the service is carried out by two or more (not closely related) organisations (and decomposition is recommended in any case to be prepared to involve yet further parties as may be the case in the future)			
FR2	A TMP feasibility study **must** be processed and a TMP feasibility document as intermediate deliverable 1 **must** be delivered as input for the next sub-phase (TMP framework development)			
FR3	Based on the input of sub-phase TMP feasibility study (intermediate deliverable 1) a sub-phase TMP framework development **must** be processed and a TMP framework document as intermediate deliverable 2 **must** be delivered as input for the next sub-phase (TMP development)			
FR4	Based on the input of sub-phase TMP framework development (intermediate deliverable 2) a sub-phase TMP scenario development **must** be processed and a TMP scenarios document as intermediate deliverable 3 **must** be delivered as input for the next phase (TMP operation).			
FR6	Functional decomposition of the TMP operation phase into two sub-functions with the provision of interfaces 4 and 5 **must** be carried out to ensure interoperability in those cases where the service is carried out by two or more (not closely related) organisations (and functional decomposition is recommended in any case to be prepared to involve yet further parties as may be the case in the future)			
FR9	Important and frequently applied TMPs **must** be assessed and preferably periodically adjusted and a TMP evaluation			

	document as intermediate deliverable 6 **must** be delivered as input for a possible necessary improvement of the TMP operation. Hence an evaluation model and an evaluation process **must** be defined.			
Functional requirements: interfaces				
None				
Organisational requirements				
OR1	All different Stakeholder roles needed to be involved in the three phases of the service **must** be considered and defined (role concept)			
OR6	Stakeholders involved in service operation **must** agree on one of the following operational organisational structures applying the corresponding communication pattern to carry out scenario activation/deactivation: • centralized structure applying the "Command" communication pattern (see TR1) • decentralized structure applying the "Request/confirm" communication pattern (see TR2) • mixture of centralised and decentralised structure applying a combination of the "Command" and "Request/confirm" communication pattern			
Technical requirements				

TR1	Independent of specific communication media, the following communication patterns **must** be applied for scenario activation/deactivation communication between TMP partners: • In case of a centralised service value chain organisation (see figure 12) requiring interoperability between two or more different organizations the "Command" communication pattern must be applied in the communication protocol as depicted in the UML-diagram6 in figure 14. • In case of a decentralised service value chain organisation (see figure 13) requiring interoperability between two or more different organizations the "Request/confirm" communication pattern **must** be applied in the communication protocol as depicted in the UML-diagram in figure 15. • In case of a mixture of centralised and decentralised service value chain organisation requiring interoperability between two or more different organizations a combination of the "Command" and "Request/confirm" communication pattern **must** be applied			
Common look & feel requirements				
None				
Level of Service requirements				
None				

[6] Unified Modelling Language (UML) is a standardized general-purpose modelling language in the field of object-oriented software engineering. The standard is managed, and was created, by the Object Management Group. It was first added to the list of OMG adopted technologies in 1997, and has since become the industry standard for modelling software-intensive systems

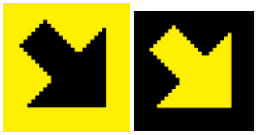
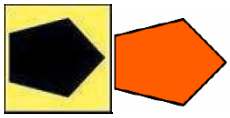
4.2 Compliance checklist "**should**"

#	Requirement	Fulfilled? Yes	Fulfilled? No	If no – explanation of deviation
Functional requirements				
FR10	The TMP evaluation process **should** compile various sources of information like: • Statistical traffic data • Experiences of road authorities and operators • Survey of incidents with Scenarios (and measures) activated • Interviews and questionnaires with operators and road users • …			
Functional requirements: interfaces				
FR5	As long as appropriate DATEX II profiles are not available, TMP-scenarios should be profiled in the following information structure (if no information is available for an element, value can be omitted): • List of incidents/events o Incident/Event name o Incident/Event type o Incident/Event Location (section, direction) o Expected duration, traffic impact or congestion length if available o Spatial dimension (area and network affected by) • List of measures o Name of measure o Implementing organisation(s) o List of actions (Name of action,Definition of action) • List of scenarios (to respond) o Scenario name o spatial application (area and network) o Thresholds for activation/deactivation o List of associated measures			

