Ex ante Evaluation of the deployment programme for Intelligent Transport Services (2007-2013) following the MIP TEMPO programme 2001-2006

Framework Contract for Evaluation in the Field of Energy and Transport (TREN1-009)

Final report

Client: European Commission, DG TREN

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Preface

The study was conducted by a team of experts led by ECORYS on behalf of DG TREN, Unit Satellite Navigation Systems and Intelligent Transport (B5).

The assignment has been carried out under a Framework Contract for Evaluation in the Field of Energy and Transport in the period July – December 2005.

The evaluation addresses the essential issue whether there is a need to continue the EU involvement in the deployment of quality network management, using intelligent transport services, and if so, to assess the most appropriate format for such continuation.

We would like to express our gratitude to all people who have shared their valuable insight with us on the matter.

The evaluation has been carried out by an independent evaluation team. It should be noted that this report represents the views of the consultant, which do not necessarily coincide with those of the Commission.

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Executive summary

The study objective of this ex-ante evaluation

Between 2001 and 2006 the Directorate General for Energy and Transport has financed studies and deployment of Intelligent Transport Services (ITS) on the Trans European Road Network, in the targeted programme for transport TEMPO. This programme is a targeted part of the TEN-T Multi annual Indicative Programme (MIP)[1]. The main objective of TEMPO is to enhance the service quality on the road network through a number of interlinked multinational Euro-Regional Projects. These projects cover all EU15 Member States except Greece.

The need now is to assess whether there is a need to continue the EU involvement in the deployment of quality network management, using intelligent transport services, and if so, to assess the most appropriate format for such continuation. Through a dedicated Framework Contract on Impact Assessment and Ex ante Evaluations, DG TREN has approached the consortium led by ECORYS to carry out the ex ante evaluation for a possible new programme for deployment of ITS.

ITS is seen as an effective tool in fighting congestion, increasing road safety and reducing the environmental impacts of transport. In this way, it indirectly contributes to the three main European Transport Policy objectives:

- Since ITS is effective in increasing the average speed in highly congested areas, it contributes to the economic competitiveness of Europe.
- Since ITS is also effective in reducing the number of accidents on the road network, it contributes to the (transport) safety of European citizens.
- And since congestion has a negative environmental impact due to the high energy consumption, ITS also contributes to a sustainable environment.

Problems in the ITS domain

A series of problems in the ITS domain has resulted in a too slow deployment and in not reaping the full potential benefits that could be realised without these problems. These problems are:

- Lack of interoperability of ITS; Harmonisation and standardisation is needed to improve interoperability at national and European level.
- Huge initial investments required; The initial investments for ITS can be considerable, while the society groups that experience the benefits (i.e. road users) are often not the ones that have to bear the investment costs.

[1] Commission Decision C(2654) September 2001

- Lack of knowledge on the impacts of ITS; There is insufficient knowledge among decision makers on the impact of ITS on congestion reduction, on safety improvement and on the environmental (emissions and noise). As a consequence, the political priority and the willingness to invest in ITS is low.
- Lack of clarity in ITS deployment objectives; Contrary to the objectives stated in the White Paper (road victims halved in 2010, increase in passenger rail transport from 6 to 10% in 2020, creation of a Single Sky by 2004), these clear objectives are currently lacking for ITS deployment.
- Lack of coherence between ITS deployment at European, national, regional and local level; Despite the establishment of national ITS organisations in several European countries and the co-ordinating role of ERTICO in ITS Research and Deployment between public and private partners, an overall vision and strategy towards an integrated ITS deployment across all levels is presently not available.
- Lack of economies of scale; In some cases ITS is implemented at a too small scale to realise the full potential of the technology. Large scale and integrated applications could result in economies of scale thereby reducing the investment costs, which is an additional argument for standardisation and harmonisation.
- Many actors involved with different jurisdictions; In many cases deployment of ITS is not only a technical issue, but an organisational issue as well, which requires a lot of time. This is the case for the development of traffic management plans, electronic fee collection, or multimodal traveller information, in which several different actors are involved.
- Role of the private market and lack of understanding the complementarities; It is not clear for the policy makers in ITS what the ultimate role of the private sector could be in traveller information services both with respect to data collection (e.g. via the GSM networks or floating car data) and data distribution (e.g. subscription based tailor-made services), emergency services, etc. In this respect, the availability of sound business is still limited, but is expected to be deployed on a wider scale the coming years.
- Weak link with multimodality; Current ITS deployment is very focused on road users, and, moreover, infrastructure driven. A user oriented approach would require an opposite approach; the user is often interested in the most suitable mobility option for his specific mobility needs. A most suitable mobility option might very well also include other modes than road transport.

The roles of different actors involved in ITS Deployment

Until now, deployment of ITS has mainly been a role of National Road Administrations (NRAs) or highway concessionaires. Road administrations have often initially introduced ITS to solve single problems such as safety black-spots or congestion. Later on it has become clear that the many (congestion) problems are not just local problems and need a network approach. However, there is still a patchwork of fragmented regional and national ITS services, rather than a homogeneous network or market. For the European transport user, the network does not stop at the border of the network of a single NRA or concessionaire. Border crossing transport becomes more and more important in Europe. It is therefore important that NRAs and concessionaires collaborate in order to serve the European road user in the best possible way. Due to national priorities and conflicting interest, this collaboration requires strong co-operation and a clear vision on how all

Member States and their citizens would benefit from a harmonised ITS approach. Present organisations like the CEDR do not have the financial resources to realise this and lack international legislation tools. A situation as with road pricing, where different countries develop and deploy their own (non-compatible) systems, should be avoided in other domains.

Private sector is not directly involved in the current ITS Deployment Programme, but mainly as supplier of systems and services. However, the development of personalised traveller information services by private organisations is moving into the direction that more sound business cases for these kinds of services will be translated into effective business models in the near future. Also in the collection of monitoring data, Telecom organisations are taking strategic positions in collecting floating car data.

The role of the EC in ITS Deployment

Deployment of Intelligent Transport Systems and Services fits well into the European policy objectives. Main European policy objectives are the implementation and development of the Internal Market and the re-enforcing of economic and social cohesion. In the achievement of these objectives the construction of the trans-European transport network is a major element. This development requires the interconnection and interoperability of well functioning national networks, as well as the access to them. ITS helps these networks to function in an efficient way. By fighting congestion, increasing road safety and reducing the environmental impacts of transport, ITS indirectly contributes to the three main European Transport Policy objectives.

Moreover, ITS does not only have an impact on congestion, but thereby also on road safety and reduction of the environmental impacts of transport. In doing so, ITS directly and indirectly contributes to achievement of the European Transport Policy objective of an efficient and sustainable transport system.

Last but not least ITS allows policies to be effective and efficient. For example, ITS can be used to implement a pricing policy, where users of infrastructure pay a fair price for internal and external costs. ITS helps to improve road safety by intelligent speed control, thus contributing to a reduction of the number of casualties and severely injured. Ultimately ITS is seen as a tool to match demand for transport (traffic) with supply (infrastructure) by dynamically allocating capacity to vehicles and by supporting demand constraint policies (setting the appropriate levels of pricing, access, etc).

There are therefore four reasons that point at a role for the Commission in ITS deployment:

- Ensuring interoperability of ITS systems across the EU, thereby stimulating the TEN-T development and uninterrupted movement of goods and persons.
- Stimulating standardisation of the ITS networks, resulting in lower total transport costs and thus higher efficiency of the transport system.
- Integrating the management of the various national road networks into one European network, thus allowing a true optimisation of the network in stead of sub-optimisation per country.

- Deployment of ITS helps to bring forward the policy objective of efficient and sustainable transport system, thereby increasing the competitiveness of Europe. ITS also allows transport policies to be effective and efficient.

Several lessons can be learned from the current ITS Deployment Programme

Some lessons that can be learned from the current ITS Deployment Programme correspond with the problems identified in the ITS domain, like the lack of common vision & strategy for ITS deployment, the inability to clearly show the benefits of ITS, and the priority given to ITS. Other important lessons learned from the current programme are:

- Programme structure. One of the strong points of the current TEMPO programme is the geographic spread of the programme into Euro-Regional Projects (ERPs). The ERPs provide the opportunity for close co-operation with neighbouring regions, which are often confronted by similar problems. However, some issues (e.g. strategic issues, harmonisation issues) and projects (e.g. LDC, pilot projects aimed at knowledge transfer) require a pan-ERP approach.
- Monitoring and evaluation. Control mechanisms are not functioning effectively in monitoring the progress of ITS deployment. Also clear target levels are missing. If deployment is lacking behind the reasons for this cannot be addressed, which hinders the taking of corrective actions to resolve this.
- Project and programme management. Most time of EC resources in the current TEMPO programme is allocated to administrative tasks, and insufficient time is available for technical guidance of the projects. The yearly Decision process is too slow. Though reporting guidelines and templates already exist in the current MIP, not all participants stick to the reporting guidelines or comply to the templates.
- Programme participants and their orientation. The type and number of partners in the current TEMPO programme is considered to be right. Practically all road authorities are present. However, most involved ITS experts have a technical background. As a consequence, the programme is very technology driven, while ITS deployment remains a tool helping to solve policy objectives. The focus on these policy objectives, and the impact of ITS deployment on realising these objectives is underexposed.
- Dissemination and marketing. Several stakeholders involved in ITS from different stakeholders (e.g. people interviewed from DG INFSO, national (road) transport politicians, ITS service providers, transport system researchers and transport consultants) were not familiar with the TEMPO Programme for ITS Deployment. Apart from the project results, which are mainly marketed among the involved ITS experts, also the ITS Deployment Programme itself can be better marketed.

Continuation of TEMPO?

The role of the EU is presently being reconsidered. The reason for this is a possible new ITS Deployment Programme for the period 2007-2013. The present report gives an ex ante evaluation of such a new programme.

Three different levels of objectives can be distinguished for a possible new ITS Deployment Programme. The general objective is to contribute to an efficient and

sustainable transport system. A more specific objective is to stimulate deployment of ITS measures that reduce congestion, enhance traffic safety and/or improve the environmental performance of the transport system, as well as to harmonise the ITS systems and services in Europe. These specific objectives can be translated into operational objectives like the further implementation of high quality road monitoring infrastructure for reliable ITS services or the removal of bottlenecks and easing of traffic flows through road traffic management and control measures. These can in turn be translated into actions.

The ex-ante evaluation considers various policy options, among which an exit strategy. The six other policy options all assume a continuation of an ITS Deployment Programme with different scopes. The first question to be answered is whether the EC should continue with a European Programme for ITS Deployment or not.

Based on analysis of the consequences of an exit strategy, it is recommended to continue with a European ITS Deployment Programme in some form for three main reasons:

- The leverage function of co-funding and the speed of deployment; The leverage function guarantees deployment on border crossing sections and development of long distance traffic management plans. Without a European Programme, these kinds of projects would not have been realised as a consequence of a focus on national priorities.
- Harmonisation of ITS services; International road transport is increasing rapidly, which puts a greater importance on providing unambiguous information provision to international road users, regardless the country they drive in. Without European harmonisation and standardisation of ITS, economies of scale will not be realised, leading to higher costs of ITS and a lower cost effectiveness of ITS applications. It is not expected that another international organisation (e.g. CEDR) has the financial resources and the legislative tools to play this coordinating and steering role.
- Best Practice and knowledge exchange; A new ITS Deployment Programme will also speed up ITS deployment through the exchange of best practices and knowledge across Member States. Countries with a well developed ITS infrastructure pull countries with a weaker developed ITS infrastructure. It is questionable whether the benefits of knowledge and best practice exchange as well as the pulling factor (strong countries pull weaker countries) would be realised without a coordinated European ITS Deployment Programme. Through a new ITS Deployment Programme the network of NRA's and concessionaires, built up during the current ITS Deployment Programme, can also be continued. This informal network proved to be valuable not only with respect to harmonisation and best practice transfer, but also for cross-border traffic management. When the Exit Strategy will be followed, initially the contacts will be maintained, but after some time people will change positions and face-to-face contacts will be reduced, thus leading to an ending of the network and its associated benefits.

A variation to the full Exit Strategy is an Exit Strategy in which only a kind of platform for cross-border co-operation on the operational/tactical level will be financially supported by the EC. In this case some form of cross-border traffic management can be maintained. However, the leverage function will be lost, and so will the incentive to deploy ITS at sections relevant for the EU (European Added Value). Cross-border best practice exchange and knowledge transfer might still be possible, but this might be on

ITS applications and services which are mainly interesting from a national point of view, with limited value for the TERN.

How to continue?

After the question whether to continue or not has been positively answered and argued, the next question is how to continue with a New Programme for ITS Deployment. Three different dimensions are relevant in defining the different policy options:

- Only ITS deployment on the TERN (corridors) or also ITS deployment on non-TERN roads (regional/urban network)?
- Only ITS deployment on behalf of car-users, or also ITS deployment for multimodal trips?
- Only ITS deployment for traffic management (domains monitoring, data-exchange and traffic management) or also ITS deployment for traveller information services?

As a consequence of discerning these three dimensions, the following six intervention strategies have been taken into account:

- Basic TERN strategy: Traffic management on TERN
- Full TERN strategy: Full ITS services on TERN
- Basic TERN+ strategy: Traffic management on TERN+
- Full TERN+ strategy: Full ITS services on TERN+
- TERN & Multimodal strategy: Traffic management on TERN and Multimodal traveller information services
- TERN+ & Multimodal strategy: Traffic management on TERN+ and Multimodal traveller information services

For each of these strategies, the contribution to the general and specific objectives of a possible new Programme has been assessed.

When the EC decides to continue with a European Programme for ITS Deployment, it is important to decide what instrument, what intervention channel and what level of intervention is to be used.
There are several instruments for financial assistance of a new ITS Deployment Programme, like annual funding, success fee of financial assistance under a Multi-annual Indicative Programme (MIP). From these instruments, the MIP offers the lowest risks and offers more security that certain multi-annual deployment projects will be really realised.

The Channels of Intervention relate to the parties that will receive support (how the support is channelled?). In the current TEMPO programme the national road administrations (e.g. Ministries of Transport) are the first beneficiaries and thus applicants for financial support, though they might act on behalf of private highway operators. The current programme does not allow for funding directly to private parties. This channel appears to be effective and provides the lowest risk.

Regarding the levels of Intervention, every grant level between 0 and 100% can be given in theory. By funding under a targeted Programme under the MIP, the guidelines for co-funding are specified, in the current MIP being:

- 10% for works

- 50% for studies.

When a new ITS Deployment Programme would act as a targeted programme under a new MIP, the flexibility in level of intervention is predefined within these new MIP guidelines. A higher percentage co-funding for works might result in a stronger leverage function, especially for countries with problems releasing the financials resources for transport infrastructure. A lower percentage co-funding for studies could improve the cost-effectiveness of the Programme but might harm the harmonisation objectives. It is therefore recommended to increase the co-funding percentage for works on border crossing sections, in particular in areas where the leverage function of co-funding is necessary in order to realise these projects.

In order to guarantee a new Programme to be effective in its contribution to the policy objectives, the following prerequisites have to be taken into account:

- Vision and strategy; A common understanding of what should be achieved by a new ITS Deployment Programme.
- Focus; A programme scope focused on road transport users.
- Structure; An effective and efficient Programme Management Structure.
- Effective Programme monitoring and evaluation.
- Challenge to release the required financial means.

These elements will be elaborated on in the next sections.

A common vision and strategy

The notice of a need for a European vision and strategy is very much in line with the findings of the mid-term evaluation of the ITS deployment programme. A High Level Strategy Group could help shaping the common vision and strategy of a new programme and could guarantee the right strategic direction of the Programme. Such a High Level Group would also help getting the priority of top politicians on ITS deployment and maintaining ITS deployment on the political agenda. It is recommended that this High Level Strategy Group consists of at least representatives of DG TREN, National Road Directors, representation of the Chair Persons of the ERP's, IRU, ASECAP and ERTICO. The latter two will guarantee a sufficient involvement of the private sector.

A focused Programme on road transport

The ex ante evaluation of a new ITS Deployment Programme for the period 2007-2013 includes an assessment of seven intervention strategies, which differ in scope. One of these strategies – the exit strategy – assumes that the EC will not continue with a European wide Programme for ITS Deployment. The other 6 strategies all assume a continuation of a European wide ITS deployment Programme, but they differ in scope on three dimensions:

- The network dimension: only the TERN road network or also urban-interurban interaction and non-TERN roads of European importance (e.g certain E-roads that are not part of the TERN)

- The modality dimension: a road-only programme or extension to other transport modes by offering multimodal traveller information services (both pre-trip and on-trip)
- The service dimension: only general services aimed at optimising the transport network or also personalised services (personalised traveller information services) that could be offered by private sector.

It is recommended that a new Programme scope is primarily aimed at European road transport users. This does not imply ITS deployment only on the TERN network, but also on roads of European importance that are not part of the TERN network, but have an important function for European long distance road travellers (like certain e-road sections). It is recommended that urban-interurban integration is included in a new Programme, but only limited to specific cases with a high degree of transferability. The European added value here comes from the exemplary function of certain projects on urban-interurban integration for other regions with the same type of problems and that are committed to support these kinds of exemplary projects.

A common vision on multimodality can only be developed when there is clear evidence of the impact and added value of multimodal traveller information services. So far, this evidence is lacking. There is no hard evidence on the effect of multimodal traveller information services on changes in modal choice. In addition multimodal traveller information services mainly deal with urban traffic and the integration of urban and interurban traffic. Therefore, the European Added Value is limited. The development of the 'pilot demonstration projects' clearly demonstrating the impacts on multimodality as well as the development of a common vision on multimodality could be embedded in a New Programme by dealing with these actions in a separate expert group on multimodality.

Personalised traveller information services are not primarily meant to optimise the network and might even be counter productive in terms of network optimisation, environmental impacts and traffic safety. Before the EC will support the deployment of personalised traveller information services, it is necessary to better understand the impacts of these services on the EU policy. The willingness to pay for these services determines the creation of a sound business case for these kinds of services. It is up to the private sector to translate these business cases into effective business models. It is recommended that a new ITS Deployment Programme facilitates data requirements from private sector in a non-discriminating way and stimulates the development of new business cases and models. Since it is inevitable that private sector will develop these personalised services, road administrations have to be proactive to this development, it is the role of NRAs to safeguard the public interest. These kinds of issues could be embedded in the Programme by creating a separate expert group on private sector participation and development of personalised traveller information services.

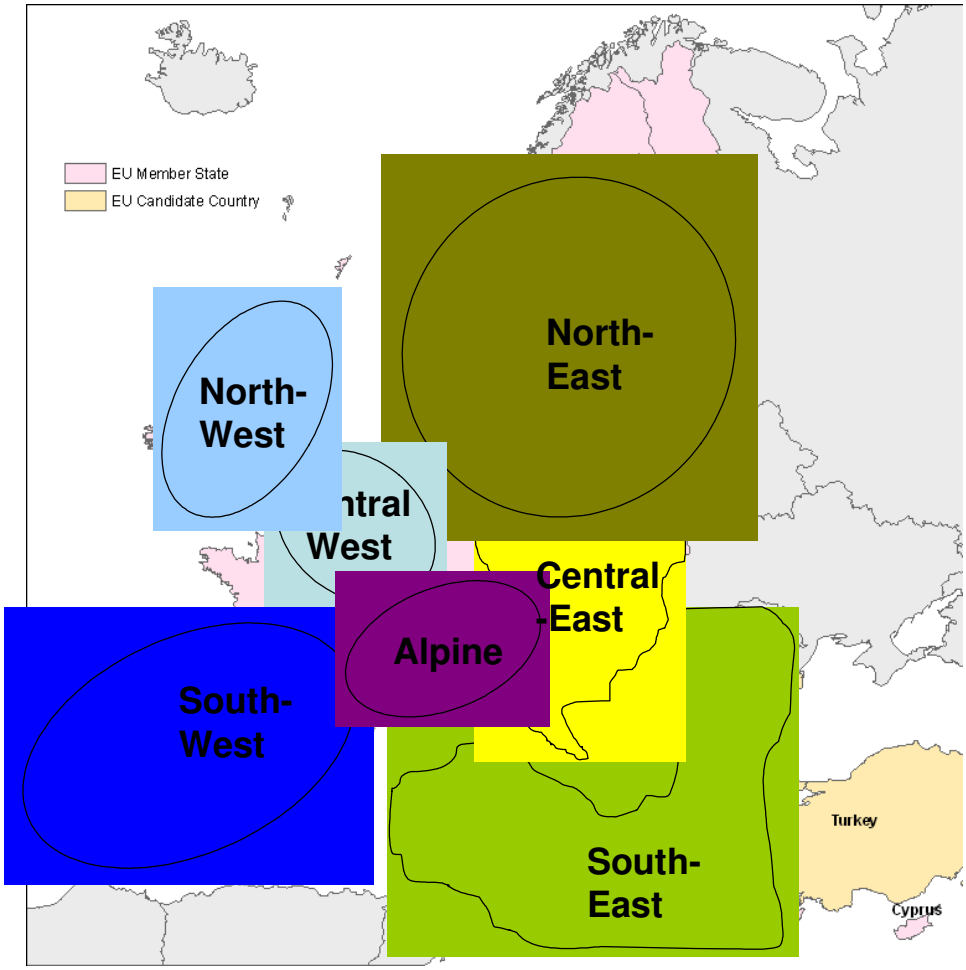
An effective Programme structure

One of the strong points of the current TEMPO programme is the geographic spread of the programme into Euro-Regional Projects (ERPs). The ERPs provide the opportunity

for close co-operation with neighbouring regions, which are often confronted by similar problems.

A new Programme needs to be open for New Member States and Candidate Countries that are not yet involved in the current TEMPO Programme or the recently started Euro-Regional CONNECT Project. Though each geographic arrangement will have advantages and disadvantages, we suggest the following rearrangement of regions, mainly based on specific geographic characteristics (e.g Alpine-crossing, Pyrenees crossing). New impulses to these projects by the entry of new partners is expected to have a positive impact on innovation, refreshing ideas and new approaches to the problems.

Figure 0.1 A possible reorganisation of the Euro-Regional structure



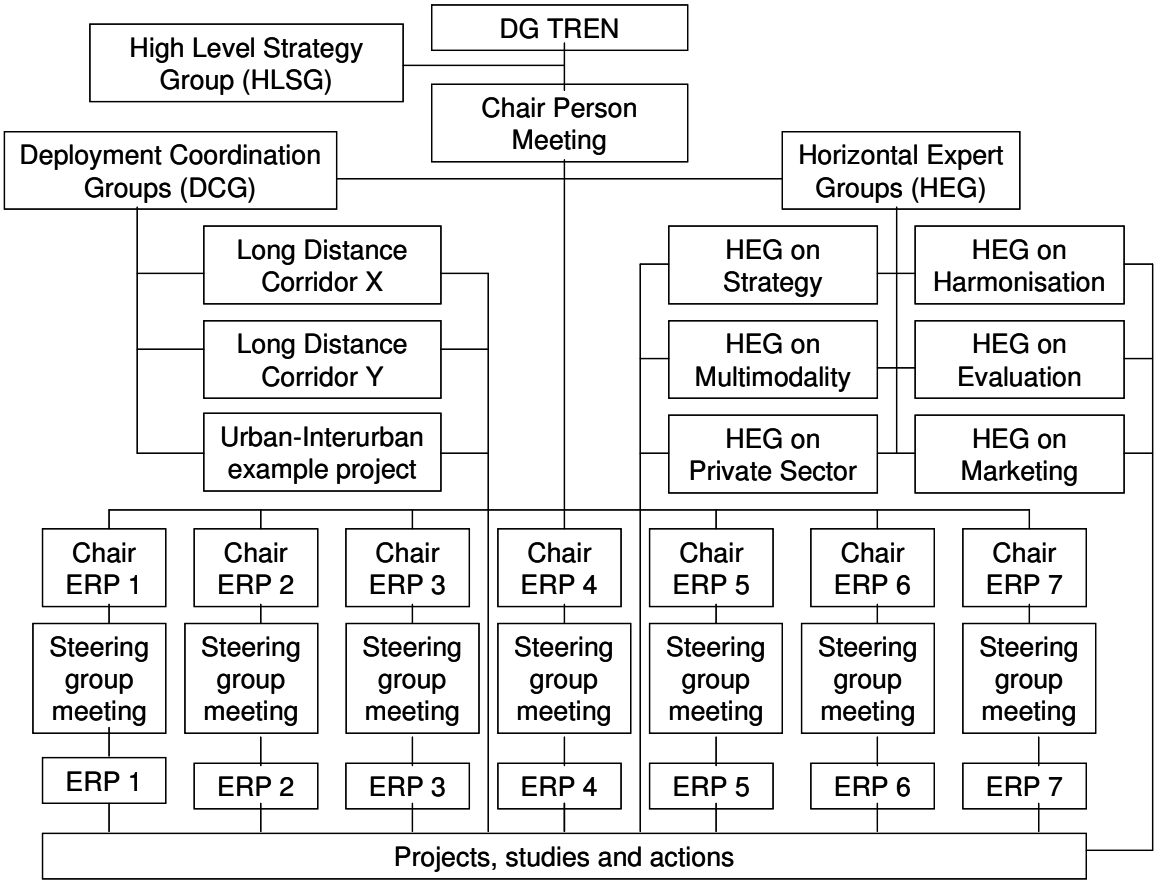
The ERP structure is not the most obvious structure for certain actions, some actions require a pan-ERP approach. For a new Programme two types of pan-ERP structures are recommended:

- Deployment Co-ordination Groups, which are intended to carry out 'works' on a pan-ERP level, for example the development of long distance traffic management plans;
- Horizontal Expert Groups, which are intended to carry out 'studies' on a pan-ERP level, such as:
  - ✓ an expert group on harmonisation and standardisation,

- ✓ an expert group on evaluation
- ✓ an expert group on marketing
- ✓ an expert group on strategic issues
- ✓ an expert group on multimodality
- ✓ an expert group on the role of the private sector.

The following figure gives a possible management structure for the Programme.

Figure 0.2 A recommended management structure for a new ITS deployment Programme



Effective monitoring and evaluation

In the current TEMPO Programme effective monitoring is lacking. Target levels are undefined, which makes it impossible to monitor progress. Adequate control mechanisms to undertake actions if deployment is lagging behind are missing. A new Programme must have such clear target levels. In the yearly reporting, progress on measurable output or deployment indicators have to be compared to the target levels. A list of possible output indicators is presented below:

- Distribution of installed equipment that is being used (e.g. traffic counting stations, weather stations, and cameras) per distance/area
- Density of VMS installed per track length
- Number of operational traffic control centres/traffic information centres
- Number of cross-border data exchange links

- Number of operational traffic management plans
- Number of traffic management systems in tunnels
- Number of websites and portals for Traveller information services of predefined quality level
- Availability of services at different times
- Number of different systems implemented in each domain
- Number of standardisation proposals for ITS services in Standardisation Bodies

Closely related to monitoring, but even more important is the evaluation of impacts. What are the actual impacts of ITS deployment projects on safety, congestion and environment? Relevant impact indicators are:

- Reduction in average number of daily traffic jams
- Reduction in average length daily traffic jams
- Reduction in congestion time losses
- Reduction in traffic deaths and traffic injuries in EU 25 per annum
- Reduction in traffic accidents in EU25 per annum in relation to the number of vehicles
- Reduction in CO_2 and NOx emissions in road transport per annum
- Reduction in number of people affected by traffic noise
- Reduction in range of area affected by traffic noise

The challenge is to measure the impact of ITS Deployment activities on the above indicators, corrected for potential other causes. An evaluation expert group can support in applying a common evaluation methodology throughout the projects, exchange best practices and provide common templates. But in order to really embed a common evaluation methodology in the Programme, the project participants and actors involved must apply this methodology and report on the planned evaluation activities in yearly workplans and report on the achieved impacts of the actions in the yearly reports. That requires allocating sufficient budget to evaluation activities, like measurement studies within the project plans.

Apart from the evaluation of the impacts of the individual projects it is necessary to evaluate the overall impacts of a new ITS deployment programme. This can be used to adapt the new ITS Deployment Programme after a mid-term evaluation or for recommendations for a potential successor of such a new programme. Applying effective evaluation methodologies will make it possible to show evidence on the worthiness of ITS and makes it easier to sell ITS to the outer world and helps to keep ITS high on the political agenda.

Challenge to release the required financial means

Obviously, a new ITS deployment Programme would require significant investments and co-funding budget. The total costs of a new European wide Programme for the period 2007-2013 is estimated to be in the range of € 1.7 – 2.9 billion. The co-funding budget depends on the overall cost budgets and the funding principles in a new MIP. This co-funding contribution is estimated to be in the range of € 280 – 500 million. The remainder (€ 1.4-2.4 billion) has to come from Member State funds.

For some Member States, this could be a challenge to release the financial means in order to realise the planned activities. Therefore, Member States have to commit to challenging but realistic target levels for deployment.

When these five prerequisites are met, the Programme can be very effective

The impact assessment has shown that many ITS applications provide significant improvements in reducing congestion, increase travel speed and reduce the number of accidents. Furthermore ITS helps to improve the effectiveness of policies. Some ITS applications provide more cost-effective benefits than others, and as the technology evolves, the choices facing those deploying ITS change. Economies of scale and widespread application of evolving technologies are expected to lower the costs of applications, while the benefits will even further increase given the autonomous growth of transport. As a consequence, the cost effectiveness of Intelligent Transport Systems and Services is expected to significantly improve in the coming years.

1 Introduction

1.1 Background

Between 2001 and 2006 the Directorate General for Energy and Transport has financed studies and deployment of Intelligent Transport Services (ITS) on the Trans European Road Network, in the targeted programme for transport TEMPO. This programme is a targeted part of the TEN-T Multi annual Indicative Programme (MIP)[2]. The main objective of TEMPO is to enhance the service quality on the road network through a number of interlinked multinational Euro-Regional Projects. These projects cover all EU15 Member States except Greece.

During the programming period some changes were made. In the second half of the period the geographical area has been extended to include the 10 Member States joining in 2004. Following a Mid-Term Review of the projects some revisions have been made to the management of the projects.

The need now is to assess whether there is a need to continue the EU involvement in the deployment of quality network management, using intelligent transport services, and if so, to assess the most appropriate format for such continuation. Through a dedicated Framework Contract on Impact Assessment and Ex ante Evaluations, DG TREN has approached the consortium led by ECORYS to carry out the ex ante evaluation for a possible new programme for deployment of ITS. Guidelines on ex ante evaluation and impact assessment have been used as a guiding principle for this ex ante evaluation.

1.2 Objective of the ex ante evaluation of ITS deployment programme

The objective of the ITS deployment ex ante evaluation is defined in the Specification of Services as follows:

> 'Analyse the available policy options and their different impacts, measure and compare potential impact with relevant and credible indicators, assess the risk and uncertainty of the assumptions and provide a cost-opportunity analysis of the Community financial intervention in order to demonstrate its added values.'

[2] Commission Decision C(2654) September 2001

1.3 Definitions and focus of a new ITS deployment programme

Focus

As indicated, the objective of this evaluation is to assess whether a new Programme is needed and, if so, how the new programme should be defined. The first question has been taken onboard in this evaluation in the form of one of the policy options or intervention strategies, namely an *exit strategy*. The second question relates to the dimensioning of a possible future programme. This leads to various possible alternative intervention strategies. Both questions will therefore be answered simultaneously (and not consecutively).

The current ITS Deployment Programme includes the following four domains:

- Road Monitoring Infrastructures
- a European Network of Traffic Control Centres
- Traffic Management & Control
- Traveller Information

The objective of the current ITS Deployment Programme is to raise the service levels of highway links to agreed appropriate levels of service. This appropriate level of service is the target level assigned by operational managers to a road and is dependent on operational factors such as volume of traffic, location and weather conditions.

Geographic scope

A new programme should cover all EU-25 countries and any additional States joining the Union during the period.

Time horizon

A future programme will have a duration of 7 years: 2007-2013, in line with the duration of the future financial perspectives of the Union.

1.4 Setting the scene of ITS

Role of ITS in Transport in General

This evaluation deals with the role of ITS deployment in the transport system. As populations grow and mobility management presents an increasingly difficult challenge, public authorities and private entities alike seek new solutions to the problems faced on today's transport network. As major infrastructure investment is becoming increasingly difficult due to financial, spatial and environmental problems, ITS can be a useful tool to make better use of existing infrastructure and thereby making the movement of people and goods more efficient and economic for all transport modes. Because, the result of ITS is that both transport infrastructure managers and transport users can make better informed decisions on the speed, timing, mode and routing of transport flows (freight and passengers).

Role of National Road Administrations

Until now, deployment of ITS has mainly been a role of National Road Administrations (NRAs) or highway concessionaires. National Road Administrations are primarily

responsible for managing, maintaining and improving traffic flow and safety on their road networks. They have traditionally met these responsibilities through the design and construction of new roads, road widening or improvement of existing roads and through the maintenance of their existing infrastructure to an appropriate standard, including minimising the impact of adverse weather, etc.

Why collaboration

Road administrations have often initially introduced ITS to solve single problems such as safety or congestion black-spots, but later on it has become clear that the many (congestion) problems are not just local and need a network approach. For the European transport user, the network does not stop at the border of the network of a single NRA or concessionaire. Border crossing transport becomes more and more important in Europe. It is therefore crucial that NRAs and concessionaires collaborate in order to serve the European road user in the best possible way.

Why European coordination?

Main European policy objectives are the implementation and development of the Internal Market and the re-enforcing of economic and social cohesion. In the achievement of these objectives
the construction of the trans-European transport network is a major element. This development requires the interconnection and interoperability of national networks, as well as the access to them.

Although Member States are primarily responsible for realisation of the TEN-T, a number of financial instruments have been set up at Community level, each with their own legal basis, in order to conduct the development of the TEN-T and to support Member States financially in specific cases. The same arguments for European coordination could also apply to the realization of ITS deployment along the TEN-T network.

ITS deployment and European policy objectives

ITS is seen as an effective tool in fighting congestion, increasing road safety and reducing the environmental impacts of transport. In this way, it indirectly contributes to three main European Transport Policy objectives and helps realising the internal market:

- Since ITS is effective in increasing the average speed in highly congested areas, it contributes to the economic competitiveness of Europe.
- Since ITS is also effective in reducing the number of accidents on the road network, it contributes to the (transport) safety of European citizens.
- Since congestion has a negative environmental impact due to the high energy consumption, ITS also contributes to a sustainable environment.
- Since ITS makes it possible to move people and goods quicker, more efficient and cheaper, it contributes to a dynamic economy and cohesive society.

Focus in this study on the role of the EC in ITS deployment

Besides the NRA's and road concessionaires others also can play a role in deployment of ITS. For instance, producers of roadside and in-vehicle equipment, including the automotive industry who have developed ITS and safety systems in cars, etc., may want to take the lead in some of the ITS applications. In particular for those applications for which users are prepared to pay, a role for the private sector is possible. Given this, the

main question in this evaluation is thus what the future role of the Commission could be in deployment of ITS.

2 Problem analysis and needs assessment

2.1 Introduction

This chapter starts with identifying the key problem areas in transport field that the European Union faces. These problem areas are addressed in the Commission's White Paper on Transport[3], which sets out the various policy objectives of the EC (and DG TREN) in this domain. The next paragraph describes the potential role of ITS in tackling these problems. Then the problems related to ITS deployment are presented, followed by a description of the potential role the Community in addressing these problems. Finally the key actors are identified.

2.2 Transport sector problem areas

2.2.1 Background

Transport and the economy

While effective and efficient transport is needed to support the free and uninterrupted movement of goods and persons, it is crucial if Europe is to become a more competitive global region. As demand for transport keeps increasing, building new infrastructure and opening up markets is not a sufficient enough answer. The transport system needs to be optimised to meet the demands of enlargement and sustainable development, as set out in the conclusions of the Gothenburg European Council.

Moreover, transport is not only part of the supporting infrastructure for economic activity; it is a significant sector of the economy itself. In Europe, it accounts for EUR 1,000 billion of annual expenditure (more than 10% of GDP) and employs more than 10 million people (see White Paper).

The continued growth in transport demand poses clear challenges

Despite the rise of 'information society', the need to move goods and persons has neither been eliminated nor reduced; transport demand continues to rise in the EU. In particular with the recent enlargement of the EU, car ownership and car use are projected to continue to increase, as is the flow of goods.

Continued growth and demand for transport services from producers and consumers, as well as requirements to implement legislation and new regulations (especially in terms of safety and environment) implicate that the transport sector faces some significant

[3] White Paper "European Transport Policy for 2010: time to decide", adopted by European Commission on 12 September 2001

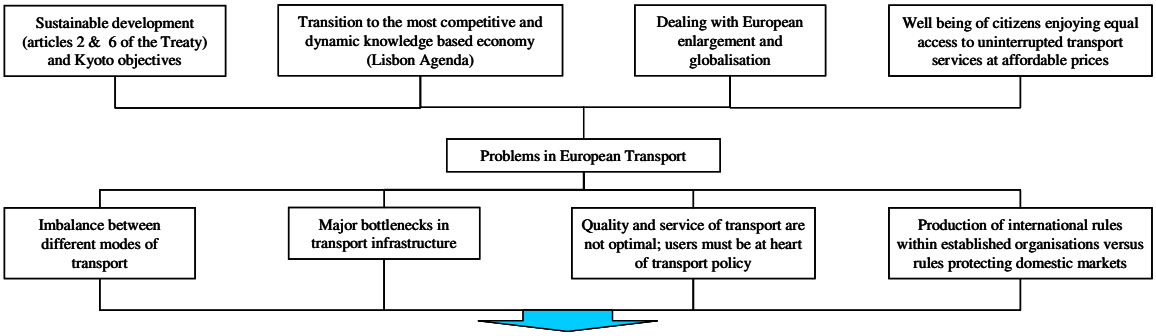
challenges over the coming years. EU enlargement adds to the challenge and means more work in terms of ensuring the harmonisation of legislation, regulations and working conditions, as well as integrating and expanding networks. The overall objective is to achieve a transport network and infrastructure that is sustainable, efficient, accessible, of high quality, safe and fairly priced.

The Commission's White Paper identifies that shifting the balance between modes of transport is at the heart of sustainable transport development. The aim is to use a series of measures – such as research and embracing of new technology, revitalising alternative modes through targeted investment, changed pricing structures and innovative ways of financing – in an integrated approach to bring about a shift in balance from 2010 onwards.

2.2.2 Key problems

Whilst obviously progress has been made since the first transport White Paper in 1992, many problems remain and new ones have emerged. Most problems can be related to a limited set of basic drivers (or "thematic angles"). These are illustrated in Figure 2.1.

Figure 2.1 Drivers for current transport problems



	Congestion & Isolation of regions	Interoperability & the internal market	Damage to the environment	Imbalanced charging & Funding problem	Safety of Modes & Quality of services	Security
Road	• Apoplexy at the centre, paralysis at the extremities. • 10% of the TENs is congested. • Expected further growth of road haulage • Expected rise of private car ownership and use • Difficulty of mobilising capital for major infrastructure projects	• harmonisation and enforcement of rules and regulations. • price dumping and social dumping	• Road transport accounts for 84% of all CO2 emissions from transport.	• Lack of public funding to revise TENs •Although for some projects eligible for the •public/private partnership formula has still not been able to attract private investors • better competitive position of roads, because externalities are not included in pricing •Differentiation in fuel tax	• Unsafe roads and tunnels; 44.000 deaths annually • Insufficient social and safety regulations • Laxity in enforcing the regulations	• Terrorist and Criminal threat to bridges and tunnels
Air	• Air traffic expected to be doubled by 2010 • Saturation of the skies and of airports	• Air traffic control insufficiently integrated in a Single European Sky. • Allocation of slots on crowded airports	• Air transport produces 13% of all CO2 emissions from transport. • Delays push up fuel consumption by 6%. • Kerosene taxes	• Competitive position if externalities are included in pricing • Kerosene taxes	• Enforcement passenger rights in case of delay • Maintaining safety standards • Growing passenger streams requires ground services (baggage handling, customs etc) • Delays push up fuel consumption by 6%.	• Terrorist and Criminal threat; • Control of access to airports and airplanes • Inspection of passengers, baggage, freight and mail • introduction of harmonised regulation
Rail	• Best use is not being made of the infrastructure. • Insufficient access to ports, airports • Bottlenecks where freight and passengers share infrastructure • Lack of efficient international freight train paths	• Geographical fragmentation of networks • Technical constraints locomotives ea electrification and signalling systems • Technical and regulatory barriers hamper new entrants • Train driver qualifications	• Air and noise pollution	• Funding problem to finance maintenance and upgrading of rail network in the new member countries • competitive condition of road will improve, because of the declined state of rail network •Differentiation in fuel tax	• Lack of punctuality, reliability, speed • Various delays cause low average speed • Different safety rules and regulations	• Terrorist and Criminal threat to trains and train stations •Aggression and vandalism in trains and against train staff
Water	• Underused capacity inland waterways in terms of infrastructure and vessels. • No uninterrupted passage of vessels (bottlenecks, inappropriate gauge, height of bridges, operation of locks)	• Harmonise & simplify rules governing operation of ports and access to ports services • Lack of practical shape intermodality	• dumping of oil and waste • loss of hazardous cargo or fuel	• Externalities are not included in pricing	• Diversity of legal systems causing delays • Navigational aid systems • Shortage merchant shipping officers.	• threat of terrorist and criminal to ports, installations and ships • Protection of passengers, staff and (dangerous) cargo •Assessment, implementation and monitoring of common basic rules on port security measures;
Urban trans-port	•Under utilised •Lack door-to-door opportunities •Congested inner cities	•harmonisation and standardisation of regulations •Intermodal terminals (rail-air) •Improvement tram-train interoperability (light rail) •Cross border connections	• utilise alternative fuels	• externalities are not included in pricing •Differentiation in fuel tax	•Ensuring easy access •customer-oriented services (reduce delays, door to door, night service) •Insufficient information provision to passengers	•Terrorist and Criminal threat public transport terminals and modes (train, metro, bus) •Aggression and vandalism in trains and against train staff

The main problems in transport, their causes and their impacts are:

- *Congestion* on roads, rail and in the air is a result of ever increasing demand for transport services strongly related to economic growth. At the same time, investment in infrastructure is not keeping pace with increasing demand. Around 10% of the Trans-European Road Network is affected daily by traffic jams. Most significantly in terms of impacts, congestion reduces productivity and therefore threatens competitiveness. If conditions continue, the economic cost could be as much as 1% of GDP by 2010.

- *Environmental damage*, notably air pollution and noise pollution, affect the quality of life, particularly in urban areas, and have an associated public health cost. The construction of new transport infrastructure (both the land required and the materials used) contributes to the depletion of natural resources, can damage habitats and reduce biodiversity. Also the continuous growth of transport, causing noise and air pollution, severely damages the environment. Congestion has an extra deteriorating effect on the environment, because it leads to increased fuel use and thereby emissions of green house gases and causes more noise. More than half the oil consumed by transport is accounted for by private cars; in 1998, transport was responsible for 28 % of CO2 emissions in Europe. Because road transport is totally dependent on oil (accounting for 67 % of final demand for oil), road transport alone accounts for 84 % of CO2 emissions attributable to transport". Road freight transport accounts for around 1/3 of transport's CO2 emissions[4].
- *Accessibility* remains an issue as remote regions lack good connections to central markets or trans-national networks/modes are incompatible. The recent European enlargement compounds this problem. The result is a lack of regional cohesion within the EU, both economically (as areas miss out on investment and become poorer) and socially (as people feel the effects of being peripheral).
- *Lack of interoperability* of transport systems (particularly the railway system) and ICT systems to support the transport system is becoming more important in light of the ten new Member States. This contributes to the non-optimal functioning of the system resulting in relative high transport costs. Standardisation can help to reduce such costs.
- *Lack of funding* of transport improvements and new developments continues to be problematic due to limited public budgets and reluctant private investors. It also reduces the space for creative, innovative solutions to transport problems.
- *Imbalanced charging systems* prevail because not always or not in all places does transport pay for the full (social) costs it causes. This distorts competition between modes and results in the suboptimal functioning of the internal market. It also means that there is less incentive for people to opt for cleaner modes of transport or slower but less congested networks.
- *The internal market* is still not fully realised. While international trade has increased, national legislation on transport still varies and liberalisation within the member states is making slow progress. Existing market parties see their positions being threatened. Profit margins are narrow in the road transport sector because of its considerable fragmentation and of the pressure exerted on prices by consignors and industry. This can tempt some road haulage companies to resort to price dumping and lower costs by side-stepping the social and safety legislation.
- *Safety* in transport is an important issue throughout Europe. Events in recent years (particular in sea traffic, road tunnels and air transport) show the sensitivity of the Community environment and the need for reducing safety risks. Accidents continue to happen. Occasional large-scale, high profile incidents result in a loss of faith in those modes and operators face increasing litigation for compensation. Of more significance, however, is the loss of human lives on the roads, which in 2004 amounted to 43,900 persons in EU25, and causes huge associated public health cost as well personal/family trauma.

[4] ECN, International CO2 policy benchmark for the road transport sector; results of a pilot study, February 2003.

- *Security* is an important challenge for the European Union. Dramatic events, such as 11 September 2001 in New York, 11 March 2004 in Madrid and 7 July 2005 in London create a determination to increase security levels in the European society, especially in transport systems, which appear to be vulnerable.

2.3 How ITS can contribute to an efficient and sustainable transport system

As populations grow and mobility management presents an increasingly difficult challenge, public authorities and private entities alike seek new solutions to the problems faced on today's Trans-European Transport Network. As major infrastructure investment is becoming increasingly difficult due to financial, spatial and environmental problems, many experts see ITS - Intelligent Transport Systems and Services - as a useful tool to make the movement of people and goods more efficient and economic for all transport modes.

ITS is a tool to effectively monitor demand and thus optimise network services. In doing so, ITS is not a replacement for transport policies that aim to reduce congestion, decrease accidents or reduce environmental risk, but a necessary complementary tool in order to reach the maximum efficiency and capacity. It can also help to minimise accidents and environmental risks on the EU transport networks, taking the transport usage as a given.

ITS uses information and communication technologies to facilitate the transport of people and goods. In the Commission's White Paper ITS is recognised as one of the solutions that can contribute to solve Europe's transport problems. Great strides forward in ITS technology have already been made. The potential impact of intelligent transport systems has been assessed both during research projects and in the early stages of deployment. Some examples are given below:

- Decrease journey times and congestion
- Improve the safety of our roads
- Alleviate the impact of transport on the environment
- Encourage multimodal transport
- Improve security of the transport system

These impacts will be further elaborated in the impact assessment (chapter 8).

2.4 Problems with ITS deployment

Although the importance of ITS in combating the negative aspects of increased mobility and transport patterns is widely seen deployment of ITS has not yet reached its full potential in the EU. While advanced road traffic management systems have already been implemented in many places throughout Europe, regional and national ITS services still form a fragmented patchwork. A series of problems in the ITS domain has resulted in a too slow deployment and in not reaping the full potential benefits that could be realised without these problems.

These problems are:

- Lack of interoperability of ITS
- Huge initial investments required
- Lack of knowledge on the impacts of ITS
- Lack of clarity in ITS deployment objectives
- Lack of coherence between ITS deployment at European, national, regional and local level
- Economies of scale
- ITS not or only partly included in design of transport infrastructure
- Many actors involved with different jurisdictions
- Lack of understanding the complementarily functions of the private and public sector in the overall market
- Uniform service levels
- Weak link with multimodality, whereas Intermodal transport requires a broad approach (not road only)

We will elaborate on each of these problems below.

Lack of interoperability of ITS

Especially in the case of ITS systems, the lack of interoperability is an important issue. Without a good coordination there is the danger of development and implementation of different systems in different EU countries, which are not interoperable. Typically this applies to data exchange between traffic centres, traveller information services, uniformity of pictograms between countries, etc. A lack of interoperability could lead to less efficient transport systems and an increase in total transport costs. Harmonisation and standardisation is needed to improve interoperability at national and European level.

Huge initial investments required

The initial investments for ITS can be considerable, while it can take some time before revenues and/or benefits are realized. Moreover, the society groups experiencing the benefits (i.e. road users) are often not the groups that have to bear the investment costs. The authorities, which in most cases have to bear the investment costs need to be convinced of the potential benefits and successful implementation of the ITS systems and/or services in order to decide to invest in deploying ITS.

Lack of knowledge on the impacts of ITS

Although with traditional investments in infrastructure ex-ante and ex-post evaluations are quite common and often even institutionalised, such evaluations are not always carried out for investments in ITS. Consequently, there is a lack of knowledge on the impacts of ITS on e.g. congestion, safety, environmental impacts, etc. This will immediately have an impact on the political priorities, and the willingness to invest in ITS, as well as getting a proper portion of the available budget.

Lack of clarity in ITS deployment objectives

There is a lack of clarity with respect to the ITS deployment objectives, both at Member State level, and at European level. In its White Paper the Commission has set a clear target of reducing the number of road victims by half in 2010, increasing the share of

passenger rail transport from 6 to 10% by 2020, creation of a single sky by 2004, etc. These clear objectives are lacking for ITS deployment.

Lack of coherence between ITS deployment at European, national, regional and local level

Due to the lack of clear ITS deployment objectives in the Member States and at EU level, a coherent deployment strategy embracing the various levels is also lacking. National ITS organisations have been established in various EU countries, being a first attempt to co-ordinate ITS deployment activities within countries. ERTICO is another example, being an organisation on a European level that co-ordinates ITS deployment activities across borders. ERTICO is comprised of public and private parties active in the ITS domain. Nevertheless an overall vision and strategy towards an integrated ITS deployment across all levels is presently not available.

Economies of scale

In some cases ITS is implemented at a too small scale to realize the full potential of the technology. Large scale and integrated applications could result in economies of scale thereby reducing the investment costs, which is an additional argument for standardisation and harmonisation.

ITS not or only partly included in design of road infrastructure

In most cases ITS is not fully integrated in the design of road infrastructures. This can lead to additional costs and make it more difficult to implement ITS at a later stage. Including ITS already at the design phase can prevent this.

Many actors involved

Proper deployment of ITS often requires the involvement of a large number of parties. In case of traffic plans, co-operation is needed with other local, regional or national road authorities, as well as with public and private traffic information providers. In the case of electronic fee collections all European Member States, the EC as well as technology providers (IT, truck and car manufacturers) and user organisation are stakeholders. This similarly applies to multimodal traveller information. In many cases deployment of ITS thus is not only a technical issue, but an organisational issue as well, which requires a lot of time.

Role of the private market and lack of understanding the complementarities

Although there is a potential role for the private sector, technology is still progressing an it is not yet clear what the ultimate role of the private sector could be, e.g. in traveller information services (both with respect to data collection (e.g. via the GSM networks or floating car data) and data distribution (e.g. subscription based tailor-made services)), emergency services, etc. In this respect clear business models are not yet available.

Enlargement of EU

The service level of the TERN network in the new Member States is not at the same level as in the old Member States. By using the experiences of those Member States that are ahead and already have a relatively high service level, the service level in other Member States can be increased in an efficient way. It should be noted, though, that the Member States don't necessarily have to be all at the same service level.

Uniform service levels

Similar to the uniformity of European highways, which have a rather similar 'look' throughout Europe with respect to safety standards, lane width, etc. a similar approach should be strived for with respect to the 'soft' infrastructure, i.e. ITS systems and services.

Weak link with multimodality

Current ITS deployment is very focused on road users, and, moreover, infrastructure driven. A user oriented approach would require an opposite approach; the user is often interested in the most suitable mobility option for his specific mobility needs. A most suitable mobility option might very well also include other modes than road transport.

2.5 Factor analysis

In this section those factors will be described which influence demand and supply of ITS systems and services relevant for road transport.

Infrastructure based ITS

Presently ITS deployment, in total as well as in the current TEMPO programme, is mainly related to road and public transport infrastructure. It is aiming at increasing the use of existing transport capacity, thus reducing or postponing the need for building costly new infrastructure.