	o expected maximum response times o organisational chain (list of involved organisations and competences) • Prioritization			
FR7	As long as appropriate DATEX II profiles are not available, the sub-functions scenario activation/measure activation **should** require/provide an interface 4 profiled in the following information structure (if no information is available for an element, value can be omitted): • SARIS – Scenario activation request information set o Time stamp of request o Incident/event type and location o Name of requesting organisation and person contact details o Name of organisation requested o Scenario name or ID o Current status of scenarios on network (active/inactive) o Description of requested scenario o List of organisations who have to be involved • Optional Information to include in SARIS, when available: o Description of incident/event duration and gravity o Time stamp of incident/event detection/reporting o Normal route/alternative route o Spatial application (area and network) o Traffic situation on network o Thresholds for activation o Thresholds for deactivation o Maximum response times (time-out procedures) o Prioritization			

FR8	As long as appropriate DATEX II profiles are not available the sub-functions scenario/measure deactivation **should** require/provide an interface 5 profiled in the following information structure (if no information is available for an element, value can be omitted): • SDRIS – Scenario deactivation request information set o Time stamp of request o Incident/event type and location o Name of requesting organisation and person contact details o Name of organisation requested o Scenario name or ID			

Organisational requirements				
OR2	For the TMP Feasibility study process the following (or comparable) process steps **should** be executed: → Step list see 2.3.2			
OR3	For the TMP development process the following (or comparable) steps **should** be executed: → Step list see 2.3.2			
OR4	For the successful implementation of a "Traffic management plan for corridors and networks service" all necessary organisational aspects **should** be documented and agreed by all involved parties/partners to fix the co-operation			
OR5	In the case of involving private partners for the delivery of privately generated data for a "Traffic management plan for corridors and networks service", a service level agreement **should** be developed and closed wherever a TMP relies on receiving privately generated data			
Common look & feel requirements				
CL&FR1	The core message of information provided for the end user **should** always be consistent whatever the media or end user device used for distribution			
CL&FR2	The display of signs/pictograms on VMS or other end-user devices **should** be in accordance with prevailing national road codes and in line with the requirements of the EW-DG for Variable Message Signs Harmonisation VMS-DG01 and VMS-DG02: • MS which ratified the 1968 Convention MUST respect the 1968 Convention and SHOULD consider the Consolidated Resolution on Road Signs and Signals (R.E.2); • MS which did sign but not ratify the 1968 Convention SHOULD follow the 1968 Convention and also consider the R.E.2" It is up to the deploying road operator to ensure that real signs are well and widely understood by the road users.			
Level of Service requirements				
None				

CL&FR3	In the case of cross-border re-routing arrow signs on VMS located at a the choice point or exit point, as complementary icon to the explanatory VMS text information in order to indicate the rerouting road to follow choice point rerouting signs according to the Vienna Convention, Rev.2 27 May 2010, Annex 10, G23, **should** be used. 			
CL&FR4	In the case of cross-border re-routing signs along the alternative road to confirm to the user he is on the right re-routing road confirmation rerouting signs according to the Vienna Convention, Rev.2 27 May 2010, Annex 10, G23, **should** be used: • on VMS (when VMS are available on the alternative road) • as static signs in order to mark the rerouting all along the alternative road (at the intersections and along links, to confirm e.g. each 5 km) 			
CL&FR5	In order to facilitate the comprehension of TMP documents between various bodies they **should** respect the common structure of the TMP framework document (intermediate deliverable 2)			
LoS requirements				
LoSR1	In the case that pre-deployment surveys / evaluations provide the necessary evidence to proceed with the deployment of the ITS-service “Traffic Management Plan for Corridors and Networks”, the minimum and optimum LoS **should** respect the following Level of Service to Operating Environment mapping table. → table see 2.6.3			

4.3 Compliance checklist "**may**"

#	Requirement	Fulfilled?		If yes –remarks
		Yes	No	
Functional requirements				
None				
Organisational requirements				
None				
Technical requirements				
None				
Common Look & feel requirements				
None				
Level of Service requirements				
None				

5 Annex B: Bibliography

1. **S. Bradner, (Network Working Group).** Key words for use in RFCs to Indicate Requirement Levels. *The Internet Engineering Task Force (IETF).* [Online] March 1997. http://www.ietf.org/rfc/rfc2119.txt.