In-vehicle and handheld devices

More and more in-vehicle and handheld ITS devices are under development and they increasingly find their way in passenger cars and trucks. Good examples are navigation systems (sometimes including real-time traffic data), chip-cards for tolling, Electronic Fee Collection (EFC) systems for trucks (Germany/Austria) and of course mobile phones and PDAs. Since a possible new ITS deployment Programme will run from 2007 – 2013, the results of these developments need to be taken into account. For example, floating car data (FCD) could be used to collect traffic data instead of current traffic counting systems. Digital maps, including speed limits and Intelligent Speed Adaptation could replace (or be complementary to) traditional road-side speed limit signs.

Private sector involvement

The private sector has a key role to play in the launching of new services. This view is also shared by the Commission, which strongly recommends the development of a legal and commercial framework for the participation of the private sector and for partnerships between public and private operators in order to facilitate the development of value added services for traffic information and travel.

GALILEO

GALILEO will become operational from 2008 onwards and will provide services to transport system users, which need to be taken into account in a possible new ITS deployment Programme.

Increased acceptance and adoption

Increasing availability of IT services to European citizens will lead to higher expectations of road users of available ITS applications. People are getting more and more familiar with IT in their daily life, which could have a positive influence upon their acceptance of ITS applications.

Protectionism

ITS, and more broadly IT, is seen as a key driving force for economic growth and employment. It is for this reason that many governments -if they have the chance- favour their own ITS industry, which will hinder the promotion of standardisation and harmonisation.

It takes time

Of course standardisation and harmonisation are valued high in order to achieve interoperable solutions. However, as could be seen with the introduction of the electronic tachograph, it might result in a very long and complex process of satisfying all stakeholders.

EFC as vehicle for ITS applications

The deployment of Electronic Fee Collection (EFC) in an increasing number of countries could act as a vehicle for the deployment of many other ITS systems and services, which could make use of the same in-vehicle and data-communication infrastructure. Whether these systems and services will be interoperable across all EU25 countries is of course another question (see also section 2.4).

2.6 Role of DG TREN

In the previous sections an overview was presented of obstacles which hinder the deployment of ITS in Europe. Not all of these problems need to be addressed at a European level, many can be solved at national or bi/multi-national level. For the Community it is important whether any involvement has additional value above such national/multinational approaches in achieving the Community's transport policy objectives. With respect to a possible new ITS Deployment Programme 2007-2013 , the key to the role of the Commission is to identify which problems can be solved at a (multi)national level, and which problems need be addressed at a European level. Of course such problems need only to be attacked at EU level if solving them brings forward the achievement of the transport policy objectives.

Since it is believed that ITS can contribute significantly to a sustainable transport system in Europe, and various evaluation studies show the benefits of ITS for transport, it can be in the interest of DG TREN to support initiatives that help to overcome (part of) the problems of ITS deployment which cannot be solved by the individual Member States themselves. In other words, it is necessary to identify those ITS deployment problems which could have a significant European Added Value once addressed through a new ITS Deployment Programme. The criteria for 'European Added Value' will be dealt with in chapter 6.

2.7 Key actors and their needs

With respect to ITS deployment the following key actors are identified:

- Public sector
- Private sector
- Road authorities
- Road users
- Public transport operators
- Public transport users
- Transport companies (road, rail, (inland) water).
- EU institutions

Road authorities

National road authorities are responsible for the greatest part of the TEN road infrastructure in each of the Member States. In the Euro-Regional projects, which are carried out under the current TEMPO Programme the road authorities are the main responsible parties for ITS deployment on these roads. In some countries concessionaires are responsible for certain parts of the TEN-network and are therefore also responsible for ITS deployment on these roads. These concessionaires are also involved in the current Euro-Regional projects (see also 'private sector' below).

National road authorities are primarily focused on an efficient use of their road networks, by optimal management of the traffic flows. Their prime need is thus in traffic management issues.

Public transport operators

Apart from the road authorities, there are actors which are responsible for running public transport services, either on the road network (bus companies) or on the various types of rail networks (tram, metro, train). These public transport operators might be privately or publicly owned. With respect to ITS deployment these public transport operators have an important role to play, both from a traffic management and monitoring perspective (especially metro, train) as well as from providing traveller information.

The need of public transport operators lies primarily with the optimal management of travellers, by providing optimal information to travellers. As public transport users can cover various modes of transport, the management and information services need to cross modal borders.

Public sector

Besides national road authorities, also other national, regional and local authorities are involved in ITS deployment at the TEN-network in each of the European countries. These other authorities are often responsible for other parts of the road network, e.g. on local and regional level. Interfaces from these networks to the TEN-network are important and interoperability should be assured.

Other transport infrastructure managers (in roads, railways, other) are therefore mostly concerned with the interface with the main road network. In order to prevent problems being forwarded to their specific networks, there is a need for close coordination of traffic information and management and therefore of ITS use and deployment.

Private sector

ITS equipment and services needed for ITS deployment are supplied by system providers, service providers and consultants. The automotive industry is involved in the in-vehicle technologies and increasingly these systems are communicating with infrastructure-based equipment, e.g. this could be the case with Advanced Driver Assistance Systems (ADAS) and Intelligent Speed Adaptation (ISA). As mentioned before, in some countries concessionaires are responsible for certain parts of the TEN-network and are therefore also responsible for ITS deployment on these roads.

Private sector parties, be it concessionaires or IT based producers, are thus primarily focused on maximising the use of their services to paying clients. This means that various ITS options might be developed by private parties, on the basis of there being a commercial market for such services and technologies. Such a market can relate to traffic information (to road users) but also to EFC technology (to the relevant road administration or concessionaire).

Road users and non-road users (passenger transport)

Road users, using the TEN road infrastructure, are one of the main target groups of ITS deployment. In addition, the non-road users are an important target group, since the non-road users should be able to make a well-informed decision on his/her mode choice, route options, transfers, etc.

The ITS related need of road users is basically to receive optimal information and guidance on the choices to be made on the routing and/or transport modes to be used at a particular time. In order to be efficient, such information should thus be dynamic.

Transport companies (road, rail, (inland) water)

Similar to passenger transport, also in the freight domain the road transport companies presently are the main target groups of ITS deployment. However, ITS potentially also plays an important role for railway companies, ferry operators and shipping lines. To mention a few applications: traffic management, ETA's, reservations, booking information, time tables.

The need for transport companies in general is thus not only to have reliable and dynamic traffic information, but also to have additional information regarding expected timing of shipments, alternative routes and modes etc.

EU institutions

Several EU institutions are involved in ITS at a European level. The ITS deployment programme itself is a European programme commissioned by DG TREN. At DG Information Society and Media ITS related programmes and projects are carried out

which focus on developing new technologies and applications, whereas DG TREN is much more focussed on the deployment side. DG Research is also involved in ITS, but then purely focuses on research and development. The GALILEO Joint Undertaking (GJU) has been set up by the EC and ESA to manage the development phase of the Galileo Programme. The GALILEO Programme is relevant for ITS for all modes of transport.

The general need of the Commission is to realise its policy objectives. As explained ITS can be a tool to bring forward some general objectives, as well as some of the transport policy objectives. The involvement of other EC services indicates that there is a need at EU level to stimulate development of IT related research as well as the use of IT.

For DG TREN realisation of the transport policy objectives is most important. By making progress on these issues also the general EU objectives will be served. Given this and the needs of the other players, the main role for DG TREN could be:

- Stimulation of harmonisation of ITS systems within the EU, across borders
- Focusing on those elements which service public objectives and which are not addressed by potentially commercial applications.

3 Objectives and indicators

3.1 Objectives of a possible new ITS Deployment Programme

Setting concrete measurable objectives is fundamental to the success of a possible new ITS deployment programme, because it:

- Clarifies the link between the new ITS deployment programme, the common transport policy goals and DG TREN wide strategies.
- Provides a common understanding why a new ITS deployment programme can be important.
- Underpins the definition of the criteria for success of a new programme and defines the indicators with the help of which progress can be measured.
- Lays the basis for later evaluations.

There are different levels of objectives to distinguish.

General objective

The general objective of a new ITS deployment programme is:

> to contribute to an efficient and sustainable transport system.

ITS deployment is a tool and not an objective in itself. A new ITS deployment programme therefore clearly needs to be linked to the relevant DG TREN transport policy objectives. It is revealing that the ITS Deployment Programme TEMPO is not mentioned in the Public Consultation of the Mid-Term Review of the White Paper as one of the measures that have been put in place since 2001.

Specific objective

The specific objective of a new ITS deployment programme is:

> to stimulate deployment of ITS measures that reduce congestion, enhance traffic safety and/or improve the environmental performance of the transport system, as well as to harmonise the ITS systems and services in Europe.

Operational objectives

The following operational objectives of a new ITS deployment programme can be identified:

- the further implementation of high quality road monitoring infrastructure for reliable ITS services
- the further establishment of a European network of road traffic centres

- the removal of bottlenecks and easing of traffic flows through road traffic management and control measures
- the deployment of systems that give easy access to high quality traveller information services, including the interface with other modes of transport
- the deployment of other ITS services like EFC, Emergency and Incident Management, etc
- the coordination of ITS deployment at European level and support for standardisation efforts.

Actions

For the current ITS deployment programme, the following actions have been formulated. Most of these actions could continue, since they contribute to achieving the operational objectives.

- Installation of road monitoring equipment (e.g. traffic counting stations, weather stations and cameras)
- Deployment and upgrading of traffic control centres and traffic information centres
- Data exchange between traffic centres and sharing data with traffic and transport operators
- Implementation of international/cross-border exchange of traffic data
- Implementation of traffic management and control systems
- Development and implementation of traffic management plans
- Provide real time traffic information to the user (e.g. by VMS, RDS-TMC)
- Development of websites and portals to provide traffic information to the user
- Implementation of other ITS services (like EFC, Emergency and Incident Management, etc)
- Harmonisation of ITS systems and services in each of the domains of the ITS deployment program (e.g. Protocols for exchange of traffic data, harmonisation of variable message signs, electronic fee collection, incident and emergency management, etc)

3.2 Indicators and target levels

In order to assess the achievement of objectives, the definition (and monitoring) of indicators is needed. The indicators on the level of general objectives are closely related to the problems and the expected impacts (impact indicators), the indicators on the level of specific objectives are closely related to the results (result indicators),while the operational objectives result in more practical indicators related to the fulfilment of actions (output indicators).

Table 3.1 Different type of objectives and corresponding indicators

Objective	Indicator	Example
General objectives	Impact indicators	Improved safety, less accidents
Specific objectives	Result indicators	Reduction average speed
Operational objectives	Output indicators	Km's road equipped with VMS

As indicated in the previous section the general objective of a new ITS deployment program will be focussed on achieving an efficient and sustainable transport system.

This general objective of the EU Transport policy can be measured according to the indicators that have been developed at this level. Such indicators relate to the use of transport means and infrastructure, the environmental and safety impacts of the transport operations etc. For the present purpose these general impact indicators are less relevant.

The specific indicators, indicating the result of ITS deployment in the EU are much more interesting. These specific objectives deal with the relation between ITS deployment and the following aspects:

- road congestion
- traffic safety
- environmental performance

The specific objective further deals with the harmonisation of ITS between countries.

Table 3.2 presents an overview of possible indicators for each specific objective.

Table 3.2 Possible impact indicators for the specific objectives

Specific objective	Indicators
Reduction in road congestion due to ITS	Increase in average speed Reduction in average number of daily traffic jams Reduction in average length daily traffic jams Reduction in congestion time losses
Increased traffic safety due to ITS	Reduction in traffic deaths in EU 25 per annum Reduction in traffic injuries in EU25 per annum Reduction in traffic accidents in EU25 per annum in relation the number of vehicles Reduction in the ratio between traffic deaths and number of accidents in EU25 per annum
Improved environmental performance due to ITS	Reduction in CO_2 emissions road transport per annum Reduction in NOx emissions road transport per annum Reduction in number of people affected by traffic noise Reduction in range of area affected by traffic noise
Harmonisation	Number of different systems implemented in each domain
	Number of agreements resulting from harmonisation activities
	Number of standardisation proposals for ITS services in Standardisation Bodies

Table 3.3 provides an overview of indicators which are related to operational objectives.

Table 3.3 Possible output indicators for the operational objectives

Operational objective	Indicators
Road monitoring infrastructure	Distribution of installed equipment that is being used (e.g. traffic counting stations, weather stations, and cameras) per distance/area
European network of Traffic Control Centres	Number of operational traffic control centres/traffic information centres Number of cross-border data exchange links
Traffic management and control	Number of operational traffic management plans Number of traffic management systems in tunnels
Traffic information services	Number of websites and portals for Traveller information services of predefined quality level Availability of services at different times
Other ITS services	Extent to which the TERN is covered by EFC Extent to which incident management is implemented on the TERN Extent to which emergency response is implemented on the TERN Extent to which tunnels on the TERN are equipped with safety systems
Harmonisation	Number of different systems implemented in each domain Number of agreements resulting from harmonisation activities in each domain of ITS deployment Number of standardisation proposals for ITS services in Standardisation Bodies

For the operational objective indicators it will not be useful to indicate standard European target levels, because these levels differ from region to region depending on the amount of traffic, weather conditions, etc. Therefore these target levels need to be established by the Member States.

4 Alternative delivery mechanisms

4.1 Introduction

This chapter forms part of the core of the study, namely the answering of one of the crucial questions: "Whether DG TREN should continue an ITS Deployment Programme, and if so, what should be the most appropriate level of this intervention, which instrument(s) should be applied in detail, etc." The outlines of a new ITS Deployment Programme are presented, which form the reference framework for all alternative delivery mechanisms to be defined.

With respect to the delivery mechanisms, seven different intervention strategies have been distinguished. All alternative delivery mechanisms are assessed on a defined set of criteria.

4.2 Towards a new ITS Deployment programme

The current TEMPO programme

The Directorate General for Energy and Transport has carried out the studies and deployment of Intelligent Transport Services (ITS) on the Trans European Road Network between 2001 and 2006 through the TEN-T Multi annual Indicative Programme (MIP)[5] in the targeted programme for transport TEMPO. This programme has enhanced the service quality on the network through a number of interlinked multinational Euro-Regional Projects covering all Member States with the exception of Greece. In the second half of the period the geographical area extended to the additional 10 Member States joining in 2004, and following a Mid-Term Review of the projects some revisions have been made to the management of the projects. In the MIP each project comprises participants from Member States governments, agencies and regional government who have direct responsibility for the smooth running of the road transport network.

In its White Paper - European Transport Policy for 2010: time to decide[6], the Commission proposed to take measures which should make the market shares of the modes of transport return, by 2010, to their 1998 levels. The White Paper states that "the trans-European network is an ideal candidate for the deployment of intelligent transport".

[5] Commission Decision C(2654), September 2001
[6] COM/2001/370final.

Domains

Since 2004 each project in the MIP ITS TEMPO programme covers four technical domains. This revision has concentrated the delivery of network management on the TEN-T using ITS into the domains of:

- **Road Monitoring Infrastructure**;
- data exchange through a **European Network of Traffic Control Centres**;
- **Traffic Management & Control** ;
- **Traveller Information Centres**.

Information needs to be available to and exchanged between the specialists who can manage traffic from traffic control centres. The traffic managers can then take action directly on the networks for which they are responsible – this is the traffic management activity – and can pass the information they have gathered and filtered on to a subsequent stage where added-value services can be provided to travellers before and in the course of making their journeys – traveller information services. In an earlier stage three other domains were also covered i.e. fleet and freight management systems, electronic fee collection systems and incident and emergency handling, but since 2004 it was decided to focus on the four domains mentioned before, whereas the three other domains were brought under one of the four main domains.

In the Euro Regional projects of the TEMPO programme a strong inter-project relationship has been created through a regular dialogue of project leaders in a Project Chairs meeting and by way of European dimension task in which more than one project participates. To further enhance the European added-value aim of the Euro Regional Projects, cross project expert groups meet to drive forward mutual issues such as road traffic monitoring; data exchange; evaluation and assessment & traveller information.

Towards a new ITS Deployment Programme

The Commission is currently preparing the Financial Perspectives of the Union for the period post-2006. In the period 2007-2013 the Community should express its political determination in changing course to a sustainable transport direction, and allocate the necessary means, including financial resources. Looking towards the transport systems and consumers behaviour that should be achieved in the year 2010, the question is how the Union could best encourage the actors involved to follow sustainable behaviour paths and deploy intelligent transport systems and services giving maximum benefit for users of the trans-European networks.

The successor to the TEMPO Programme should build on the successful experience gained in the framework of the previous TEMPO programme under the MIP, whilst being supported by a robust management structure preferably less complex than that for the present TEMPO programme.

The need now is to assess the need to continue the deployment of quality network management using intelligent transport services, and if so, the most appropriate format. The aim would be to maintain the momentum of structured deployment of ITS, but with a streamlined project management effort designed to gain maximum European added-value as required by European Transport Policy, whilst limiting the management burden on the Commission services and their homologues in the Member States.

Budget

The 2001-2006 six-year budget for the TEMPO programme was set at €1.2 billion, with an EU-funding of €192 million. A similar amount could be envisaged for the next six-year programme, however this will depend on the scale of the programme (content, geographically), the reorientation of its objectives, the level of commitment of the Member States, the cost of the technical aspects, etc.

4.3 Towards seven intervention strategies

In the previous chapter it was already described how ITS can contribute to the realisation of the policy objectives of DG TREN in the field of transport as described in the White Paper. The question however is to what extent, or even 'if', DG TREN should initiate a new ITS Deployment Programme for the period 2007 to 2013.

For the purpose of this ex-ante evaluation of the ITS Deployment Programme, four different types of intervention have been defined by DG TREN in the tender documentation. These are called **'intervention strategies'**. Below, the four defined options are described in short.

The following intervention strategies have been discerned:

Table 4.1 Overview of intervention strategies defined by DG TREN in the Terms of Reference

No.	Intervention strategies
1	**Exit strategy** No continuation of a European Deployment programme for ITS. Further ITS deployment is a full responsibility of the national Member States. Harmonisation and standardisation is on a voluntary basis, which could be supported by research projects under FP7.
2	**Business as usual** Continuation of the current TEMPO programme, using the 4 domains in the current TEMPO programme as a backbone (Road Monitoring Infrastructures; a European Network of Traffic Control Centres; Traffic Management & Control; Traveller Information). The programme of Studies and Works has to raise the minimum and common ITS services for all road users to an appropriate level of service. The currently growing multimodal nature is strengthened.
3	**Extended modal coverage** Similar to the business as usual option, but with an extended modal coverage. This option includes also the provision of dynamic multimodal traveller information. In order to provide this type of information, monitoring data from other modes is required as well as exchange of this multimodal data between countries.
4	**Revised domain structure** A revised Domain structure based on: • Network Operation (the Smart Motorway) incorporating traffic monitoring, data exchange, and traffic management; • Minimum & Common European ITS services centred on the provision of multimodal traveller information and other user orientated services.

The four options mentioned above do not provide a practical basis for comparing alternative delivery mechanism, since various dimensions are mixed up. However, the four options clearly show the various dimensions that have to be considered in the delivery mechanisms:

- Only ITS on the TERN (corridors) or also ITS on non-TERN roads (regional/urban network)?
- Only ITS on behalf of car-users, or also ITS for multimodal trips?
- Only ITS for traffic management (domains monitoring, data-exchange and traffic management) or also ITS for traveller information services?

Based on these elements the following delivery mechanisms can be discerned:

- Exit strategy
- Basic TERN strategy: Traffic management on TERN
- Full TERN strategy: Full ITS services on TERN
- Basic TERN+ strategy: Traffic management on TERN+
- Full TERN+ strategy: Full ITS services on TERN+
- TERN & Multimodal strategy: Traffic management on TERN and Multimodal traveller information services
- TERN+ & Multimodal strategy: Traffic management on TERN+ and Multimodal traveller information services

Exit strategy

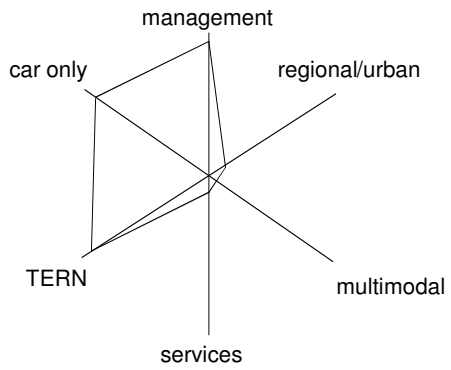
This policy option is the most radical change compared to the current EU position in the deployment of ITS. Within this option, the European ITS deployment programme will not be continued. The intention of this delivery mechanism is to shift control and responsibility completely to the Member States. Harmonisation and standardisation of ITS technology and services cannot be guaranteed, but European research projects under FP7 can support the adoption of a harmonised approach.

Basic TERN strategy: Traffic management on TERN

This strategy includes continuation of the current TEMPO programme, however restricted to only the three domains which can be considered as the clear responsibility of the road authorities:

- Road Monitoring Infrastructures
- European Network of Traffic Control Centres
- Traffic Management & Control

Figure 4.1 Spider web of the Basic TERN strategy



Traveller information is only provided as part of traffic management. Services aimed at individual travellers will be dealt with by the private sector, and as such will not be part of the new ITS deployment programme. Furthermore, intermodality is excluded, and so is ITS deployment which is not aimed at the TERN.

The programme of Studies and Works has to provide a minimum and common level of road monitoring infrastructures, a network of traffic control centres and traffic management and control aimed at the optimum use of the TERN from a society point of view.

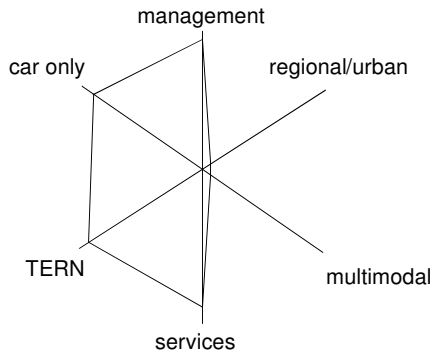
Full TERN strategy: Full ITS services on TERN

This strategy includes continuation of the current TEMPO programme, using the 4 domains in the current TEMPO programme as a backbone:

- Road Monitoring Infrastructures
- European Network of Traffic Control Centres
- Traffic Management & Control
- Traveller Information

Intermodality is excluded, and so is ITS deployment which is not aimed at the TERN. Traveller information in this respect includes information aimed at individual road users, as well as traveller information as part of traffic management.

Figure 4.2 Spider web of the Full TERN strategy



The programme of Studies and Works has to raise the minimum and common ITS services for all road users to an appropriate level of service.

Basic TERN+ strategy: Traffic management on TERN+

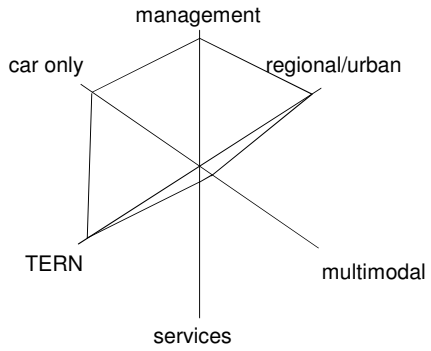
This strategy includes continuation of the current TEMPO programme, however restricted to only the three domains which can be considered as the clear responsibility of the road authorities:

- Road Monitoring Infrastructures
- European Network of Traffic Control Centres
- Traffic Management & Control

Traveller information is only provided as part of traffic management. Services aimed at individual travellers will be dealt with by the private sector, and as such will not be part of the new ITS deployment programme. Intermodality is excluded. ITS deployment on

regional/urban roads will be part of the new ITS deployment programme in those cases where strong interaction with the TERN are evident and clear European Added Value can be shown (best practice exchange).

Figure 4.3 Spider web of the Basic TERN+ strategy



The programme of Studies and Works has to provide a minimum and common level of road monitoring infrastructures, a network of traffic control centres and traffic management and control aimed at the optimum use of the European road network from a society point of view.

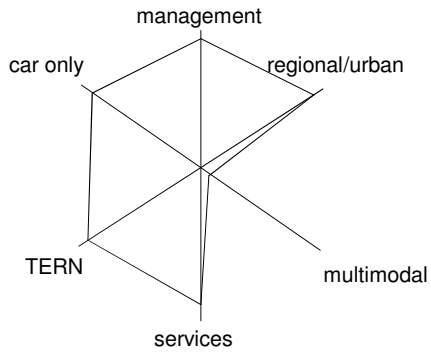
Full TERN+ strategy: Full ITS services on TERN+

This strategy includes continuation of the current TEMPO programme, using the 4 domains in the current TEMPO programme as a backbone:

- Road Monitoring Infrastructures
- European Network of Traffic Control Centres
- Traffic Management & Control
- Traveller Information

ITS deployment on regional/urban roads will be part of the new ITS deployment programme in those cases where strong interaction with the TERN are evident and clear European Added Value can be shown (best practice exchange). Intermodality is not included in this option.

Figure 4.4 Spider web of the Full TERN+ strategy



The programme of Studies and Works has to raise the minimum and common ITS services for all road users to an appropriate level of service.

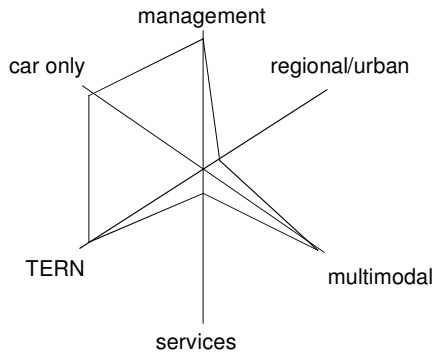
TERN & MM strategy: Traffic management on TERN and multimodal traveller information services

This strategy includes continuation of the current TEMPO programme, using the 4 domains in the current TEMPO programme as a backbone:

- Road Monitoring Infrastructures
- European Network of Traffic Control Centres
- Traffic Management & Control
- Traveller Information

Multimodality in this case only refers to traveller information (both long-distance and urban), whereas the other three domains apply only to the TERN. Integration of multimodal information should be realised, providing more reliable travel times and travel time predictions for car traffic. Multimodality will not mean direct involvement of other mode stakeholders.

Figure 4.5 Spider web of the TERN & Multimodal strategy



The programme of Studies and Works has to provide a minimum and common level of road monitoring infrastructures, a network of traffic control centres and traffic management and control aimed at the optimum use of the TERN from a society point of view and to harmonized multimodal traveller information services.

TERN+ & MM strategy: Traffic management on TERN+ and Multimodal traveller information services

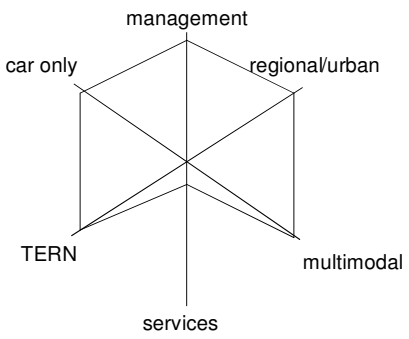
This strategy includes continuation of the current TEMPO programme, using the 4 domains in the current TEMPO programme as a backbone:

- Road Monitoring Infrastructures
- European Network of Traffic Control Centres
- Traffic Management & Control
- Traveller Information

ITS deployment on regional/urban roads will be part of the new ITS deployment programme in those cases where strong interaction with the TERN are evident and clear European Added Value can be shown (best practice exchange). Multimodality in this case only refers to traveller information (both long-distance and urban). Integration of multimodal information should be realised, providing more reliable travel times and

travel time predictions for car traffic. Multimodality will not mean direct involvement of other mode stakeholders.

Figure 4.6 Spider web of the TERN+ & Multimodal strategy



The programme of Studies and Works has to provide a minimum and common level of road monitoring infrastructures, a network of traffic control centres and traffic management and control aimed at the optimum use of the TERN from a society point of view and to harmonized multimodal traveller information services.

4.4 A first assessment of the intervention strategies

In table 4.2 all delivery mechanisms are scored with respect to their effectiveness on the general and specific objectives, as well as on expected costs and risks. The 'Basic TERN' strategy has been taken as a reference, thus scoring '0' and 'M'. All other scores are based on comparison with the Basic TERN strategy.

	Effectiveness on general objectives[a]			Effectiveness on specific objectives[a]		Costs[b]	Risks[b]
	congestion	environ-ment	safety	ITS deployment	ITS harmonisation		
Exit	0 -	0 -	0 -	-	- -	L	L
Basic TERN	0	0	0	0	0	M	M
Full TERN	0	0	0	+	0 +	M/H	H
Basic TERN+	++	++	++	+	+	H	H
Full TERN+	++	++	++	++	+	HH	H
TERN & MM	0 +	0 +	0 +	+	0 +	H	HH
TERN+ & MM	++	++	++	++	+	HH	HH

a) Scale for effectiveness compared to 'Basic TERN': - - = much less effective, - = less effective, 0 = equally effective, + = more effective, ++ = much more effective

b) Cost and risk assessment: LL = very low, L = low, M = medium, H = high, HH = very high

Based on this first qualitative assessment, four strategies are eliminated for further elaboration, based on the comparison table outcomes. The justification for this elimination is presented below.

4.4.1 Continue or not ?

The first question to be answered is whether the EC should continue with a European Programme for ITS Deployment or not (Exit Strategy). With an Exit strategy, control and responsibility is shifted to the Member States. Costs and risk for DG TREN will be minimal in this intervention strategy.

Based on analysis of the consequences of an exit strategy, it is recommended to continue with a European ITS Deployment Programme in some form for three main reasons:

- The leverage function of co-funding and the speed of deployment; The leverage function guarantees deployment on border crossing sections and development of long distance traffic management plans. Without a European Programme, these kinds of projects would not have been realised as a consequence of a focus on national priorities. It became apparent from interviews with people directly involved in the current TEMPO Programme that the EC co-funding in some cases triggered or convinced national decision makers to start ITS deployment activities that otherwise would not have been realised. National Road Administrations would then focus on the parts of their network with the highest problems in terms of congestion and traffic safety, which are certainly not the border crossing sections, but often the conurbation areas.
- Harmonisation of ITS services; International road transport is increasing rapidly, which puts a greater importance on providing unambiguous information provision to international road users, regardless the country they drive in. Without European harmonisation and standardisation of ITS, economies of scale will not be realised (e.g. the different road tolling systems in Europe are a good example), leading to higher costs of ITS and a lower cost effectiveness of ITS applications. It is not expected that another international organisation (e.g. CEDR) has the financial resources and the legislative tools to play this coordinating and steering role.
- Best Practice and knowledge exchange; A new ITS Deployment Programme will also speed up ITS deployment through the exchange of best practices and knowledge across Member States. Countries with a well developed ITS infrastructure pull countries with a weaker developed ITS infrastructure. It is questionable whether the benefits of knowledge and best practice exchange as well as the pulling factor (strong countries pull weaker countries) would be realised without a coordinated European ITS Deployment Programme. Through a new ITS Deployment Programme the network of NRA's and concessionaires, built up during the current ITS Deployment Programme, can also be continued. This informal network proved to be valuable not only with respect to harmonisation and best practice transfer, but also for cross-border traffic management. When the Exit Strategy will be followed, initially the contacts will be maintained, but after some time people will change positions and face-to-face contacts will be reduced, thus leading to an ending of the network and its associated benefits.

A variation to the full Exit Strategy is an Exit Strategy in which only a kind of platform for cross-border co-operation on the operational/tactical level will be financially supported by the EC. In this case some form of cross-border traffic management can be maintained. However, the leverage function will be lost, and so will the incentive to deploy ITS at sections relevant for the EU (European Added Value). Cross-border best

practice exchange and knowledge transfer might still be possible, but this might be on ITS applications and services which are mainly interesting from a national point of view, with limited value for the TERN.

4.4.2 How to continue ?

After the question whether to continue or not has been positively answered and argued, the next question is how to continue with a New Programme for ITS Deployment. Three different dimensions are relevant in defining the different policy options:

- Only ITS deployment on the TERN (corridors) or also ITS deployment on non-TERN roads (regional/urban network)?
- Only ITS deployment on behalf of car-users, or also ITS deployment for multimodal trips?
- Only ITS deployment for traffic management (domains monitoring, data-exchange and traffic management) or also ITS deployment for traveller information services?

Basic TERN

This is the reference strategy in the analysis. Other strategies are compared to this one. Therefore the strategy scores 'neutral' on all criteria, meaning a '0' on the effectiveness criteria and 'M' on costs and risk.

Basic TERN+

By extending the deployment of ITS beyond the basic TERN network, it is expected that this will contribute positively to congestion reduction, traffic safety and environmental conditions.

The network extension could include urban-interurban integration. The most congested highway tracks include often only conurbation areas, where long-distance traffic overlaps with the local and regional traffic, which causes subsequent traffic-problems. As a consequence, ITS deployment on this extension means a highly effective use of the means. Therefore, traffic management on the TERN at least requires the consideration of urban traffic systems in its vicinity. A weak element of network extension in this direction is the European dimension of urban-interurban integration. Though the ring roads of most major European capitals are part of the TERN, the roads within an urban network have a local function. It is therefore not a European task to enhance ITS deployment on these roads. The European added value comes from the exemplary function of certain projects on urban-interurban integration. Example projects could be included in a new European ITS Deployment Programme if the results can be translated to other European regions and there is clear commitment from other European regions to apply the lessons learnt in such example projects. The project objectives then need to address aspects like diffusion and dissemination of knowledge and lessons learned. Also example projects could address typical harmonisation issues related to integration of urban and interurban network data.

The network extension might also include interurban road sections of European importance that are not yet included in the TERN network. The definition of the TERN network has an administrative background. The European E-roads cross national borders

and are the responsibility of the United Nations Economic Commission for Europe (UNECE). Some parts of the TERN are not included in the European E-road network, whereas some E-roads are not included in the TERN. Since these E-roads are important border crossing corridors, ITS deployment along these roads provides clear European added value.

By including currently missing E-roads as well as example projects of urban-interurban ITS integration, the Basic TERN+ option will be more effective on the general objectives compared to the basic TERN option. Even though the Basic TERN+ option means a higher risk and cost claim, the cost-effectiveness is expected to be higher than the basic TERN option. However, given the fact that elements of the Basic TERN+ option are further away from a 'European approach', special attention should be paid in this option to knowledge transfer (best practices, lessons learnt, harmonisation etc.).

Full TERN

Traveller information in this strategy includes information aimed at individual road users, as well as traveller information as part of traffic management. Information aimed at individual road services provides added value to the individual road user and is not primarily meant to optimise the network. It might even be counter productive in terms of network optimisation. It might also lead to unwanted societal impacts, individual trip planners could suggest crossing highly populated areas instead of avoiding these areas. Therefore, the contribution to the general policy objectives is rather limited.

The willingness to pay for these services determines the creation of a sound business case for these kinds of services. The advice is therefore not to actively include these type of services in a new Deployment Programme, but keep it open for private sector to come up with ideas for sound business cases and facilitate data requirements from private sector in a non-discriminating way.

Full TERN+

The same arguments also apply to this strategy, since the basic TERN+ strategy outranks this strategy on the same grounds as described above.

TERN & Multimodality

Multimodality might contribute to general policy objectives like congestion reduction and reducing environmental damage. This is actually the underlying reason for the European Transport Policy objective to shift the balance between the different transport modes and develop intermodality (see the White Paper). The development of intelligent multimodal traffic systems to inform passengers of all transport modes should help travellers to make well informed choices about traffic mode, route alternatives, time schedules, delays, etc., thus enabling them to make the best choice.

Intra-EU-25 and domestic transport demand using passenger cars, buses & coaches, railways as well as tram & metro was ca. 5,092 billion pkm or 11,240 pkm per person. Passenger cars accounted for 82.5% of this total, buses & coaches for 9.5%, railways for 6.8% and tram & metro for 1.1%. These figures, however, do not include air transport which in the EU-15, had a share of 5.7% of total transport performance.

Table 4.2 Passenger transport performance in the EU-15 per mode of transport

Transport mode	Performance in 2002	Modal share
Passenger cars	4203 billion pkm	*77.6%*
Bus/coach	486 billion pkm	*9.1%*
Railway	346 billion pkm	*6.6%*
Tram & Metro	57 billion pkm	*1.1%*
Waterborne	0 billion pkm	0%
Air (domestic/intra EU)	308 billion pkm	5.7%
Total	5400 billion pkm	100%

As can be seen, the passenger car is responsible for the majority of the traffic performance in the EU-25. The majority of passenger car use is on a national level. Intra-EU passenger car use is only a very small part of the total traffic performance.

The policy of balancing the modes of transport by providing multimodal traveller information services is assumed to have only a minor impact. The potential modal shift from road users to intermodal or multimodal use will – as far as it is supported by ITS – be aimed at commuter traffic and interaction with urban networks mainly. The expected impact in terms of modal shift on long distance corridors and border crossing sections is rather limited. And in situations where the modal choice on long distance trips can be influenced by intelligent multimodal traveller information, it will often be influenced by providing pre-trip information. The impact of on-trip multimodal information in changing the travel behaviour is assumed to be negligible. The limited impact of multimodal traveller information on long distance and border crossing transport has to be supported by the research done under the impact assessment (chapter 8).

Giving multimodality a crucial role in a new European ITS Deployment Programme means at the same time a significant increase of the risk of the Programme. Since it already took several years to establish a well-functioning network of ITS experts in road transport, it will become extremely difficult to establish a similar effective network of practitioners and network operators of the different transport networks (road, rail, air, public transport).

TERN+ & Multimodality

The same arguments on multimodal extension also apply to this strategy, whereas the advantages of extending the network dimension have already been described under section Basic TERN+.

4.4.3 Summary of the first evaluation of the different strategies

Summarised, from the initial assessment it can be concluded that:

- Although the exit strategy might have low costs and risks while still realising ITS deployment on the most congested road network sections, its contribution to harmonisation of ITS is very low.
- All options where the TERN network is expanded have a significant higher impact on congestion, environment and safety than 'TERN only' strategies.

- The strategies 'Full TERN' and 'Full TERN+' only have a slightly higher positive impact on congestion, environment and safety. However, both strategies have higher costs and a higher level of complexity, and thus risks. The advice is therefore not to actively include these type of services in a new Deployment Programme, but keep it open for private sector to come up with ideas for sound business cases and facilitate data requirements from private sector in a non-discriminating way.
- Enhancing multimodality by providing multimodal traveller information very well fits into the general transport policy objectives and if it works it would have a positive impact on congestion, environment and safety. However, it is questionable whether provision of multimodal traveller information might really change the travel behaviour of individual travellers. It also increases costs and in particular the risks of the programme.

As a result it can be concluded that of the seven delivery mechanisms three strategies stand out for the moment:

- Basic TERN strategy: Traffic management on the TERN network and traveller information for road users in order to support traffic management and network optimisation.
- Basic TERN+ strategy: Traffic management on TERN+ network
- TERN+ & Multimodal strategy: Traffic management on TERN+ and Multimodal traveller information services

The basic TERN strategy is the reference strategy and could be effective as a consequence of its focus. The basic TERN+ strategy seems very effective on the general objectives as well as effective on the specific objectives. The TERN+ & MM strategy might have an extra positive contribution to the general policy objectives, but the impact assessment has to support that assumption. The multimodal extension has also a higher score on ITS deployment. However, it also involves serious risks.

4.5 Instruments, channels and levels of intervention

Each delivery mechanism or intervention strategy consists of a mix of *instruments* (how to intervene?), *channels of intervention* (directed to whom?) and *levels of intervention* (magnitude of intervention).

4.5.1 Instruments

Under the current TEMPO programme *financial assistance* is applied as instrument to speed up the deployment of ITS in Europe. On the instruments level, alternatives for the proposed MIP II instrument have been defined. Alternative financial options are:

- Annual funding
- Success fee (afterwards).

The potential instruments are shown in figure 4.3. The MIP II instrument has been taken as a reference, thus scoring '0' on effectiveness, and 'Medium' on costs and 'Low' on risks. The other scores are based on comparison with this instrument.

Table 4.3 Assessment of the instruments for a new ITS Deployment Programme

	Effectiveness on general objectives[a]			Effectiveness on specific objectives[a]		Costs[b]	Risks[b]
	Congestion	environ-ment	safety	ITS deployment	ITS harmonisation		
MIP II	0	0	0	0	0	M	L
Annual funding	0 -	0 -	0 -	-	-	M	M
Success fee	-	-	-	-	- -	M	H

a) Scale for effectiveness compared to 'MIP II': - - = much less effective, - = less effective, 0 = equally effective, + = more effective, ++ = much more effective

b) Cost and risk assessment: LL = very low, L = low, M = medium, H = high, HH = very high

Contrary to the MIP II funding, *annual funding* creates a lot of uncertainty to the beneficiaries of the funding. Without the financial assurance, Member States will think twice before starting up high-risk ITS deployment projects and thus fewer projects will be realised. Consequently, the effectiveness will be reduced compared to the MIP II funding. The costs will be more or less the same, but the risk of not being able to use all resources available for one year is higher than with MIP II financing. However, the annual decisions in MIP I resulting in a budget cut halfway the MIP have also created uncertainty among the beneficiaries.

A *success fee* disbursed after the project has showed its effectiveness is another alternative for the co-financing within a new ITS deployment programme. This has two main consequences. First of all, the risk of not realising the expected impacts lies fully at the receiver of the fee. Secondly, being able to show the effectiveness requires well developed evaluation and monitoring methodologies in order to measure the effectiveness. As a result the beneficiary will choose to invest only in projects which will have a high likelihood of being successful, thus reducing the number of projects and consequently the impact on the general and specific objectives. Given the risky nature of ITS deployment and the insufficient application of clear evaluation methodologies in the current programme, this instrument seems not to be the most logical choice.

Therefore financial assistance through MIP II seems to be an obvious instrument for the ITS deployment programme.

4.5.2 Channels of intervention

The Channels of Intervention relate to the parties that will receive support (how the support is channelled?). The current TEMPO programme is co-funded under the guidelines of the TEN-T multi-annual indicative programme (MIP). In the current TEMPO programme the national highway authorities (e.g. Ministries of Transport) are the first beneficiaries and thus applicants for financial support. However, they might act on behalf of private highway operators. The current programme does not allow for funding directly to private parties.

Alternative channels of intervention (compared to MIP II funding to (road) authorities) for defined direct support to beneficiaries are:

- Directly to road concessionaires
- Directly to 'other mode operators'
- Directly to ITS system and service providers

In table 4.4 the various intervention channels have been scored with respect to their effectiveness, costs and risks. The channel of funding to road authorities has been taken as a reference, again scoring '0' on effectiveness, and 'Medium' on costs and 'Low' on risks. The other scores are based on comparison with this channel of intervention.

Table 4.4 Assessment of the channels of intervention for a new ITS Deployment Programme

	Effectiveness on general objectives[a]			Effectiveness on specific objectives[a]		Costs[a]	Risks[a]
	congestion	environment	safety	ITS deployment	ITS harmonisation		
Funding to (road) authorities	0	0	0	0	0	M	L
Directly to road concessionaires	0 -	0 -	0 -	0	-	M	L M
Directly to 'other mode operators'	0	0	0	0	-	M	H
Directly to ITS system and service providers	-	-	-	0	-	M	H

a) Scale for effectiveness compared to 'MIP II': - - = much less effective, - = less effective, 0 = equally effective, + = more effective, ++ = much more effective

b) Cost and risk assessment: LL = very low, L = low, M = medium, H = high, HH = very high

Compared to the funding to road authorities, funding directly to the road concessionaires will probably be slightly less effective on the general objectives, since these concessionaires are less concerned with these objectives than non-commercial road operators. In addition the financing directly to concessionaires will also increase the complexity of the programme and thus will have a higher risk.
Direct funding to 'other mode operators' such as railway companies, public transport operators, etc. will have a comparable impact on congestion, environment and safety, but it will highly increase the complexity of the programme, and thus will increase the risk associated with it.
Funding directly to private system and service providers could be an option in those cases where it concerns e.g. the provision of (multimodal) traveller information services and other commercial user oriented services. The profit-orientation of these companies will make it less likely that they have a strong focus on congestion, environment and/or safety. For all direct funding to private parties it can be expected that (cross-border) harmonisation will not be their priority.

From the above, the current channel of intervention through (road) authorities seems to be the logical choice also for the new programme. Participation of the private sector can be arranged through subcontracting or calls for tender by the (road) authorities.

4.5.3 Level of intervention

Regarding the levels of Intervention, given the instrument of financial support through grants, every grant level between 0 and 100% can be given. Currently the TEMPO programme falls under the guidelines of the TEN-T Multi-annual Indicative Programme and has two grant levels:

- 10% for works
- 50% for studies.

In order to put more emphasis on the European Added Value, it could be considered to give a bonus (e.g. 10%) for works and/or studies with a high European Added Value. This is even possible under the renewed TEN-T guidelines, which enables co-funding of 20% for certain border-crossing infrastructure projects. Of course this requires clear and unambiguous evaluation criteria.

The following table shows the level of intervention per intervention strategy. The current level of funding (10% for works and 50% for studies) has been taken as a reference, again scoring '0' on effectiveness, and 'Medium' on costs and 'Low' on risks. The other scores are based on comparison with this level of intervention.

Table 4.5 Assessment of the level of intervention for a new ITS Deployment Programme

	Effectiveness on general objectives[a]			Effectiveness on specific objectives[a]		Costs[b]	Risks[b]
	congestion	environ-ment	Safety	ITS deployment	ITS harmonisation		
10% for works, 50% for studies	0	0	0	0	0	M	L
15% for works, 35% for studies	+	+	+	+	0 -	M H	L
10% for works, 50% for studies, 10% bonus for 'true European Added Value'	0	0	0	0	+	H	M

a) Scale for effectiveness compared to 'MIP II': - - = much less effective, - = less effective, 0 = equally effective, + = more effective, ++ = much more effective

b) Cost and risk assessment: LL = very low, L = low, M = medium, H = high, HH = very high

Compared to the current situation (10% for works, 50% for studies) it is expected that a higher percentage funding of works and a lower percentage of funding for studies (respectively 15% and 35%) will result in a higher effectiveness with respect to congestion, environment and safety. It will also result in more ITS deployment, but the harmonisation is expected to decrease slightly. The costs are expected to increase slightly, assuming that the share of works compared to share of studies will increase as a result of higher funding for works and lower funding for studies. The risks are expected to be the same.

If the percentage of funding remains the same, but a bonus of 10% is introduced for works and/or studies with 'true European Added Value', the impacts on congestion, environment and safety are not expected to change significantly, and also the level of ITS deployment will remain more or less the same. However, a positive impact is expected on ITS harmonisation, since these works and studies will have a higher percentage of funding. Of course this funding mechanism will result in higher costs, while also the risk will be higher, since harmonisation is a rather difficult and time consuming process.

4.6 Summary and conclusions

In this chapter, seven alternative delivery mechanisms, or intervention strategies, have been described, that differ in scope. In the table below, these are summarised in short.

Table 4.6 Summary of the different intervention strategies

Intervention strategy	Short description
1. Exit strategy	European ITS deployment programme will not be continued. Control and responsibility is shifted completely to the Member States.
2. Basic TERN	Continuation of the current TEMPO programme, however restricted to only the three domains which can be considered as the clear responsibility of the road authorities: - Road Monitoring Infrastructures - European Network of Traffic Control Centres - Traffic Management & Control Traveller information is only provided as part of traffic management. Services aimed at individual travellers will be dealt with by the private sector outside the Programme. Furthermore, intermodality is excluded, and so is ITS deployment which is not aimed at the TERN.
3. Full TERN	Continuation of the current TEMPO programme, using the 4 domains in the current TEMPO programme as a backbone. Intermodality is excluded, and so is ITS deployment which is not aimed at the TERN. Traveller information in this respect includes information aimed at individual road users.
4. Basic TERN+	Similar to the Basic TERN strategy, but with one fundamental difference. ITS deployment on regional/urban roads will be part of the new ITS deployment programme in those cases where strong interaction with the TERN are evident and clear European Added Value can be shown (best practice exchange).
5. Full TERN+	Similar to the Full TERN strategy, but with one fundamental difference. ITS deployment on regional/urban roads will be part of the new ITS deployment programme in those cases where strong interaction with the TERN are evident and clear European Added Value can be shown (best practice exchange).
6. TERN & MM	Continuation of the current TEMPO programme, using the 4 domains in the current TEMPO programme as a backbone: - Road Monitoring Infrastructures - European Network of Traffic Control Centres - Traffic Management & Control - Traveller information Multimodality in this case only refers to traveller information (both long-distance and urban), whereas the other three domains apply only to the TERN.

Intervention strategy	Short description
4. TERN+ & MM	Similar to the TERN & MM strategy, but with one fundamental difference. ITS deployment on regional/urban roads will be part of the new ITS deployment programme in those cases where strong interaction with the TERN are evident and clear European Added Value can be shown (best practice exchange). Multimodality in this case only refers to traveller information (both long-distance and urban).

A first assessment on effectiveness (on general and specific objectives), costs and risks points out that the options that enlarge the scope to including the interaction with urban networks scores very positively on the effectiveness criteria, though it requires higher costs to enlarge the road network under consideration.

Enlarging the scope to offering full services including traveller information services aimed at individual road users has only a limited impact on the general objectives while seriously increasing the risks of the programme. These options therefore will not be taken into account in the further impact analysis.

Enlarging the scope to multimodal services under certain assumptions scores positive on effectiveness. Whereas the current programme is focussed on roads, the multimodal extension of the scope implies the involvement of several other stakeholders in the programme. As a consequence, the risks of the programme are also seriously higher. It is unclear in this stage yet whether it is worthwhile to take these risks.

A conclusion from this analysis is that only the following strategies concerning the scope of the programme will be subject of further evaluation:

- The basic TERN strategy
- The basic TERN+ strategy and
- The TERN+ & MM strategy

Concerning the possible instrument use, the financial funding under a MIP II programme appears to be the most effective type of instrument. Attention has to be paid to the guidelines, rules and restrictions for MIP II funding in relation to funding deployment on the non-TERN network. Though integration with urban and regional network in itself is not against the TEN-T financing guidelines, the vision of a MIP II is to fund rather a limited number of large scale projects instead of a wide range of smaller projects. A possible inclusion of urban-interurban integration under MIP II should therefore not lead to a fragmented series of smaller projects.

Concerning the possible channel of intervention, the current channel through national highway authorities appears to be the most effective type of channel creating the lowest risks. *Attention has to be paid to the representatives of national authorities in the case of multimodal extension (mode neutrality).*

Concerning the level of intervention, the current levels appear to be effective. On the other hand, a shift in co-funding share from studies to works (e.g. studies to 35% and works to 15%) might increase the effectiveness of the programme.
A ‘bonus’ funding for works and studies that provide a clear and ‘true’ European Added Value will influence only slightly the effectiveness of the Programme, but ensures that

enough attention will be paid to deployment on border crossing sections and that harmonisation activities will be guaranteed.

After reviewing experiences from the past, in the subsequent chapters, the three alternative strategies (basic TERN, basic TERN+ and TERN+ & MM) will be further assessed on their impacts, budget implications, cost-effectiveness, risks, and on programme management and monitoring & evaluation issues.

5 Lessons learned

5.1 Introduction

The lessons learnt from the past are one of the key issues to be addressed before shaping the future programme. The findings have been analysed on the basis of evaluations of the existing DG TREN ITS Deployment Programme (TEMPO) and other relevant DG TREN Programmes and projects. Also relevant Programmes from other DG's like DG Information Society and Media have been taken into account. Interviews with the main stakeholders have been held to find out their experiences with the current programme and their ideas about the future programme. First interviews with stakeholders from the EC (mainly DG TREN and DG Information Society and Media) which are involved in ITS deployment in Europe have been held. After that interviews with organisations involved in the current TEMPO projects have been held to find out their views. Finally interviews with other relevant stakeholders have been undertaken. In addition, a stakeholder consultation[7] using questionnaires has been carried out.

5.2 Findings from the current ITS deployment programme

The Mid-term review of the current TEMPO Programme provides an evaluation of the first three years of the programme. The main conclusions are the following:

- There is a strong need to simplify the programme in order to be able to manage it. Everything should be measured and reported in a consistent manner across the programme.
- All projects within the programme will need to work together to achieve a harmonised set of possible service levels within each activity. Based on the operational conditions of the TERN network an appropriate level of services should be defined and can be used to monitor ITS deployment.
- Time-based implementation plan (as proposed in the Mid-term review) should be used to take into account the main recommendations of the Mid-term review

The achievements of the TEMPO Programme for the four main domains, as presented in the Mid-term review, can be summarized as follows:

- Road Monitoring – Road monitoring equipment to collect basic traffic and road condition data (e.g. traffic counting stations, weather stations, and camera installations) have been installed in the EU countries covered by the six Euro Regional projects.

[7] More information about the stakeholder consultation can be found in the Annex.

- European network of Traffic control centres – New traffic control centres and traffic information centres have been established and existing ones have been upgraded with advanced data communication in order to provide the necessary infrastructure and procedures to provide coordinated traffic management and information services across Europe. All projects have been working to make the TICs and TCCs DATEX compliant. Also new internet-based concepts for data exchange have been developed (e.g. OTAP). Several international data exchange links have been implemented. Common databases and digital maps have been developed to facilitate the exchange of traffic information.
- Traffic management systems – Large scale implementations of traffic management systems have been carried out. For all regions traffic management plans (TMP) have been developed and in most cases are also in operation. Special attention is given to cross-border TMPs and long distance corridors.
- Travel information services – large scale implementations of RDS-TMC and VMS have been carried out. Websites and webportals for Traveller Information Services (TIS) have been developed. Travel time services have been developed.

In the Mid-term review recommendations are given for the remaining three years of the programme. Recommendations, which are also relevant for the new programme are the following:

- Road monitoring – All projects should develop a strategic plan The emphasis should be on the work to complete the task of having the appropriate monitoring equipment on the whole network.
- European network of Traffic control centres – A clear strategy on the development and implementation of traffic centres has to be made. Member States should identify the traffic centres which are responsible for international data exchange in order to facilitate international exchange of traffic data.
- Traffic management systems – Concrete deployment strategies have to be developed explaining which systems will be installed where and for what purposes. More attention should be given to the urban-interurban interface.
- Travel information services – A strategy for large scale implementations of various TIS systems should be developed. All projects planning to install VMSs should participate in VMS platform in order to guarantee harmonisation.

5.3 Other DG TREN Programmes

Relevant for the new ITS Deployment programme are the research activities of DG TREN. In the ITS deployment program developed and proven technologies will be implemented. Research activities are needed to develop and test these technologies. Research activities of the EU are mainly done within the Framework Programmes. Results of the previous Framework Programmes are already available (FP4 and FP5), while results of the current FP6 programme will become available within the coming years.

Research can be split into three main categories:

- Fundamental research
- Applied research

- Policy preparatory studies

Applied Research in the short-term should lead to concrete products and/or services, and is therefore the most relevant for ITS Deployment. Within Applied Research the following phases can be distinguished:

- market research
- product development
- pilots
- demonstration
- dissemination.

The first two phases (product development, pilots) are still more research oriented and the outcomes are not certain. It might still be that after the pilot the conclusion should be drawn that the product or service is not (commercially) viable. The latter two phases (demonstration, dissemination) are more demonstration-oriented, showing the world that the concept of the product/service works in real life. Applied research is mostly initiated by industry (in case of commercial products and services) or by authorities (in case of societal interest). Of course also third parties (universities, research institutes, consultants, etc.) are often involved in Applied Research.

5.4 Programmes other DGs

Lessons can be learnt from the eTEN programme of DG Information Society and Media. eTEN is designed to help the deployment of telecommunication networks based services (e-services) with a trans-European dimension. It focuses strongly on public services, particularly in areas where Europe has a competitive advantage. There are two kind of eTEN projects:

- Validation projects are commercial feasibility studies which provide financial assistance during the prior validation phase of an e-service. It is during this phase that the assumptions about the proposed e-service's operating costs and potential revenues, savings and public benefits are put to the test. This involves demonstrations or pilots of the proposed service, user feedback and peer reviews. eTEN funding can be up to 50%.
- Deployment projects are aimed at the practical deployment of electronic applications and services. Funding is currently set at 10% of the costs of deployment for the initial rollout of a new service.

In February 2003[8] DG Information Society and Media concluded that impact of the programme could be improved, based on the following actions:

- Gearing funding, project structures and work plans to achieve a greater practical impact. The current eTEN project portfolio is imbalanced in the proportion of market validation (or study) projects versus the number of market deployment projects (approx 95% vs. 5%). It is our ambition by the end of 2004 if not to completely

[8] eTEN "Orientations and priorities for the eTEN Programme 2003-2004, February 2003.

reverse this trend, to at least rebalance to approx. 1/3 validation vs. 2/3 implementation.

A key mechanism for achieving this will undoubtedly be the implementation of the proposed funding ceiling change from its current 10% to a proposed 30% (coherent with the funding percentage more generally accorded to service demonstration/rollout projects in other programmes). However this change will not occur in time for the 2003 work programme or subsequent call and therefore 2003 must in some ways be seen as transition year. Nevertheless, already in 2003 we will be attempting to shift the emphasis in the desired direction as explained more fully below.

- Better exploitation of synergies with other programmes implementing the eEurope goals (e.g. eCONTENT, IDA and IST). For example, where IST projects have demonstrated innovative services that fall within the context of eTEN, consortia may wish to take the next step towards "service take-up" and propose a market validation/deployment project.
- Increasing the visibility of the programme as a whole

5.5 Interview findings

From the interviews with the stakeholders involved in ITS deployment in Europe, the following main findings can be reported:

Strengths of TEMPO Programme

The TEMPO Programme has lead to a network of ITS experts in Europe. Within this network ideas and experiences are exchanged and contacts are used to work together and set-up projects. Almost all European road operators are involved in the TEMPO programme. Harmonised services are provided to European road users by standardisation and interoperability of ITS systems, because the TEMPO projects are implemented at a European level and not only at a national level. A European dimension is added to the traffic management and travel information services as a result of the TEMPO Programme. The co-funding of the TEMPO projects by the EC has a leverage function for the financing of these projects at national level. The experiences of the countries which are ahead in the field of ITS deployment can be used in the TEMPO projects by countries which are lacking behind. The actual contents of the TEMPO Programme are flexible, and proposed activities for next years can be adapted if this is required.

Lack of vision & strategy for ITS deployment

The development of a European vision and strategy for ITS deployment should be co-ordinated by DG TREN and this should form the basis for the new ITS deployment programme. Unfortunately, at this moment most Member States do not yet have a national ITS deployment strategy or plan[9]. On the other hand there is an increased awareness that ITS is an extremely cost effective measure to reduce congestion compared to the building of new infrastructure.

[9] Except for Sweden (2006-2009 ITS Deployment Plan), Austria (Telematics Master Plan), France (ATEC & ITS France Strategy Plan, June 2005) and Finland (ITS Strategy 2004-2007).

The notice of a need for a European vision and strategy is very much in line with the findings of the mid-term evaluation of the ITS deployment programme (see section 5.2).

Monitoring and evaluation

Control mechanisms should be included in the new programme in order to monitor ITS deployment. Also clear target levels need to be defined in order to see if deployment is progressing as planned. If deployment is lacking behind the reasons for this should be find out and analysed and if possible actions should be undertaken to resolve this. A mechanism is needed to start up activities which have not been foreseen at the start of the Euro Regional projects. Member State inputs for workplans at a national level should be analysed and discussed within the TEMPO projects and between the TEMPO projects to find out how they contribute to the general objectives of the TEMPO programme. This will require insight in the contribution of the actions to transport policy objectives.

Ability to show benefits of ITS

It is difficult to show the benefits of the current TEMPO programme. There are several reasons for this. Hardly any quantitative evidence of the benefits of ITS is available, mainly because it is hard to isolate ITS impacts from other developments at the TERN network. Only very limited examples of best practices are available. Top politicians are sceptical about ITS. In the future ITS deployment programme evaluation should be fully integrated in all Euro Regional projects and not only be covered by an expert group. For this reason an evaluation methodology should be developed and agreed before the start of the new programme. One way to show the benefits would be to treat the benefits of ITS as opportunity costs. The alternative investments, which would have been required in order to have the same level of congestion and safety, are in this case an indication for the benefits.

Priority given to ITS

In many Member States ITS deployment has a low priority, which is reflected in the absence of a national ITS deployment strategy or plan. Although ITS deployment is mentioned in the White Paper, it has a low priority among top politicians in Europe, because it is difficult to actually show the benefits of ITS deployment to them. On the other hand, the co-funding of the EC in the current TEMPO programme has succeeded in leveraging national funds for these projects

Project and programme management

Most time of EC resources in the current TEMPO programme is allocated to administrative tasks, and insufficient time is available for technical guidance of the projects. Dynamic financial guidelines for reporting during the programme should be avoided, and reporting should be as consistent as possible and not changed too much during the programme. Providing all required financial details takes a lot of time, and should be improved. The yearly Decision process is too slow, and should be speeded up. Unnecessary bureaucracy should be avoided as much as possible in the new programme in order to reduce the workload of the organisations involved in the projects. Clear templates and reporting guidelines need to be developed AND used. Though reporting guidelines and templates already exist in the current MIP, not all participants stick to the reporting guidelines or comply to the templates. In this way it will be easier for the projects to provide the required information, while the provided information can be better

processed and used by the EC. Effective control mechanisms and feedback loops need to be developed and included in the new programme. More guidance and steering could be given by DG TREN to the Euro Regional projects, with the aim of creating coherence between the numerous subprojects and Euro Regional projects.

Programme participants

The type and number of partners in the current TEMPO programme is considered to be right. Practically all road authorities are present. The number of partners already tends to be on the high side, with at least one representative from each country covered by a project, although in many cases many more participants can be seen, e.g. for the German Bundesländer, for the private road operators in France, etc.
A further increase of partners on project level is not considered desirable, since it would increase the complexity of the project management and it would also increase the diversity between the various partners (mainly public road authorities compared to private system and service providers and public/private public transport operators).

Dissemination and marketing

Dissemination and marketing of the project results could be improved. This aspect should be given more attention throughout all phases of the execution of the programme. Apart from the project results, also the ITS Deployment Programme itself should be marketed. During the interviews it was noticed a couple of times that people were not aware of the 'TEMPO programme', even though it has been ongoing for almost 5 years.

5.6 Other lessons learnt

In the High Level Group on Ten-T report[10], two recommendations are given which are relevant for the new ITS deployment programme:

- The share of community funding for important cross-border projects should be increased from 10% to 20% (and much more in the next Financial perspectives). This increase could also be considered in the new ITS deployment programme in case of proposed cross-border projects with a high priority and a high European Added value.
- Common evaluation methods and joint procedures for trans-national enquiries ought to be developed. In the new ITS deployment programme a common evaluation methodology can be an important part of the monitoring and evaluation of the programme.

In the CEDR (Conference of European Directors of Roads) report[11] "The Move of the European Road Administrations towards Network Operations" recommendations are given for National Road Administrations (NRA) which have to expand their traditional role of maintaining and improving the road network by taking on an additional responsibility for network management, to ensure that the best use is made of their existing infrastructure. ITS is the tool that can be used to achieve this. The six key messages, which are provided in this report, are the following:

[10] High Level Group o Ten-T Report, van Miert, 30 June 2003.
[11] "The Move of the European Road Administrations towards Network Operations", CEDR subgroup Telematics, November 2004

- Services rather than Systems – travellers and the wider community are the ultimate 'customers' of the road network. NRAs must work continuously with all their customers to identify (changing) demand and deliver appropriate and seamless services. Users appreciate services, not systems nor equipment.
- Multiple Stakeholders and Partnerships – in a network operator role NRAs have to deal with a variety of stakeholders from the public and private sectors. Appropriate partnering arrangements will be required which recognise their different aims, ambitions and motivation.
- New Roles and Different Skills – the expansion of responsibilities to include road network operations requires a change of roles, attitude and approach to liability by the NRAs. These changes involve new challenges and opportunities and will require different skills and methods of working (24/7).
- Strategic, Tactical and Operational Planning – when developing and implementing service operations it is important to take account of strategic and policy objectives to meet public and Government aspirations. NRAs must seek to optimise and co-ordinate at strategic, tactical and operational levels.
- Changing Perspective on Funding and Finance – service implementation opens up opportunities for new, multiple sources of funding, and ensures that the whole life cycle costs of the service are taken into account, not just initial capital costs.
- Data and Information Management – the availability of high quality traffic and management information (not just data) is essential for the success of network operators. Information and data can be major assets and must follow international standards.

6 European added value

The reason to analyse the European Added Value of the new ITS deployment programme is to demonstrate that there is a rationale for taking action at EU level and that the instrument used adds value to what is done elsewhere (particular on national level). The focus is therefore not on achievement of the programme objectives (this is done elsewhere in the report), but on the particular role that the intervention by the EU plays. A basis condition for creating added value is that the intervention at EU level is **complementary to** and **coherent with** other, mainly national, interventions, so that it can generate synergy effects.

6.1 Complementary to and coherence with other programmes at EU level

A number of other programmes are running at EU level which also include Intelligent Transport Systems. The question should be raised whether these programmes do not already offer sufficient possibilities to achieve the general objectives (congestion, environment and safety) and the specific objectives (ITS deployments and ITS harmonisation). In the following these programmes are analysed.

6th Framework Programme

The main aim of the 6th Framework Programme is to create a European Research Area (ERA). This means that the 6th Framework Programme is aimed primarily at research, where small-scale implementation could be part of it. ITS is dealt with by various Directorate-Generals, like DG Research, DG Energy and Transport and DG Information Society and Media. Each DG has its own perspective, e.g. DG TREN focuses on Activities having an impact in the Short and Medium Term (SM), while DG RTD focuses on research activities having an impact in the Medium and Long Term (ML). DG Information Society is aiming at bringing new technologies closer to the market, whereas DG TREN is more interested in researching ITS applications which can help to realise the White Paper transport objectives.

It is clear that the ITS deployment programme is *not aiming at research*, but has as a clear objective to *deploy* ITS applications on the TERN (possibly extended with multimodal transport and some regional connections). CIVITAS projects constitute a specific part of FP6, i.e. focussed on clean urban transport. Through an integrated approach the so-called CIVITAS cities implement a range of measures, including ITS, aimed at promoting clean urban transport. As such CIVITAS is closer to deployment than other FP6 projects, but the focus is on cities exclusively, and not on the TERN. Furthermore it can be noted that the majority of 6th Framework Programme projects will be finished by the time the new ITS deployment programme will start (2007).

7th Framework Programme

The 7th Framework Programme will run from 2006 to 2010, and therefore overlaps with the period of the new ITS deployment programme (2007 to 2013). Similar to the 6th Framework Programme, the clear focus of the 7th Framework Programme is on research, aiming at the 'realisation of the European Research Area (ERA)'. A key innovation in the 7th Framework Programme will be the European Technology Platforms (TP), which are seen as a means to provide effective private partnerships between the research community, industry and policy makers. One of the specific aims of Technology Platforms is to facilitate/accelerate market penetration of new technologies, with technology demonstrations acting as an element to facilitate the removal of obstacles. The 7th framework and the new ITS Deployment Programme will thus be very much complementary, the first aimed at research and demonstrations, the second aimed at deployment of ITS.

eTEN Programme

eTEN promotes public interest services which give every citizen, enterprise and administration full opportunity to gain from the e-Society, bridging the digital divide which threatens to create an information underclass. Currently the main focuses of eTEN are applications and generic services in the areas of eGovernment, eHealth, eInclusion, eLearning and Trust and Confidence. For the new ITS Deployment Programme, eGovernment is the most relevant area. eGovernment is defined to include on-line public services, culture, tourism, transport and mobility, environment and services aimed at broadening participation in the democratic process. The Intermediate Evaluation[12] showed that only 5 projects were carried out in the area of transport and mobility. In terms of the project value chain from research to deployment, eTEN fills part of the gap between the research and full-scale deployment phases, since eTEN is the only Commission programme which is focused on the trans-European market validation and early deployment phases of eServices. In can be concluded that the eTEN Programme can be complementary to the new ITS Deployment Programme, but will have no overlap. Furthermore eTEN addresses transport and mobility marginally (around 5% of the available budget).

6.2 Complementary to and coherence with national initiatives

From interviews with (road) authorities, based on the completed questionnaires (see stakeholder annex) as well as literature review, it became apparent that a new ITS Deployment Programme will have the following value added compared to national initiatives in the field of ITS deployment:

- **To know each other**
  For the TERN managers participation in the TEMPO programme has resulted in a tight 'network of people', which has proven to be very valuable in cases of incidents

[12] Intermediate Evaluation of the eTEN (formerly TEN-Telecom) programme, Report 1: Final Report on Intermediate Evaluation, December 2004, Rambøll Management (Denmark) and IDATE (France).

with a cross-border impact (e.g. in the Pyrenees). If ITS deployment would have been carried out only on a national basis, such a European network of road manager would have never been realised. Operators were frequently unaware of their foreign counterparts, resulting in a lack of co-ordination between traffic management centres. A new TEMPO programme will allow this network to be kept alive and even to be extended to the EU27.
Co-operation in the TEMO Programme also promotes ***appropriate organisational frameworks***, i.e. organisational and legal issues such as access to public data by private service providers, and data exchange at the EU and regional levels. In order to accelerate the deployment of ITS services such frameworks are needed on a European level, since also many actors will be active at a European scale.

- **Harmonised services**
  The new ITS deployment programme could help to establish a database of ***traveller information services available*** by each mode, in each region and country at an EU level. This would be an important step in bringing these information sources together, and would help in linking them, e.g. through the provision on websites of hyperlinks to related sites, telephone numbers, teletext pages, etc. or the provision of regional 'directories' of transport information sources in the form of leaflets, newspaper columns, etc. Co-operation at an EU level can help to establish c***ommon standards for data collection*** and evaluation of traffic control services can help ***to define a common set of monitoring requirements in Europe.*** Co-operation in the planning and installation of monitoring infrastructure ***to guarantee cross-border continuity of service*** is an essential milestone for the European road network. This process has been initiated through the Euro-Regional projects. The role of the European Union in supporting these projects is therefore an important one. Through the TEMPO programme ***cross-border data exchange agreements and the continued installation of DATEX nodes*** throughout the Member States has been realised and there is a need to continue this work in the new ITS deployment programme, especially in the new Member States. The completion of a European network of traffic centres and DATEX nodes is a key milestone for the good functioning of the TERN.
  Harmonisation of national ITS system architectures is a first step towards convergence of ITS systems and services. There is still a lot of work to do on the development of ITS system architectures. Efforts towards European convergence should also be a ***stimulus to increase the market for ITS***. However, the challenge is to convince European industry that harmonised standards will improve their overall position in the market. Member States and traffic operators will need to play their part in applying the relevant standards as they become available.

- **European cross-border traffic management**
  A major European Added Value is the offering of ***continuous service levels across borders***. Users should expect to have ***consistent traffic management and traveller information*** on each side of internal borders. ***On-board equipment*** in one Member State should also work in other Member States and information services should be available in ***user's own language***. In addition pictogram and text strategies should be the same in all countries, or at least have a ***common 'look and feel'***. If necessary, and update of the Vienna Convention may be required. A ***good organisation and clear procedures*** are needed to implement cross-border management. Depending on the

period, there is a very high proportion of heavy goods vehicles and foreign vehicles on certain major route and cross-border closures due to weather conditions or unforeseen incidents are common in some areas, often resulting in serious disruption. The TEMPO programme has resulted in signed and implemented cross-border agreements, which probably would not have happened without the TEMPO programme. In addition, national and international service providers by agreement broadcast cross-border messages for long-distance and international drivers. Cross-border traffic management will also be of great importance for ***facilitating exchanges between Member States***.

- **Leverage function**
  Many Member States have indicated that the 10-50% funding provided by the EC has stimulated the earlier deployment of ITS. Without the 10 to 50% funding the level of deployment would have been lower than has been the case with the TEMPO programme. It is expected that this will also for the new ITS deployment programme, and certainly for the new Member States and potential new Member States.

- **Strong countries pulling the weaker countries**
  It is experienced in the current TEMPO programme that the ***weaker countries learn from the stronger countries***. In this respect 'impact evaluation', 'best practices' and 'lessons learnt' are important elements to transfer knowledge and experience from the stronger countries to the weaker countries. With the new and potentially new Member States it is foreseen that this European Added Value will also be realised in the new ITS deployment programme. Furthermore this will also strengthen cohesion between the EU Member States.

7 Future options and budget calculations

For the budget calculations for the new ITS deployment programme the current TEMPO programme has been taken as a starting point. This seems to be reasonable, since the complete budget of € 1.2 billion seems to be fully used by the TEMPO projects. Of the total € 1.2 billion the EU contribution amounts to € 192 million.

The original six-year budget approved by the Commission for each of the domains is given in table 7.1 below.

Table 7.1 Total original budget 2001-2006 (x mln €) by project and activity domain

	ARTS	CENTRICO	CORVETTE	SERTI	STREETWISE	VIKING	TOTAL	%
RMI	56.0	81.3	53.2	58.3	5.6	28.1	282.5	24%
TIC	31.4	81.2	34.6	25.8	6.8	52.8	232.6	19%
TMC	3.1	140.0	66.7	5.5	27.2	80.3	322.8	27%
TIS	65.2	43.9	23.9	57.2	9.8	27.9	227.9	19%
FFM	2.4	0.5	17.0	3.7	0.4	5.8	29.8	2%
EFC	-	10.7	0.2	0.9	0.6	0.8	13.2	1%
IEH	20.6	6.8	19.8	2.3	2.8	0.3	52.6	4%
HI	0.5	1.4	1.5	1.1	0.9	1.8	7.2	1%
PM	3.0	11.2	6.7	5.4	2.3	4.3	32.9	3%
TOTAL	182	377	223	160	56	202	1201	100%

In 2004 a budget cut was introduced for the TEMPO programme: for the last 3 years a reduction of 15% was applied, thus resulting in a reduction of the budget with € 90 million, and a reduction of the DG TREN funding with around € 15 million. On the other hand in 2004 the CONNECT project was added to the six already existing Euro-Regional projects. The CONNECT budget is € 120 million[13].

As can be seen from the table, the first four domains account for 90% of the budget. The programme is designed to provide appropriate levels of traffic monitoring infrastructure on the whole of the TERN to provide the necessary information on the traffic and road conditions. The network of linked Traffic Control Centres collect, analyse and manage the monitoring data. Appropriate traffic management systems use the traffic information to make informed decisions on strategies and systems for managing the traffic. Information is disseminated by means of the Traveller Information Services to improve

[13] It should be noted that the CONNECT budget does not fall under the MIP funding, but comes from another DG TREN budget. As such, the CONNECT budget should be approved on an annual basis. The figure mentioned is the budget estimated for the period 2004-2007.

individual traveller decisions. These systems and services form the basis of the ITS deployment programme.

In order to calculate the budget for the new ITS Deployment Programme those factors have to be identified that will influence the required budget:

- New Member States since TEMPO
- Increase in road network and car ownership
- Duration of the programme
- Inflation
- ITS infrastructure already deployed
- Different level of intervention
- Extension from TERN to TERN+
- Extension to multimodality
- New topics/domains.

New Member States

The original TEMPO programme included 14 Member States, of the EU15 only Greece did not participate. Through the CONNECT project five new countries were added, i.e. Poland, Czech Republic, Slovakia, Hungary and Slovenia, bringing the total number of involved countries to 19.
For the new ITS deployment programme it is expected that another 9 countries will participate, bringing the total to 28:

- Greece
- Estonia
- Latvia
- Lithuania
- Cyprus
- Malta
- Bulgaria
- Rumania
- Croatia.

Assuming that the current TEMPO budget is a good starting point, the following calculation can be made (see table 7.2 and 7.3)

- For the EU15, for a total of 273,272 kilometres of highway, main and national road the total budget is € 1.18 billion, which is € 4,323 per kilometre. Applying this to the total network of the EU28 results in a total budget of € 1.67 billion.
- For the EU15, in 2002 there were 186 million cars, implying an ITS budget of € 6.36 per car. Applying this figure to the number of cars foreseen for the EU28 in 2010 (215 million), a budget results of € 1.63 billion.

Table 7.2 Budget calculated for ITS deployment in EU28 based on network length

	EU15	EU28
Budget	€ 1,181 mln	€ 1,667 mln
Km network*)	273,272	385,701
Budget/km	€ 4,323	€ 4,323

*) highway, main or national road

Table 7.3 Budget calculated for ITS deployment in EU28 based on number of cars in 2010

	EU15	EU28
budget	€ 1,181 mln	€ 1,626 mln
Cars in 2002	185.8 mln	214.7 mln
Budget/car	€ 6.36	€ 6.36
Cars in 2010	218.0 mln	255.8 mln

The two calculations are very close, even though very different ratios have been applied. The average of the two calculations is € 1.65 billion.

Increase in network and increase in car ownership

Both aspects have been covered in the previous section. With respect to the network only the increase as a result of new Member States has been included. With respect to the car ownership both the increase as a result of new Member States has been included as well as the increase as a result of 'autonomous' growth of car ownership in all Member States (on average 2% per year).

Duration of the programme

The current programme has a duration of six years, while the new ITS deployment programme will have a duration of seven years. Taking the current TEMPO programme as a basis, this will automatically increase the required budget with 16.7%.

Correction for inflation

The buying power of one Euro in year T is higher than one Euro in year T+1. On average this inflation is around 2% in the EU25. Applying this to the current TEMPO budget, this means that the required budget needs an additional increase of 12.63% to compensate for the inflation over 6 years.

The combined impact of duration of the programme and correction for inflation is shown in table 7.4, using the previously calculated budget for the EU28 as a basis.

Table 7.4 Budget calculated for ITS deployment in EU28 taking into account a longer duration of the programme and inflation correction

	EU15	EU28
Budget	€ 1,181 mln	€ 1,647 mln
Additional budget required for longer duration		16.7%
Additional budget required to compensate for inflation		12.6%
Budget for programme 2007 - 2013		€ 2,164 mln

ITS infrastructure already deployed

So far the calculated budget has been increased due to expansion of the geographic scope, growth of car ownership, the longer duration of the new programme and correction for inflation.

However, it can also be argued that already a certain amount of basic ITS infrastructure has been implemented. This especially applies to Road Monitoring Infrastructure, Traffic Control Centres and Traffic Information Centres and the exchange of data between them. Since this infrastructure is already available to a large extent, a reduced budget is required for this infrastructure in the future compared to the current programme. Therefore an overall reduction of the budget with an (arbitrary) 30% is applied to all countries in the current TEMPO programme, with two exceptions:

- it does not apply to the New Member States of the CONNECT project, i.e. Poland, Czech Republic, Slovakia, Hungary and Slovenia;
- only 15% reduction is applied to Ireland and 22,5% to the UK due to the fact that the STREETWISE project has a relatively low budget compared to the other ER projects (ARTS, CENTRICO, CORVETTE, SERTI and VIKING).

As a result, the required budget for 2007 – 2013 is reduced by 21% to € 1.71 billion. This is shown in table 7.5.

Table 7.5 calculated for ITS deployment in EU28 taking into account already existing ITS infrastructure

	EU28
Budget for programme 2007 – 2013	€ 2,164 mln
Reduction for BE, DK, DE, ES, FR, IT, LU, NL, AT, PT, FI, SE	30%
Reduction for UK	22,5%
Reduction for IE	15%
Budget for programme 2007 – 2013, taking into account already existing ITS infrastructure	€ 1,709 mln

Different levels of intervention.

In the current TEMPO programme the level of funding is 10% for works and 50% for studies. It was indicated that many stakeholders are in favour of a higher percentage of funding for works and a lower percentage of funding for studies. In order to calculate the impact of a higher level of EC support for works, 4 scenarios have been defined, of which the results are shown in table 7.6.

Table 7.6 Impact of different levels of funding on overall funding by EC

	Base case	Option 1: higher level of funding with equal share of works	Option 2: higher level of funding with higher share of works	Option 3: higher level of funding with lower share of works
Overall budget for EU28	€ 1,709 mln	€ 1,709 mln	€ 1,709 mln	€ 1,709 mln
Percentage works	84.5%	84.5%	90.0%	75%
Percentage studies	15.5%	15.5%	10.0%	25.0%
Funding (%) of works	10.0%	15%	15%	15%
Funding (%) of studies	50.0%	35%	35%	35%
EC funding for EU28	€ 277 mln	€ 309 mln	€ 291 mln	€ 342 mln
EC funding as percentage of overall budget for EU28	16.2%	18.1%	17.0%	20.0%

Base case: The base case assumes the same funding principles as in the current TEMPO programme. If also the share of works (around 85%) and studies (15%) remains the same, the EC funding for the new ITS deployment programme for the EU28 would be € 277 mln, i.e. 16.2%.

Option 1: If the funding for works is increased to 15%, while at the same time reducing the funding for studies to 35%, and if the share of works and studies remains the same, then the EC funding for the EU28 would be € 309 mln, i.e. 18.1%.

Option 2: If the funding for works is increased to 15%, while at the same time reducing the funding for studies to 35%, and as a result the share of works increases to 90% (thus reducing the share of studies to 10%), then the EC funding for the EU28 would be € 291 mln, which is 17%. In this case the higher percentage of funding for works results in relatively more works, which seems logical.

Option 3: If the funding for works is increased to 15%, while at the same time reducing the funding for studies to 35%, but the share of works decreases to 75% (thus increasing the share of studies to 25%), then the EC funding for the EU28 would be € 342 mln, which is 20%. This however does not seem to be a likely scenario.

It can be concluded that, as an incentive for more works and less studies, an increase in the level of funding for works to 15%, while at the same time reducing the level of funding for studies to 35%, will result in only a slightly higher EC funding (17.0%) than in the base-case scenario (16.2%). Therefore in the remainder of this chapter only the base case and option 2 will be worked out in more detail with respect to extension of the scope of a new ITS deployment programme.

Extension from TERN to TERN+

One of the intervention strategies is to widen the scope from TERN to TERN+, i.e. including ITS deployment on regional/urban roads in those cases where strong interaction with the TERN are evident and clear European Added Value can be shown (e.g. best practice exchange). It is evident that this will allow for a wider range of projects. If the same level of ITS deployment will be maintained as in the current programme, extension to TERN+ will require an additional amount of budget, and thus of EC funding. For this purpose it is proposed to increase the budget with an additional 10-30%.

Extension towards multimodality

One other intervention strategy is to put more emphasis on multimodality. Again it is clear that this will increase the budget of the programme and thus the required funding of the EC. However, the increase in budget is expected to be lower than the increase from TERN to TERN+. An additional 10-20% seems to be reasonable.

New topics/domains

At this stage it is not clear yet whether new topics will be added to a new ITS deployment programme, but the stakeholder consultation has resulted in at least the following topics that should be reconsidered[14] for a new ITS deployment programme:

- Electronic Fee Collection

[14] These domains were incorporated in the initial TEMPO programme, but since only a very small part of the budget was used for these topics, at a later stage these domains were skipped from the programme.

- Incident and Emergency Handling
- Security (especially with respect to tunnels).

Each new topic/domain will increase the need for budget and funding, unless these new topics/domains go at the expense of other domains, which is not likely to happen. This means that additional budget and funding will be required if new topics are dealt with in the new ITS deployment programme. For calculation purposes an estimate between 5% and 20% is taken.

Adding these new deployment areas to the budget calculations results in a table showing the budget and funding by the EC for six options, ranging from full extension with TERN+, multimodality and new topics to extension with new topics only. This is shown in table 7.7.

Table 7.7 Impact of minimum extended scope of the programme on overall budget and funding by EC

	Minimum		Maximum		Average		Only TERN+		Only MM		Only new topics	
	%	Mln €	%	Mln €	%	Mln €	%	Mln €	%	Mln €	%	Mln €
Overall budget for EU28		1,709		1,709		1,709		1,709		1,709		1,709
Extra budget for TERN+	20%	342	30%	513	25%	342	25%	342		0		0
Extra budget for multimodality	10%	171	20%	342	15%	171		0	15%	171		0
Extra budget for new topics	5%	85	20%	342	12.5%	85		0		0	12.5%	85
Overall extended budget EU28		2,307		2,905		2,606		2,136		1,965		1,922
EC funding for EU28:												
- base case (10%/50% funding, *equal* share of works)		374		471		422		346		318		311
- option 2 (15%/35% funding, *higher* share of works)		392		494		443		363		334		327

Table 7.7 shows that in order to be able to extend the scope of the programme to TERN+, multimodality and new topics, additional budget is required ranging from nearly 600 for the minimum option up to € 1,200 million for the maximum option. On average the overall required budget for the extended scope will be € 2,606 million, which requires EU funding equal to € 422 million (base case) or € 443 million (option 2).
If the scope of a new programme is only extended with the TERN+, the budget will increase with € 432 million (average). If the programme is only extended with multimodality, the budget will increase with around € 171 million (average), while only adding new topics will result in an increase of the required budget with € 85 million.

Other considerations

In addition to the previous considerations, the following remarks should be made:

- There is a general tendency to increase the national budgets for ITS deployment. E.g. the Irish government has tripled the budget for ITS deployment for the coming years. As a consequence also the funding by the EC should be increased to keep pace with the national budgets and thus to be able to influence the ITS deployment at a sufficient level.
- The EC funding of the TEMPO programme (€ 192 million) is approximately 5% of the total TEN-T funding by the EC (€ 4 billion). For the new MIP (2007-2013) the

request for funding is around € 20 billion. Taking again 5% of this budget would result in a ITS deployment programme funding by the EC for the period 2007-2013 of around € 1 billion. The bottom-up approach presented in this chapter results in a much lower EC-funding request, ranging from € 277 million to € 581 million.

Conclusion on budget calculation

In this chapter a budget calculation has been presented of a new ITS deployment programme, using the budget of the current ITS deployment as a starting point.
The extension of the geographic scope from EU15 to EU28 requires an additional € 450 million. Extended duration and inflation adds another € 517 million. Since already part of the ITS infrastructure has been realised, € 455 million can be deducted, especially from the 'old' Member States. This would bring the budget on a total of € 1.7 billion.
Extension with new topics deployment areas (TERN+, multimodality, new topics) would increase the budget with € 600 million (minimum) to € 1,200 million, bringing the total ITS deployment budget to € 2.3 billion or even € 2.9 billion.

If the financing mechanism (10% funding for works, 50% for studies) remains the same, the required EC funding would be in the range of € 277 – 470 million.

If the financing mechanism is changed to 15% for works and 35% for studies, leaving the share of works vs. studies the same, the required EC funding would be in the range of € 309-526 million.

If the financing mechanism is changed to 15% for works and 35% for studies, resulting in a shift to more works (90%) and less studies (10%), the required EC funding would be in the range of € 291-494 million.

8 Impact assessment and results

In chapter 4 a first assessment has been made through the presentation of various intervention strategies and their effectiveness with respect to the general and specific objectives. A conclusion from this analysis was that only the following strategies concerning the scope of the programme would be subject of further evaluation:

- The basic TERN strategy
- The basic TERN+ strategy and
- The TERN+ & MM strategy

In this chapter the impacts of a new ITS deployment programme will be assessed in more detail for the three delivery mechanisms shown above.

The Impact Assessment Guidelines (June 2005) distinguish four groups of impacts: economic, administrative costs, environmental and social impacts. For the impact assessment of a new ITS deployment programme the following impacts are relevant:

- **Economic impacts:**
  - ✓ Influence the costs of production factors
  - ✓ Impact on enlargement countries
- **Environmental impacts:**
  - ✓ Air quality
  - ✓ Mobility
  - ✓ Increase/decrease consumption of energy (renewable or non-renewable resources)
  - ✓ Increase/decrease the demand for transport or influence its modal split
  - ✓ Increase/decrease vehicle emissions (among others greenhouse gasses)
- **Social impacts**
  - ✓ Affect the health of the population including life expectancy, mortality, morbidity.

Although grouped differently, these impacts match rather well with the general objectives of a new ITS deployment programme, i.e. reduce congestion, improve environment and improve traffic safety. The specific objectives of ITS implementation and ITS harmonisation are not mentioned by the guidelines, but will also be taken into account in this impact assessment.

In the following section the impacts of a wide range of ITS applications relevant to a new ITS deployment programme are presented, thus providing a good overview of the impact of ITS applications on congestion, environment and traffic safety. In section 8.2 the impact of a new ITS deployment programme on the specific objectives will be presented. Section 8.3 deals with the assessment of three remaining intervention strategies. Finally

in section 8.4 conclusions will be drawn with respect to the impact assessment of the three intervention strategies.

8.1 A qualitative elaboration on the impacts of ITS deployment

We define that ITS are all measures that influence traffic and transport using ICT in a dynamic way. As the "Policy White Paper"[15] stated and predicted, a large part of the people's traffic and the goods transport is going on the roads in Europe. The transport volume and performance has increased enormously in the last decades for in road, aviation and international maritime transport whereas the growth of rail and inland waterway sector has been essentially lower, and the strong growth, especially in road traffic and transport will continue. The economic growth and the technology are obviously responsible in a large scale for that.

The running ITS programme has advanced the technology in transport essentially. In reality, it is rather difficult to estimate these improvements precisely.
The increase on the road traffic and transport is not only successful for the society and the economy, but causes serious problems, especially in the fields of

- capacity and efficiency of the network,
- traffic safety, and
- environment.

One of the most important targets of the present ITS programme is to improve this situation, that means, to reduce the problems named above in an essential way.
So, the next chapter 1.2 is dealing with the "Degree of Performance".

"Degree of Performance"

ITS deployment has to solve several objectives which founded by the EU policy and the problems caused by the (increase of) traffic. Generally they can be defined as:

- capacity and efficiency of the network (especially reduction of congestion)
- traffic safety,
- environmental performance and sustainability,
- interoperability and
- harmonisation.

Generally it is difficult to detect which objectives are supported by different ITS measures, in the majority of the cases the impacts of the ITS-measures enhance more than one objectives. Nevertheless there is the attempt to characterize the single objectives and their interaction with ITS measures or bundles of measures.

Capacity and efficiency of the network

The improvement of the capacity and the efficiency of the network is one of the most important issues today and in the future because of the tremendously increasing traffic volumes (on all modes).

[15] White Paper, European Transport Policy for 2010 – Time to Decide.

By now there are a lot of measures ITS measures which have a direct impact on the capacity and efficiency of the network in the TEMPO-Programme as well as elsewhere. Variable traffic signs, re-routing systems, ramp surveillance and many other measures are implemented to have an direct impact on the traffic itself and try to improve the management.

The increase of capacity and efficiency of the network – and as a consequence the reduction of congestions are the main output. The efficiency of these measures is in some cases significant. There are estimations that the impact of ITS measure can reduce congestion in a essential way[16] .
But there are also ITS measures which have an indirect impact on the capacity and efficiency of the network, such as pre-trip information systems, navigation systems etc.

Traffic safety

Following for example the Road Safety Action Plan set by the European Commission traffic safety is one of the major issues in the next years (e.g. reduction of fatalities in road traffic by half until 2010).
Automatic speed enforcement (e.g. section control, ISA etc.), variable warning systems, guidance and steering assistances systems are only a few of a wide range of ITS measures which improve traffic safety actively. The implemented ITS- measures are infrastructure based as well as vehicle based.
Several ITS services aim to minimize the risk of crash occurrence. This goal area focuses on reducing the number of crashes, and lessening the probability of a fatality should a crash occur. Surrogate measures are also used, including vehicle speeds, speed variability, or changes in the number of violations of traffic safety laws.

As an example automatic speed enforcement cameras along segments of Norwegian highways which met certain warrants regarding traffic speeds and accident rates prior to the deployment of cameras found a 26% decline in injury accidents[17] .

Environmental performance and sustainability

Dwindling resources on the one hand and environmental destruction on the other hand in relation to the ongoing increase of need for transport is already and will change the “face of transport” in the future. The main positive effect of this development is an increase of productivity per spend resource caused by the changes of processes in design, production, use, logistics or recycling.
In most cases, environmental benefits can only be estimated by the use of analysis and simulation. The problems related to regional measurement include the small impact of individual projects and large numbers of exogenous variables including weather, contributions from non-mobile sources, air pollution drifting into an area from other regions, as well as the time-evolving nature of ozone pollution. Studies generally show positive impacts on the environment. These impacts result from smoother and more efficient flows in the transportation system which cause savings of fuel.[18] For example a

[16] BMVIT: Austrian Telematik Plan. Vienna 2005
[17] Elvik, R. "Effects on Accidents of Automatic Speed Enforcement in Norway." Transportation Research Record No. 1595. 1997.
[18] United States Department of Transportation, Intelligent Transportation Systems - Benefits and Costs, 2003 Update

priority system implemented on a Helsinki bus line indicated reductions of HC, CO, and NO_x, as well as a 3.6% reduction in fuel consumption.[19]

Harmonisation and Interoperability

For the Single European Market harmonisation of

- legal documents
- technical requirements,
- social regulations and
- a harmonised proceeding of their enforcement

are the basis for perfect competition. Harmonised guidelines are also very important to guarantee the interoperability of systems within the European Union and prevent for future investments on interfaces, connectivity features etc.

ITS deployment does not have an effect on the harmonisation itself, but harmonisation is the basis for an effective and efficient ITS deployment. So there is the need for directives and regulations which ensure harmonised basics for ITS deployment.

The fact of the former development of various different systems for transportation systems is historically based. By now we have to deal with the consequences like difficult connectivity, bad technical matches, commercial interests of multinational companies etc. As ITS activities developed the ITS measures became one of most efficient and successful factors to overcome some of these obstacles and provide the interoperability of the different systems. The definition of interfaces (and their standardisation) has accelerated the proceedings in transport a lot, examples are consignment notes, signalling systems etc.

In this context deployment of the European Rail Traffic Management System (ERTMS) developed since the early 1990s under the Community framework-programmes of research marks a considerable step forward in network and system interoperability. Although wagons and a large proportion of passenger carriages have, for decades, been technically capable of travelling from Sicily to Scandinavia, the same cannot be said of locomotives, which suffer numerous constraints concerning electrification and signalling systems. The benefits of interoperability are estimated at 30% of the cost of rolling stock.

8.2 A quantitative elaboration on the impacts of ITS deployment

Across Europe and the USA a range of intelligent transport systems and services has been deployed over the years. In a number of cases an assessment of the impacts has been carried out, sometimes only qualitatively, in other cases also quantitatively.

Before going into detail, a few remarks have to be made about the assessment of impacts of ITS applications:

[19] Lehtonen and Kulmala. "The Benefits of a Pilot Implementation of Public Transport Signal Priorities and Real-Time Passenger Information." Paper presented at the 81st Annual Meeting of the Transportation Research Board. Washington, DC. 13-17 January 2002.

The evaluation results of ITS applications might be 'too positive' because evaluators might have an interest in the outcomes of the evaluation. As a result benefits might be evaluated too generous while costs are underestimated, e.g. by only taking into account investment costs, and not considering current costs and financing costs.

- For the same reasons there might be a tendency not to include the negative impacts, such as attracting new traffic, social exclusion, etc.
- Evaluations often consider a limited number of impacts (e.g. capacity, environmental, safety), but other aspects a left out, such as solidarity, democracy, international, etc.

In this section the impacts of a wide range of ITS applications is described, with the aim to come to a rough indication of the impact of ITS on a series of indicators. The assessment is based on an extensive literature survey, both inside and outside the current ITS deployment programme. The ITS applications have been grouped (sometimes rather arbitrary) under the following categories:

- Traffic Management & Control;
- Traveller Information (road)
- Traveller Information (multimodal);

Traffic management

Minnesota Ramp Metering System Evaluation (2001)

A study on ramp metering in the Twin Cities (US) found a 22% decrease in freeway travel times with meters, which more than offset ramp delay reduction during the no-ramp meter test period. Differential benefits were demarked to two classes of commuters (short distance and long distance). The benefits to short-distance commuters were often negative when weighed against the additional queuing time. There was, however, a decrease in fuel consumption without ramp metering, thus revealing a trade-off inherent in this system. Accounting for the cost of the entire congestion management system (including changeable message signs, traveller information, and other components), the estimated benefit-cost ratio for ramp metering was 5:1.
Assessing the benefits and costs of ITS, making the business case for ITS investments, Edited by David Gillen and David Levinson, Kluwer Academic Publishers, 2004.

Ramp metering in the Netherlands

A 13% reduction of travel time losses has been measured on the A12. Average speed on the highway A10 increased from 35 to 55 km/h. On the A20 travel times were reduced by 6% and on the A29 of 10%. Impacts on traffic safety are not clear: on the one hand it will lead to fewer accidents on the highway, but on the other hand the number of accidents at the ramp metering spot will increase. There is a positive effect on air quality, energy consumption and noise due to a more constant flow of traffic.
A similar impact can be seen by entry and exit-control measures, e.g. better synchronisation of traffic lights at the connection of the ramp with the secondary road. The main impacts will be realised on the highways (largest volume), because it will reduce the chance on traffic jams on the highway as a result of (partially) blocking the highway at the exit. In the Netherlands access control is estimated to reduce rear end collisions with 25%.

Investment costs of ramp metering vary between € 230,000 and € 700,000, with exploitation costs around € 3,000 per year.
Effects and costs of accessibility measures (final report), Directorate General Rijkswaterstaat, AVV, October 2002.

Peak hour lanes

Peak hour lanes are only possible because ITS systems can be used to monitor speed, accidents, misuse, signalling, etc. Various evaluation studies on peak hour lanes in the Netherlands (A2, A4, A28) show that traffic delays can be reduced through increased capacity (from 32% congested driving to 17% congested driving). In addition peak hour lanes attract more traffic to peak hour times (+1%) and reduces traffic on the secondary road network. The number of traffic accidents in peak hour time can be reduced by 10-50%, depending on complexity of the design, as a result of a reduction of rear-end collisions. Peak hour lanes also have a positive impact on air quality, energy consumption and noise (more constant flow). It should be noted that these impacts cannot be attributed to ITS alone, but to the combination of expanding road capacity (peak hour lanes) with ITS. Costs per kilometre vary from € 0.25 million to € 1.6 million per kilometre including ITS systems. Annual costs are around € 26,000 per year.
In Italy peak hour lanes (third lanes) have been realised by the Società delle Autostrada di Venezia e Padova S.p.A., which resulted in a reduction of accidents by around 50%, and an increase in flow speed, especially in summer (+15 km/h).
Effects and costs of accessibility measures (final report), Directorate General Rijkswaterstaat, AVV, October 2002.
Evaluation of ITS within CORVETTE and SERTI, 2 case studies in CORVETTE, Rome, 24 June 2005.

Automatic traffic jam detection

Automatic traffic jam detection linked to variable speed signs will be able to improve the capacity with 5%, partly caused by a reduction of accidents (15-25%), the number of cars involved in accidents and the reduction of 'traffic waves'.
Preventive speed limits is a similar application. A test on the Dutch A2 did not result in a higher capacity, but traffic flows have become more constant.
Effects and costs of accessibility measures (final report), Directorate General Rijkswaterstaat, AVV, October 2002.

Dynamic restrictions for overtaking by trucks

Dynamic restrictions for overtaking by trucks could increase road capacity by around 2%. Intensity could increase by 2-5% (A28 in the Netherlands) or 5-10% (A50 in the Netherlands). Average speed could increase with 1-2%.
Effects and costs of accessibility measures (final report), Directorate General Rijkswaterstaat, AVV, October 2002.

M25 Controlled Motorway

The Highways Agency (HA) implemented a Controlled Motorway scheme (Incident Detection, Variable Speed Limits, Speeding Detection) on the M25 in August 1995, a dual 4-lane carriageway. The scheme was extended, in January 2002, to include the section of Motorway between J15 and J16. By introducing mandatory variable speed limits and the means to enforce those limits, the M25 Controlled Motorway scheme aims to demonstrate improvements in driver behaviour, particularly adherence to speed limits. A sustained reduction in injury accidents of 28% was found, compared to previous year (without the system in place). Motorists were found to be more inclined to keep to their lane, as well as to keep to the inside lane (flow rate increased by 15%) and to maintain proper separation distances. A survey (1600 drivers) found that 60% believed the system had resulted in improvements. Just under 60% thought the speed limits were appropriate for the conditions (only 25% disagreed), and 84% said they complied with the limits posted. Over two-thirds wanted the system extended to cover other areas of the M25 or to other congested parts of the motorway network.
For the first section of M25 implementation the costs were £13.5m (£560,000 per km) capital cost (some equipment was already available) and £1.7m per year (£70,000 per year per km) revenue costs (all figures in 1995/96 prices).
Understanding the Benefits and Costs of Intelligent Transport Systems, version 1.0, Department for Transport, February 2005.

Speed control A7 (France)

Speed control, i.e. activating 110 or 90 km/h instead of 130 km/h, on the A7 between Orange and Valence in August 2004 resulted in 48% reduction of accidents and 16% reduction of congestion. In total 350 km of traffic jam was avoided, resulting in a saving of € 1.2 million.
Euro-regional projects: Results and perspectives at the end of 2004, July 2005.

Interdistance

An evaluation of a system monitoring average speeds and distance between vehicles, and showing excessive speed or too short distance on a VMS including license plate number has resulted in a drop of speeding from 60 to 28% in 8 months time. 93% of the people were in favour of the experiment and 97% thought that it was an educational process.
Euro-regional projects: Results and perspectives at the end of 2004, July 2005.

Traffic Management Cooperation at the French Spanish border

During the winter of 2003, French actors asked the Catalan authorities to stop HGVs from crossing the border, in order to avoid blocking the A9 in France. Closure of the road was achieved within 30 minutes, which normally would have taken hours. Around 5000 HGVs were stocked in Catalonia for about 12 hours. Assuming that a half-day closing of the A9 motorway will cost € 150,000, this procedure has saved € 1.8 million.
Euro-regional projects: Results and perspectives at the end of 2004, July 2005.

Cross border Management between the Netherlands and Belgium/Germany

Between Eindhoven and Köln there are two different routes with almost equal travel distance and travel time. VMSs have been installed at the decision points in order to be able to provide alternative route directions in case of disturbances. A simulation study showed that, given the actual number of 40 reroutes and a percentage of 3,5% of influenced traffic will result in a saving of € 290.000 per year, including secondary effects. Compared with the pilot costs of € 328,000 the measures proves to be very efficient.
Between Rotterdam and Antwerp a similar system was implemented. An assessment of 23 incidents resulted in the conclusion that CBM improved the traffic flow quality. During the incidents in the direction of Antwerp about 5-8% of the traffic followed the advice given, which means that about 150-200 vehicle hours of delay was saved. Based on the same assumptions as for the corridor Eindhoven-Köln and a yearly number of 50 reroutings, the savings can sum up to € 149,000 per year, while the costs equalled € 450,000. A survey among users revealed that they found the information clear, understandable and useful.
Centrico, February 2004

Dangerous goods monitoring

In order to increase tunnel safety, in 2004 from the French Riviera to the Italian border a Dangerous Goods Monitoring System has been implemented using TIS toll badges. Through this system the tunnel operator knows precisely and in real-time the exact nature (danger code, UNO code) and the precise position of the Dangerous Goods Transport in the tunnel, which will reduce the risk of accidents and will improve rescue teams capacity and safety. 100% of the vehicles were detected in the test phases in situ with the transport companies (1191 transits).
Impacts not known.
Euro-regional projects: Results and perspectives at the end of 2004, July 2005.

eCall

In the SEiSS report an economic evaluation has been carried out concerning eCall. Based on accident statistics for the EU25, it has been calculated that eCall could save annually between 2,500 and 7,500 lives and between 30,000 and 45,000 severe injuries. Depending on the calculations and assumptions made, this has a total benefit worth between 5,700 million and 21,900 million annually. In addition, eCall could reduce congestion costs by € 170 – 470 million. The total costs (onboard, investment, training) of eCall are estimated between € 3,030 and € 4,550 million. As a result the benefit/cost-ratio of eCall is between 1.3 and 8.5. Although this is a very wide range, in all cases the benefit/cost-ratio is higher than 1.
Socio Economic Impact Intelligent Safety Systems (SEiSS) final report, VDI/VDE Innovation + Technik GmbH, Institute for Transport Economics University of Cologne, January 2005.

Adaptive Cruise Control

Adaptive Cruise Control (ACC) will enable the vehicle to maintain a driver-defined distance from the preceding vehicle while driving within a maximum speed limit – again

set by the driver. ACC could help to reduce the number of fatalities by 332, the number of severely injured by 2,677 and the number of slight injuries by 6,654 in 2020. The monetary assessment of ACC safety impacts for the EU25 leads to considerable benefits, ranging from € 490 million in year 2010 to € 990 million in year 2020. The total system costs are estimated to be € 540 million in 2010 and € 840 million in 2020. As a result the benefit/cost-ratio is 0.9 for 2010 and 1.2 for 2020. This is mainly the result of an increased 'installed base' and lower per unit costs.
Socio Economic Impact Intelligent Safety Systems (SEiSS) final report, VDI/VDE Innovation + Technik GmbH, Institute for Transport Economics University of Cologne, January 2005.

Lane Departure Warning and Lane Change Assistance

Lane Departure Warning (LDW) and Lane Change Assistance (LCA) are expected to result in a total saving (accidents, congestion) of € 173 million in 2010 and € 1,529 in 2020. The accompanying costs are € 86 and € 735 million, which results in a benefit/cost-ratio of 2.0 and 2.1 respectively.
Socio Economic Impact Intelligent Safety Systems (SEiSS) final report, VDI/VDE Innovation + Technik GmbH, Institute for Transport Economics University of Cologne, January 2005.

Freight service portal

The freight service portal provides real-time traffic information on the north-western part of France as well as multimodal information on ferries, the port, etc. and other freight related services (maps, parking space availability, etc.). Every month 1,500-3,000 visitors used the 8 internet terminals of the SAPN network.
Impacts not known.
Euro-regional projects: Results and perspectives at the end of 2004, July 2005.

Detroit Freeway Corridor

This study used simulation techniques to evaluate the impacts of ITS on the John C. Lodge freeway in Detroit, Michigan. The study was able to discount freeway bias (driver preference for freeways) and analyze the system and facility level benefits of ITS currently deployed in the corridor.
ITS in the corridor consisted of internet-based pre-trip traveller information systems (ATIS), highway advisory radio (HAR), ramp metering, and variable message signs (VMS). The simulation results demonstrated how existing ITS systems were beneficial to corridor capacity. The existing ITS technologies in the corridor (ATIS, HAR, ramp metering, and VMS) increased average vehicle speed up to 5.4 miles per hour (mph), decreased average trip time by approximately 4.6 minutes, and reduced commuter delay by as much as 22%.
Ramp metering was most effective at reducing congestion during major incidents, however, the study questioned its use in the absence of incidents or during minor incidents.
Prepared for the FHWA USDOT by Mitretek Systems, (DTFH61-00-C-0001). July 2001.

Intelligent Transportation Infrastructure Program (ITIP) in Pittsburgh and Philadelphia, Pennsylvania

This study distributed website surveys and conducted telephone interviews to evaluate customer satisfaction with web-based traveller information services that supplied real-time traffic information. A complex network of microwave and acoustic vehicle sensors were deployed on major arterials and freeways in Pittsburgh and Philadelphia in order to collect and transmit real-time traffic data to a central computer database located at the National Transportation Data Centre (NTDC). According to the internet survey, 68% of users in Pittsburgh and 86% of users in Philadelphia changed their original travel route, while 47% of users in Pittsburgh and 66% of users in Philadelphia changed their original time of travel as a result of the traffic information. The effect on mode choice was less noticeable, 6% in Pittsburgh and 2% in Philadelphia changed their mode of transportation based on the information provided.

18% of internet respondents in Pittsburgh and 47% in Philadelphia felt Traffic.com helped decrease their commute time. However, 75% of respondents in Pittsburgh and 43% in Philadelphia felt their commute time remained about the same.

Less than 10% of internet respondents in Pittsburgh, and 27% in Philadelphia were willing to pay money for the traffic information.

Prepared for the USDOT by Battelle. 5 September 2002.

Real-Time Remote Speed Enforcement in Work Zones

This study examined the use of automated speed enforcement (ASE) to enable police officers to monitor work zones from remote locations, and not be endangered by limited lateral space, limited sight distance, and the presence of barriers.

Automated speed enforcement has been used extensively in Europe for a number of years. In 1978, ASE units were installed on a high-accident portion of the German autobahn. Following the installation of the ASE system, 85th percentile speeds dropped by 45 km/h (28 mph) (ITE Journal, Vol. 68, No. 6). The yearly number of accidents was also reduced after the system was installed.

A study in the Netherlands evaluated the effects of ASE when combined with variable message sign warnings (Transportation Research Record 1560). This study found that average speeds were reduced by 5 km/h (3 mph) and the 85th percentile speeds were reduced by 8 km/h (5 mph). The percent of vehicles speeding declined by 27 percent after the system was installed. Norway began using ASE in 1988 and now has units on 336 km (209 mi) of road (Transportation Research Record 1595). The number of injury accidents on the portions of road with the ASE systems declined an average of 20 percent, and the total number of accidents on these sections declined between 5 and 26 percent.

Canada and Australia have both used automated speed enforcement. In Ontario, a one-year ASE pilot program reduced the number of vehicles exceeding the speed limit by 50 percent. The number of vehicles travelling at more than 40 km/h (25 mph) over the speed limit was reduced by 74 percent. In Australia, the percent of traffic exceeding the speed threshold for enforcement fell from 10.8 percent to 2.4 percent after the ASE system was implemented (ITE Journal, Vol. 68, No. 6).

Paper presented at the 81st Transportation Research Board Annual Meeting, Washington, DC. 13-17 January 2002.

Emergency dispatching and guidance

Albuquerque Ambulance (New Mexico) uses a map-based computer-aided dispatch system that allows the dispatch to send ambulances the exact location of an emergency and guidance on how to get there. The company's efficiency has increased by 10-15%. In Minnesota, most of those surveyed about the Minnesota Guidestar's Smart Work Zone technology said the warning signs were accurate, useful, and gave them the information they needed. Construction workers also applaud the efforts.
ITS World. January 1997.

Traffic and Incident Management System

In Philadelphia, Pennsylvania, the Traffic and Incident Management System (TIMS) is helping traffic circumvent highway incidents and emergencies on I-95. TIMS reroutes vehicles immediately after an incident is detected, thus diluting traffic flow and decreasing the risk of second-hand pile-ups. TIMS has helped decrease freeway incidents by 40%, cut freeway closure time by 55%, and reduced the incident-severity rate by 8% since its implementation in 1993.
ITS World. January 1997.

Adverse Visibility Information System Evaluation (ADVISE): Interstate 215 Fog Warning System

During the 1995-2000 winter seasons, a technology known as the Adverse Visibility Information System Evaluation (ADVISE) was tested on a two-mile section of I-215 subject to recurring fog in Salt Lake City, Utah. The purpose of the system was to reduce the variation in road speeds and provide a more uniform traffic flow during fog. The system used four roadway visibility sensors, a central computer system, wireless communication devices, and two roadside dynamic message signs to communicate speed recommendations to freeway travellers. The results indicated the deployment was successful at promoting more uniform traffic flow during fog events. As a surrogate measure of safety, the improved uniform traffic flow indicated there was less risk for drivers travelling in recurring fog zones. The data showed that when recommended travel speeds were provided, the number of excessively slow drivers decreased. The ADVISE technology effectively reduced the average standard deviation of speed between vehicles by 22%. Prior to the deployment, the standard deviation was 9.5 mph. After the system was deployed and ADVISE messages were provided, the standard deviation decreased to 7.4 mph.
Prepared by the University of Utah for the Utah Department of Transportation, Report No. UT-02.12. Salt Lake City, UT: June 2003.

Weather-Related Motorist Warning Systems

This study investigates the effectiveness of an automated motorist warning system (AMWS) in the city of Ft. Lauderdale, Florida. The system evaluated warned motorists of the presence of wet pavement on a freeway ramp at an urban interchange. Comparing vehicle speed data from an evaluation period of 6 weeks prior to the activation of the AMWS and 9 weeks following the activation indicate a significant reduction of vehicle

speeds during wet pavement conditions. The evaluation determined that vehicle speeds were 10.2 mph lower during heavy rain and 4.6 mph lower during periods of light rain. *Paper presented at ITE 2000 Annual Meeting, Nashville, Tennessee, August 6-10, 2000.*

Traveller Information Services (road)

Variable message signs

Variable message signs that are used for route directions lead to an increase of road capacity of 3-5%. The use of the Coentunnel (Netherlands) increase with 9% when 'no delay' was shown, compared to the before-situation where the VMS was not yet available. At the Amsterdam Ring Road traffic jams were reduced by 20%, and traffic jams became shorter and resulted in less delay (from 32 to 11 minutes). At a later stage part of the impacts had disappeared. Users highly appreciate travel time information. In the Breda area traffic jam times were reduced by nearly 50%, travel time losses were reduced by nearly 80%, average vehicle speed increased with 6-10%.
Effects and costs of accessibility measures (final report), Directorate General Rijkswaterstaat, AVV, October 2002.

Travel time on VMS

Travel time forecasts have been applied on French highways. Evaluation studies have shown:

- High user satisfaction degree on reliable and quality information (90% in Rhone Valley during summer peak season)
- 40% of users having received the travel information time decided to stop on a lay-by, 10% decided to leave the motorway.
- 70% of the users interviewed considered that the information reflected the reality of the situation.
- During one incident on the A6 (France) travel time forecasts on the motorway and deviation itinerary allowed to shorten the jam period by more than 1 hour.

Euro-regional projects: Results and perspectives at the end of 2004, July 2005.

N7 Travel Time Scheme

The N7 Travel Time Scheme is a pilot traffic monitoring and motorist advisory system from Rathcoole to M50, a 10 km very busy stretch of road (N7).
Impacts not known.
Multimodal Travel Information Services in Streetwise, David Gott (UK Department for Transport) and Graeme Scott (IBI Group).

Info Traffic Radio

On 6,000 km of the French road network RDS services have been applied. User surveys have shown that:

- Traffic information on the 107.7 FM is considered reliable at 98%.
- 86% of the listeners plebiscite the broadcast
- The most listened to radio on the network is by far the 107.7 FM

- Two-third of the listeners chose it spontaneously 'to know if everything was going well' or 'on entering the motorway'.

Euro-regional projects: Results and perspectives at the end of 2004, July 2005.

Multilingual information service (RDS-TMC)

Between France, Spain and Italy information services are offered in real-time to road users, adapted to their locations and mother tongue, using the RDS-TMC technology. Evaluation has shown that users receive information on road safety in real-time (less than 5 minutes) and with a high level of reliability.
Impacts not known.
Euro-regional projects: Results and perspectives at the end of 2004, July 2005.

Quick warning

A quick warning system was deployed on the most critical parts of the SAPN network in France, considering the particular dense traffic conditions, often-difficult climatic conditions (fog) and the restricting geometric characteristics. The aim of the device is to inform drivers in real-time of traffic accidents through VMSs. Impacts are not known.
A similar idea was applied in the Companion project, to warn motorway users of an impending danger, using a lighting post system placed on the left-hand side guardrail of the carriageway. Analysed cases showed that light posts activations due to low visibility resulted in speed reduction from 0.4 to 13.6%. Comparing the Soave-Montebello section with the full Brescia-Padova motorway, 10.6% less accidents occurred. Under low visibility conditions, the number of accidents increased by 4.8%, but the number of vehicles involved per accident reduced by 28%.
Euro-regional projects: Results and perspectives at the end of 2004, July 2005.
Evaluation of ITS within CORVETTE and SERTI, 2 case studies in CORVETTE, Rome, 24 June 2005.

Advanced Traveller Information Services for Unfamiliar Urban Drivers

This study used the HOWLATE (Heuristic On-line Web-Linked Arrival Time Estimator) model to simulate traffic activity with and without traveller information. The HOWLATE system compared millions of simulated paired driving trials on a network of 169 arterial and freeway links in the Washington, DC metropolitan area. Baseline link travel times were obtained from an archive of travel time estimates reported by SmarTraveler.com, a traveller information website that provided link travel time updates every five minutes on weekdays between June and July of 2000.
Based on all simulated trips on the Washington, DC network, both ATIS users and the ATIS non-users were on time approximately 99% of the time. Drivers that used ATIS, however, significantly reduced the amount of time spent on early arrivals.
Using ATIS, unfamiliar drivers arrived at their destination within 15 minutes of the target arrival time 79% of the time. Without ATIS, unfamiliar drivers arrived within 15 minutes 42% of the time.
Paper presented at the 9th World Congress Conference, Chicago, IL. October 14-18, 2002.

StadtinfoKöln

StadtinfoKöln is an advanced transport and traffic information system in Cologne (Germany), consisting of a parking guidance system, alternative route suggestions, P+R via VMS and P+R information system. A total reduction of 0.5% of vehicle kilometres can be saved in the Cologne road network, of which 3.9% on Inner City roads and 1.9% on arterial roads. The total saving realised through StadtinfoKöln in 2000 amounts to approx. €8.5 million, of which 39% comes from time savings, 26% of vehicle operating costs and 20% of improving traffic safety costs in Cologne. Improving air quality and noise reduction amounts to 15% of the total benefits. The investment costs over the period 1985 to 1999 amounts to approx. €12 million, and additional annual operating costs are approx. € 400,000. As a result total annual costs (investment, operating, maintenance) of StadinfoKöln comes to € 1.3 million, thus resulting in a benefit/cost-ratio of 6.3.

StadtinfoKöln (city information Cologne) – economic assessment of advanced transport and traffic information systems, Institute for Transport Economics at the University of Cologne, Germany.

Traveller Information Services (multimodal)

The TravInfo Project, based on the Broad Area Surveys (1997, 2000), incident surveys (1998, 2000) and TravInfo Traveller Advisory Telephone System survey (1998, 2000, 2001).

Between 18-52% (depending on the mode and trip purpose) of trip-makers did not divert because of travel information. Unexpected delays significantly increased the route change propensity of automobile commuters and non-commuters. One-third to one-half of users who acquired travel information made changes in their travel decisions. Users that actively seek information via telephone or internet are more likely to change their travel behaviour than travellers who relied on radio and television, as expected. Few travellers changed to transit (public transport), despite the relatively good transit opportunities in the Bay Area, mainly because they perceived it to be inconvenient and more time-consuming than driving. The studies also revealed that non-commuting drivers changed their travel habits more than commuting drivers, perhaps reflecting the flexibility inherent in non-work trips.

For a hypothetical ATIS that provided (1) automatic notification of unexpected congestion on respondents' usual route, (2) estimated time of delay form unexpected congestion on respondents' usual route, (3) automatic alternate route planning around congestion, and (4) estimated travel time on respondents' usual route and on any planned alternate routes, 66% of the respondents sought travel information, and of these information seekers 71% were willing to pay for ATIS. The willing to pay for Advanced Traveller Information Services was on average $ 0,74 per call or $ 3,84 per month.

Assessing the benefits and costs of ITS, making the business case for ITS investments, Edited by David Gillen and David Levinson, Kluwer Academic Publishers, 2004.

Transport Direct

Transport Direct is an internet-based travel information and journey planning service for private and public transport. It covers the whole of Great Britain and all major modes.

Impacts not known.
Multimodal Travel Information Services in Streetwise, David Gott (UK Department for Transport) and Graeme Scott (IBI Group).

Leicester Star Trak (UK)

Star Trak is Leicester's Real Time Information system for buses. It was conceived in 1998 to deliver real time passenger information and to allow the monitoring of route and vehicle performance. In addition, modern Intelligent Transport System tools, such as intelligent signal priority for late running buses were installed.
Information is transmitted to the bus stops, can be retrieved through SMS or can be viewed through the Leicester Star Trak web site.
Selected routes have recorded a 20% increase in patronage since the introduction of Star Trak. It should be noted however that these routes may have had infrastructure improvements and new vehicles. Star-Trak has enhanced the quality of information at interchange points, though no specific integration benefits were reported. Users believed that bus services had increased in reliability (62%), reduced waiting times at stops (53%), waiting is more acceptable now (68%), they are 'more prepared to wait for a bus (67%) and they feel more secure (80%). The total capital costs are approximately £3,397,000 over 4 years, while revenue costs were approximately £90,000 per year.
Understanding the Benefits and Costs of Intelligent Transport Systems, version 1.0, Department for Transport, February 2005.

Winston-Salem Mobility Management

The Transit Authority in Winston-Salem, North Carolina, evaluated the effects of a computer-aided dispatch and scheduling system on the operation of a 17-bus fleet. During a 6-month period, the client list grew from 1,000 to 2,000 and vehicle miles per passenger-trip grew 5%. At the same time, operating expenses dropped 2% per passenger trip and 9% per vehicle mile. These productivity improvements occurred at the same time that other service improvements were incorporated. As a result, it is difficult to isolate the effects of the CAD system. These improvements included the institution of same day reservations, which grew to account for 10% of trips. Also noted was a decrease in passenger wait time of over 50%.
North Carolina State University, Civil Engineering Program: NC: 1995.

Table 8.1 Impact assessment for Traffic Management and Control applications and services

ITS application / service	Aver. speed	Travel time	Capacity	Chang to other mode	Air quality	Fuel consumption	Accidents	Speeding	Costs	Benefits	B/C ratio
Ramp metering USA		-22%									5
Ramp metering NL	+20 km/h (+50%)	-6 -13%			pos	pos					
Highway entry and exit control							-25%				
Peak hour lanes NL					pos	pos	-10% -50%				
Peak hour lanes IT	+15 km/h						-50%				
Automatic traffic jam detection			+5%				-15% -25%				
Dynamic restrictions for overtaking by trucks	+1% +2%		+2%								
M25 controlled motorway							-28%				
Speed control		-16%					-48%				
Interdistance								-50%			
Cross border TM cooperation Spain-France										1.8 mln	
Cross border TM cooperation NL – D									328,000	290,000 annual	
Cross border TM cooperation NL – B		150-200 h per incident							450,000 investment	149,000 annual	
eCall		-170 mln -470 mln					-6% -18%		3 – 4.5 bln	6-22 bln	1.3 – 8.5
Adaptive cruise control (2010 vs 2020)							pos		0.5- 0.8 bln	0.5 – 1 bln	0.9 – 1.2
LDWA and LCA (2010 vs 2020)									86-735 mln	173-1,529 mln	2
Detroit Freeway Corridor ITS	+9 km/h	-22%									
ITS in Pittsburg				6%							
Philadelphia				2%							
Speed enforcement in workzones (Europe)							-5% -26%	-50%			
Traffic Incident		Pos	+40%				-40%				

ITS application / service	Aver. speed	Travel time	Capacity	Chang to other mode	Air quality	Fuel consumption	Accidents	Speeding	Costs	Benefits	B/C ratio
Management System Fog warning USA Weather related mortorist warning system	 +22%	(55% less closing)						 -7 km/h -16 km/h			

Table 8.2 Impact assessment for Road Traveller information Services

ITS application / service	Aver. speed	Travel time	Capacity	Chang to other mode	Air quality	Fuel consumption	Accidents	Speeding	Costs	Benefits	B/C ratio
VMS routing information VMS travel time information Quick warning ATIS Stadtinfo Köln	+6% +10%	-50% -80% pos -37% Pos	+3% +5%		 pos		 -10.6% +4.8% pos	 -0.4% -13.6%	 12 mln + 400,000 per year	 8.5 mln	 6.3

Table 8.3 Impact assessment for Multimodal Traveller information Services

ITS application / service	Aver. speed	Travel time	Capacity	Change to other mode	Air quality	Fuel consumption	Accidents	Speeding	Costs	Benefits	B/C ratio
TravInfo Project Leicester Star Trak *) possibly also due to new infra and busses Winston Salem *) CAD-system in combination with same day reservation				Few +20% *) +10% *)					BP 3.4 mln + BP 90,000		

Table 8.1 clearly shows that especially in the field of ***traffic management and control*** a lot of information is available on the impacts of these applications. Under congested conditions average speed goes up with 2-20%, time-loss is reduced by 6-22% and capacity increases 2-5%. A positive impact can also be seen on fuel consumption and air quality, although no quantified impacts are available from these cases. However, it is well known that there is a direct relationship between congestion, fuel consumption and air quality. If congestion improves, also fuel consumption and air quality will improve. Many systems also show a very high impact on traffic safety, with reductions often in the two-digit numbers, up to 50%. Similar impacts can be seen with respect to speeding.

With respect to the costs and benefits less information is available. For ramp-metering and cross-border traffic management co-operation positive C/B-ratio's can be seen, and also for some safety-related applications like eCall, ACC, LDWA and LCA.

In the domain of ***road traveller information (table 8.2)*** it can be concluded that similar impacts (congestion (and as a result environment) and safety) have been realised as with traffic management and control, which also shows that the distinction between the two groups is rather arbitrary.

In the field of ***multimodal traveller information (table 8.3)*** few well-documented applications are known. Of the three cases described in this section one resulted in a very limited modal shift, while two cases reported 10-20% more public transport travellers, but possibly not just as a result of ITS but also other changes to the public transport system (new infra, busses, reservation). Furthermore it is not known whether these new PT users previously used a car, or are new travellers. Although information on costs is reported, social benefits are not described and thus a C/B ratio is not available.

8.3 Impacts of ITS deployment on the specific objectives

The specific objectives of a new ITS deployment programme have been formulated in chapter 3 as: to realise deployment of ITS that contributes to a sustainable transport system, as well as to harmonise the ITS systems and services in Europe. In this section therefore the impacts of a new ITS deployment programme on ITS deployment and ITS harmonisation is presented.

8.3.1 Impact of ITS deployment

In the current ITS deployment programme a whole range of ITS applications has been deployed, including the necessary data exchange and monitoring infrastructure. In this section an overview will be given of ITS deployment realised in the current ITS deployments programme. The overview will not be complete due to a lack of information and the rapidly changing level of deployment.

Deployment of road monitoring infrastructure

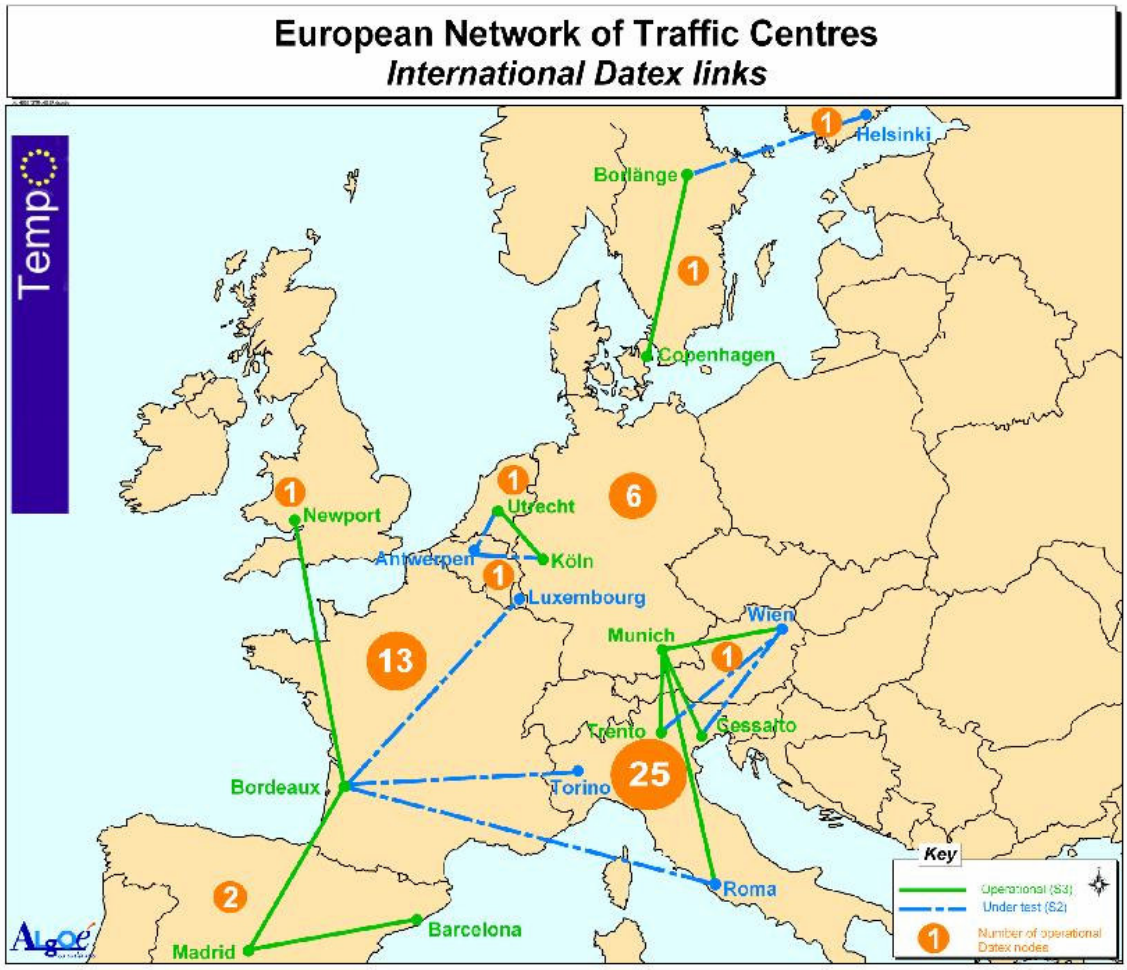
Monitoring is a prerequisite for all traffic management measures. Therefore high investments are made in this area. At the start of the MIP period only 49% of the TERN

had sufficient monitoring systems in the CENTRICO area. By 2006, it is planned that up 87% will be covered with appropriate levels of traffic monitoring.

Deployment of traffic information centres

To reach harmonised cross-border traffic management and traffic information, traffic control and information centres are required which are linked to each other for required data and information exchange. Approximately 40 of these centres will be operational by the end of the MIP. At the beginning of the MIP only one link between neighbouring traffic centres had been established. Approximately 13 links are planned to be operational by 2006.

Figure 8.1 The network of traffic centres realised and planned in the ER projects



Deployment of traffic management systems

The deployment of cross-border re-routing corridors and traffic management plans is a major activity in CENTRICO. At the beginning of the MIP-TEMPO three corridor re-routings were operational. By the end of 2006 the number of successfully installed systems, including traffic management plans, will have quadrupled.

Furthermore, significant progress in the deployment of tactical traffic management systems is planned. For instance, about 170 additional ramp metering systems, 45 temporary hard shoulder running sites and about 1080 additional VMS panels will have been installed by the end of 2006 to improve traffic flow on heavily congested sections of TERN.

Figure 8.2 Deployment of traffic management systems in CENTRICO

Deployment of traffic information services

During the MIP-TEMPO, the coverage of the TERN by end-user services providing real time traffic information will almost reach 90%. About 60 traffic information and 15 services providing real-time door-to-door traffic information will be available by the end of 2006.

The following maps show the status of deployment at the end of 2003 of the following services:

- RDS-TMC
- Variable Message Signs
- Travel time information
- Internet Services

Figure 8.3 Deployment status of RDS-TMC and VMS coverage at the end of 2003

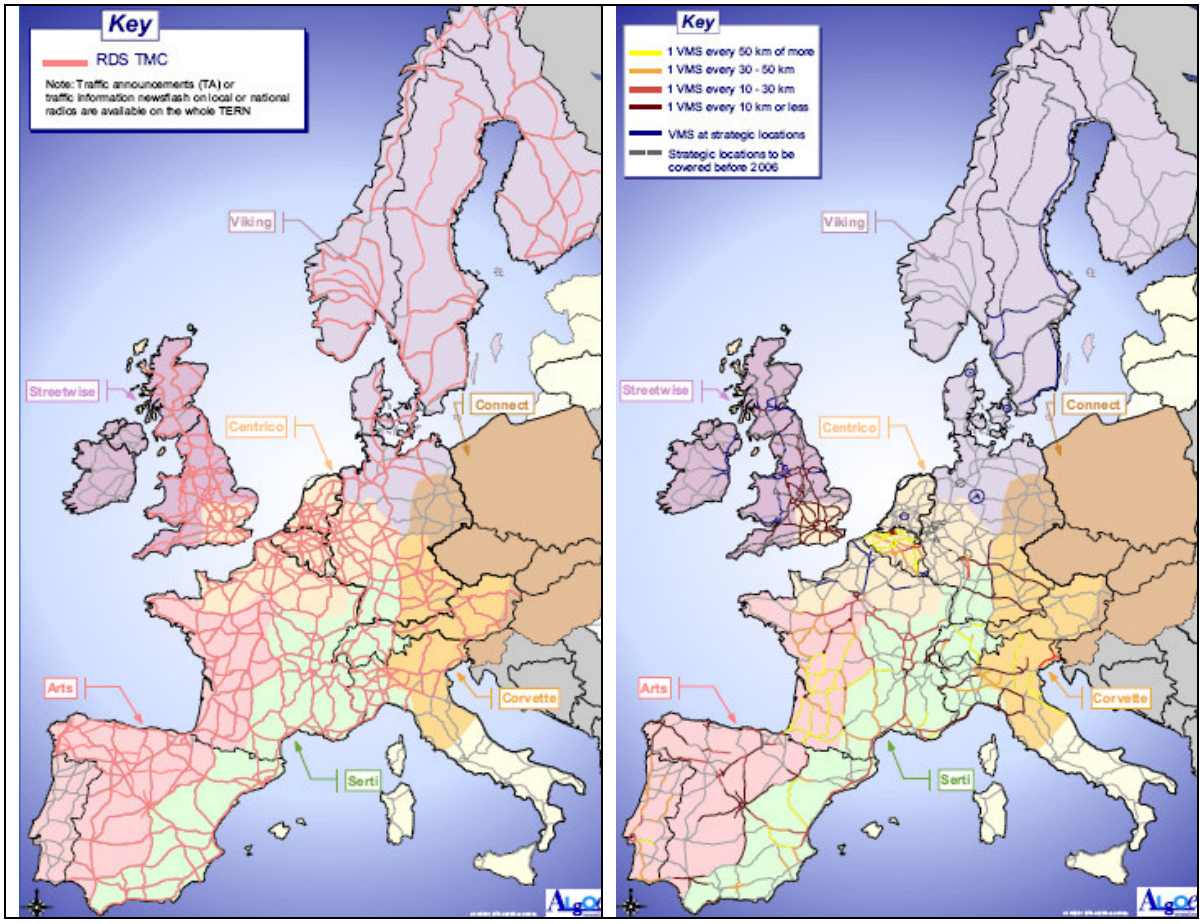
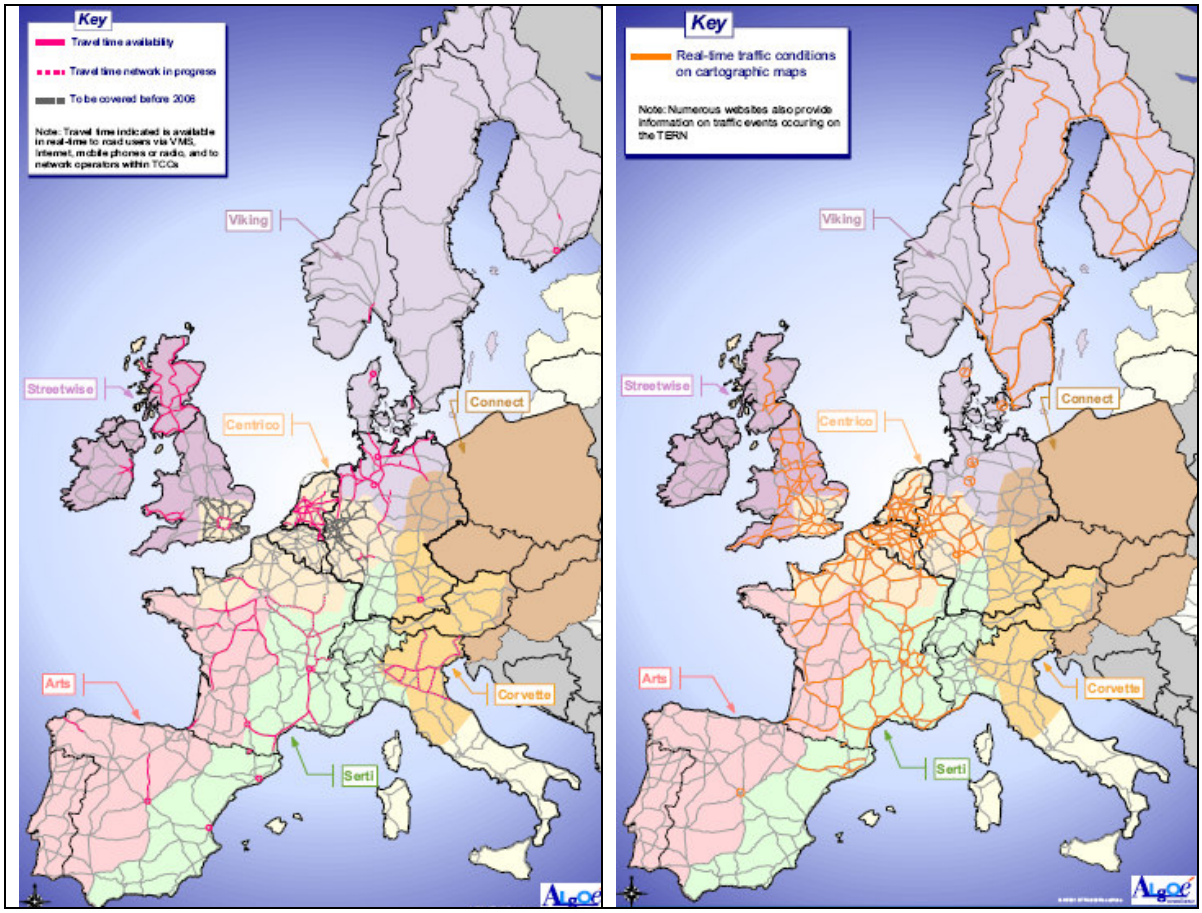


Figure 8.4 Deployment status of travel time availability and real time travel information at the end of 2003



Furthermore, the provision of travel time information will cover approximately 60% of the TERN in CENTRICO area.

The **CORVETTE** project has made good progress towards the goals. More than 1100 VMS, over 600 meteorological and road detectors, approximately 500 video monitoring cameras and in excess of 5000 SOS systems have been installed in the area. The entire TERN is now covered by RDS-TMC services. Traffic management plans covering the main Alpine passes (the Tauern, Brenner, Gotthard and San Bernardino) are being developed and validated.

In 2002, construction began on Europe's most modern traffic management and information centre in Vienna-Inzersdorf, and was completed in mid 2003. It is the central node of the traffic guidance system in Austria. In April 2005 the first traffic guidance signs on the A12 Inntal Motorway and the A13 Brenner Motorway started its operational phase. It is now possible to gather traffic data and to control traffic on one of Europe's most strained transit routes.

Since **SERTI**'s inception in 1997, several major milestones have been reached. Dedicated traffic information is now broadcast by radio on 1800 km of the roads in the SERTI geographical area and main road networks are covered by RDS-TMC services in France, Spain, northwest Italy, Switzerland and Baden-Wurttemberg. Journey time indicators are

now available in real-time on 900 km of the road network and real-time travel information is provided on the internet for all of the countries involved.

SERTI's stakeholders point to considerable improvements in the level of monitoring possible as a result of the installation of some 900 km of optic fibres, 50 weather stations, 300 video systems and hundreds of traffic counting stations. Over 20 traffic control and information centres have been installed or upgraded and there are now 20 operational DATEX nodes.

As mentioned before the overview of ITS deployment within the current ITS deployment programme is not exhaustive, because a standardized format for monitoring the progress of the project is missing. Nevertheless the overview gives a good impression of the ITS deployment realized within the current ITS deployment programme.

8.3.2 Impact of ITS harmonisation

One of the aims of a new ITS deployment programme is ITS harmonisation. Looking back at the efforts in this field in the current ITS deployment programme it can be seen that significant improvements have been realised:

- DATEX Memorandum of Understanding, with a full DATEX protocol for TCC - TCC and a lighter version for TCC – TIC.
- OTAP, Open Travel Data Access Protocol. Addresses EC 551 recommendation to support private service providers, easy standardized access through XML-internet. Data available for UK, B, NL, D, F. To be merged with DATEX II low cost profile
- Mare Nostrum, an initiative to harmonise VMSs across Europe. This has resulted in a draft document and a methodological approach.
- Long Distance Corridor, with special attention to long-distance drivers and uniform services and signs across Europe.
- Web-tr@fic, a website with cross-border traffic information. First high standard level-of-service information on cross border scale. Network coverage almost 10.000 km, including roads in France, Spain and Italy. Over 25.000.000 page views since January 2004. Further extension is planned
- Common Expert Groups on monitoring, Traveller Information Services, Data Exchange and Evaluation.

8.4 Assessment of three intervention strategies

If we now consider the two alternative intervention strategies (Basic TERN+ and TERN+ & MM) compared to the base case (Basic TERN), the following observations can be made from the impact assessment in sections 8.1 and 8.2:

Congestion, environment and traffic safety

- The highest impacts with respect to improving congestion, environmental conditions and traffic safety are realized on the most congested parts of the motorways. These are often the motorway stretches in urban areas, connections to the secondary road network and important secondary roads (e.g. for reroutings). This is a strong

argument in favour of the Basic TERN+ strategy, since this allows ITS deployment on regional/urban roads in those cases where strong interaction with the TERN are evident and clear European Added Value can be shown.

- Much less clear are the benefits for multimodal traveller information. Although multimodal traveller information has led to an increase in the amount of PT travellers, it is not clear whether this is only due to ITS deployment, or whether also other factors played a role. Furthermore an increase in PT travellers does not necessarily mean that these travellers previously used their cars. As a result, and this is also shown through the cases, the impact on congestion, environment and traffic safety are not clear. Cost-benefit figures are not available.

ITS deployment and harmonisation

- Both the Basic TERN+ and the TERN+ & MM strategy will result in a wider ITS deployment than the Basic TERN strategy, since it will cover a wider road network respectively include other modes. Thus ITS deployment will be higher in Basic TERN+ and even higher in TERN+ & MM.
- Also with respect to ITS harmonisation the strategies Basic TERN+ and TERN+ & MM are expected to be more effective than the Basic TERN strategy, since both options cover a broader range of ITS applications that can be harmonised. Of course there is the risk that if the number of applications and actors becomes too big,, harmonisation efforts will become contra-productive.

Costs

- Since the Basic TERN+ strategy considers a larger road network, the number of ITS deployments will be higher than in the Basic TERN strategy, and therefore also the request for financial support will be higher.
- For the TERN+ & MM strategy it might be expected that each of these parties will ask for a substantial amount of financial support (there is a certain threshold for financial support: it should be much higher than the administrative costs of getting the support). Therefore the costs of the TERN+ & MM strategy will be much higher than the Basic TERN and Basic TERN+ strategies.

Risks

- Compared with the Basic TERN strategy, in the Basic TERN+ strategy the variety of projects will increase (urban, non-urban, long distance) and more projects will require interaction with other actors than the highway authorities. Thus the risks of the Basic TERN+ strategy will be higher than the risk of the Basic TERN strategy.
- The risks for the TERN+ & MM strategy are much higher compared to the Basic TERN and Basic TERN+ strategy: the number of parties involved, the mix of public and private parties as well as the type of actors (road authorities versus railways and PT companies) will result in an increased complexity of a new ITS deployment programme, and thus the associated risk.

8.5 Conclusions on impact assessment

From the assessment of the three intervention strategies presented in sections 8.1 – 8.3 it can be concluded that the Basic TERN+ strategy is expected to have the highest positive

impact on congestion, environment and traffic safety. This strategy also scores positive on ITS deployment and ITS harmonization. Compared to the Basic TERN option the only drawback consists of the higher costs and risks.

Although in chapter 4 the TERN+ & MM strategy was retained because of its high score on congestion, environment and traffic safety, this could not be supported by the impact assessment, where clear impacts with respect to congestion, environment and traffic safety could not be found. In combination with the high costs and risks of the TERN+ & MM strategy this strategy scores lower than the Basic TERN+ strategy.

In table 8.4 all three intervention strategies are scored with respect to their effectiveness on the general and specific objectives, as well as on expected costs and risks. The 'Basic TERN' strategy has been taken as a reference, thus scoring '0' and 'M'. The other scores are based on comparison with the Basic TERN strategy.

Table 8.4 Adjusted impact assessment table for the three intervention strategies

	Effectiveness on general objectives[a]			Effectiveness on specific objectives[a]		Costs[b]	Risks[b]
	congestion	environ-ment	safety	ITS deployment	ITS harmonisation		
Basic TERN	0	0	0	0	0	M	M
Basic TERN+	++	++	++	+	+	H	H
TERN+ & MM	??	??	??	++	+	HH	HH

c) Scale for effectiveness compared to 'Basic TERN': - - = much less effective, - = less effective, 0 = equally effective, + = more effective, ++ = much more effective, ?? = not known

d) Cost and risk assessment: LL = very low, L = low, M = medium, H = high, HH = very high

9 Cost effectiveness of the options

The cost-effectiveness of the different intervention strategies relates the effectiveness of the different intervention strategies to the costs of implementing the strategies. The results of chapter 7 on budget calculations and chapter 8 on impact assessment are used as inputs. Costs used in cost effectiveness calculations are the total EC subsidy for projects; programme management costs and costs borne by the contractors are not included. The cost-effectiveness is assessed from the perspective of DG TREN.

9.1 Effectiveness of ITS deployment

In chapter 8 the impacts have been assessed for three intervention strategies. Table 8.1 clearly shows that especially in the field of ***traffic management and control*** positive impacts can be realised. Under congested conditions average speed goes up with 2-20%, time-loss is reduced by 6-22% and capacity increases 2-5%. A positive impact can also be seen on fuel consumption and air quality, although no quantified impacts are available from these cases. Also very high impacts on traffic safety can be found, with reductions often in the two-digit numbers, up to 50%. Similar impacts can be seen with respect to speeding. Although the impact assessment showed cases both from the TERN and non-TERN, most applications were aimed at congested parts of the road network, where the potential gains for fighting congestion, improving environmental conditions and improving traffic safety are highest. Therefore the potential contribution of a new ITS deployment programme not only aimed at the TERN, but also at the TERN+, is expected to have a higher contribution to the general objectives of such a programme.

In the domain of ***road traveller information*** similar impacts (congestion, environment and traffic safety) have been realised as with traffic management and control.

In the field of ***multimodal traveller information*** few well-documented applications are known. Of the three cases described one resulted in a very limited modal shift, while two cases reported 10-20% more public transport travellers, but possibly not just as a result of ITS but also other changes to the public transport system (new infra, busses, reservation).

With respect to the costs and benefits less information is available. For ramp-metering and cross-border traffic management co-operation positive C/B-ratio's can be seen, and also for some safety-related applications like eCall, ACC, LDWA and LCA. For multimodal traveller information cost-benefit information is not available.

With respect to the specific objectives of a new ITS deployment programme the impact assessment clearly showed that the current ITS deployment programme also has resulted in a massive deployment of ITS applications in the EU15. Although many of these

deployments would probably also have been realised without EC-funding, there is a series of deployments for which EC-funding probably has been essential, such as cross-border data exchange, cross-border traffic management co-operation, cross-border websites, etc. Similarly, EC contribution has been instrumental for the realisation of a number of harmonisation projects: DATEX. OTAP, Mare Nostrum, Long Distance Corridor, Web-tr@fic and common Expert Groups on monitoring, Traveller Information Services, Data Exchange and Evaluation. It is not very likely that these initiatives would have been started without funding through the ITS deployment programme, and certainly not with the involvement of so many road authorities.

9.2 Cost-effectiveness of intervention strategies

In chapter 7 the budget and costs have been analysed for a number of options of a new ITS deployment programme. The main conclusions are shown in table 9.1.

Table 9.1 Summary budget and costs of a new ITS deployments programme (x million €)

	budget	Costs - based on 10% for works and 50% for studies	Costs - based on 15% for works and 35% for studies
Base case	1,709	277	291
Extension TERN+ only	2,136	346	363
Extension TERN+ & MM	2,392	388	407

Going from EU15 to EU28, a longer duration and inflation adds increases the budget compared to the current programme. On the other hand, since already part of the ITS infrastructure has been realised, € 455 million can be deducted, especially from the 'old' Member States, thus resulting in a 'base case' budget of € 1.7 billion.
Extending the scope with TERN+ would increase the budget with € 420 million. TERN+ & multimodal would increase the budget with € 683 million.

A change in the financing mechanism (from 10% to 15% funding for works, and from 50% to 35% funding for studies) is expected to increase the share of works to 90% (currently 85%), resulting in only a small increase in the overall funding from 16.2 to 17.0% of the budget.

Chapter 8 clearly showed high impacts for ITS deployment on traffic management and control as well as for traveller information for car drivers. It proved to be very difficult to show clear benefits on congestion, environment and traffic safety for multimodal traveller information.
The Basic TERN+ strategy is expected to have the highest positive impact on congestion, environment and traffic safety. This strategy also scores positive on ITS deployment and ITS harmonization. Compared to the Basic TERN option the only drawback of the TERN+ strategy consists of the higher costs and risks.

Although in chapter 4 the TERN+ & MM strategy was retained because of its high score on congestion, environment and traffic safety, this could not be supported by the impact assessment, where clear impacts with respect to congestion, environment and traffic

safety could not be found. In combination with the high costs and risks of the TERN+ & MM strategy this strategy scores lower than the Basic TERN+ strategy.

In table 9.2 these three intervention strategies are scored with respect to their effectiveness on the general and specific objectives, as well as on expected costs and risks. The 'Basic TERN' strategy has been taken as a reference, thus scoring '0' and 'M'. The other scores are based on comparison with the Basic TERN strategy.

Table 9.2 Cost-effectiveness table for the three intervention strategies

	Effectiveness on general objectives[a]			Effectiveness on specific objectives[a]		Costs[c]	Risks[b]
	congestion	environ-ment	safety	ITS deploy.	ITS harmon.		
Basic TERN	0	0	0	0	0	284	M
Basic TERN+	++	++	++	+	+	355	H
TERN+ & MM	??	??	??	++	+	398	HH

a) Scale for effectiveness compared to 'Basic TERN': - - = much less effective, - = less effective, 0 = equally effective, + = more effective, ++ = much more effective, ?? = not known

b) Risk assessment: LL = very low, L = low, M = medium, H = high, HH = very high

c) Average costs of 10/50% and 15/35% funding mechanism

9.3 Cost-effectiveness compared to other programmes

Apart from initiating a new ITS deployment programme, there are other ways of realising deployment of ITS that contributes to a sustainable transport system, as well as to harmonise the ITS systems and services in Europe.

6th and 7th framework programme

The 6ht and 7th framework programme are much more focussed on RTD than on deployment of ITS, and therefore the immediate to mid-term impacts with respect to congestion, environmental issues and traffic safety will be much lower than will be the case with a new ITS deployment programme. Possibly in the long-term the impacts might be higher, but the uncertainty (risks) is very high since much of the RTD will never reach the stage of deployment. Therefore this option also scores low on ITS deployment and ITS harmonisation. On the other hand the costs will be much higher, since the level of funding in the 6th and 7th framework is much higher (50-100%) and the number of projects to be funded is higher.

Support through national programmes

Instead of an ITS deployment programme co-ordinated at a European level, it would also be possible to support national ITS programmes with EC-funding. In this case the EC only gives a funding, but has little to no control on the way of how the funding is used in the countries. Although it is expected that the effectiveness on the general objectives could be comparable to a new ITS deployment programme, there is a high risk of non-co-ordinated ITS deployment and there will be no incentive and no structure for ITS

harmonisation. Since no specific effort will be put on harmonisation, the costs of this option will be lower than a new ITS deployment programme.

In table 9.3 the various alternatives to a new ITS deployment programme have been listed.

Table 9.3 Cost-effectiveness table for alternatives to a new ITS deployment programmes

	Effectiveness on general objectives[a]			Effectiveness on specific objectives[a]		Costs[c]	Risks[b]
	congestion	environ-ment	safety	ITS deploy.	ITS harmon.		
ITS deployment programme	++	++	++	+	+	355 (H)	H
6th/7th Framework programme	0+	0+	0+	0+	0	HH	HH
Support through national programmes	++	++	++	0+	0	L/M	HH

a) Scale for effectiveness compared to 'Basic TERN': - - = much less effective, - = less effective, 0 = equally effective, + = more effective, ++ = much more effective, ?? = not known

b) Costs and risk assessment: LL = very low, L = low, M = medium, H = high, HH = very high

9.4 Conclusions on cost-effectiveness

For traffic management and control as well as for traveller information (road) clear and unambiguous impacts can be found with respect to improving congestion, environmental conditions and traffic safety. For multimodal traveller information this is much less clear.

Furthermore it can be concluded that for the first two groups of applications and services most benefits are realised on high-density parts of the road network. This implies that the most cost-effective applications and services can be found in the urban areas. Therefore the focus of a new ITS deployment programme should not necessarily be on cross-border applications and services, but on applications and services which contribute most effectively to the general objectives of such a programme, however keeping in mind the specific objectives of ITS deployment and ITS harmonisation. The latter can then be realised through transferring knowledge and best practice to other countries, in a similar way as is currently done through the CIVITAS FP6 sub-programme, in which cities have clean urban transport experiments, one learning from the other.

Therefore the Basic TERN+ strategy is expected to have the highest positive impact on congestion, environment and traffic safety. This strategy also scores positive on ITS deployment and ITS harmonization. Compared to the Basic TERN option the only drawback of the TERN+ strategy consists of the higher costs and risks. However, even if the budgets and associated costs would be the same (which is a political decision), the effectiveness of the Basic TERN+ option would be higher, and thus also the cost-effectiveness.

Since the TERN+ & MM strategy is not expected to result in clear impacts with respect to congestion, environment and traffic safety, in combination with the high costs and risks of the TERN+ & MM strategy, the cost-effectiveness of the TERN+ & MM strategy is lower than the Basic TERN and Basic TERN+ strategies.

Finally alternatives to a new ITS deployment programme have been considered. Based on an assessment of the expected impacts on the general and specific objectives, together with the associated costs and risks, it was concluded that no suitable alternatives exist for a new ITS deployment programme, either because the specific objectives are too low, or because the costs and risks are too high.

10 Programme management and future monitoring and evaluation

10.1 Introduction

Monitoring and evaluation is an important aspect of the new ITS deployment programme. The aim of the programme is not ITS research, but implementation of ITS technologies in practice. Therefore monitoring is needed to find out if implementation is progressing according to planning and evaluation is needed to see if implementation is indeed carried out successfully.

The *monitoring* information will be used for the management of the programme and projects, and consequently for taking corrective measures -if needed- during the programme and projects. The main goals of monitoring activities for the new ITS deployment programme are to:

- Follow progress of programme and projects during their implementation, in relation to the original time schedule, inputs and scope.
- Assess whether programme and projects are generating the identified output and results.
- Identify whether corrective actions are required..

The project and programme *evaluation* will be mainly used for judging the projects and programme on their overall performance at specific points in time, e.g. annual evaluations, mid-term evaluations and an ex-post evaluation. These evaluations should be carried out both on the project and programme level. External experts normally carry out the evaluation, in order to give an independent and unbiased evaluation report.

10.2 Programme management and structure

10.2.1 Human resources

Currently, the Commission staff involved in TEMPO programme management involves four persons (DG TREN), who are responsible for the coordination and programme management of the 7 Euro-regional projects (4 Euro-Regional Project Officers).

Typical tasks of a Euro-Regional Project Officer include:

- negotiate and validate the yearly workplans
- issue the decisions and the contract
- administrative and cost issues

- once per year validation of final report, resulting in technical approval thus allowing financial cell to pay the invoices
- technical discussions with and between the projects in order to guarantee the EU objectives

In total, these four persons spend 2.5-3 Full Time Equivalent (FTE) on managing the current TEMPO programme. It became apparent from interviews with the Project Officers that most of their effort is spent on administrative and financial issues, whilst insufficient time is left for technical discussions with and between the projects.

The first 3 years of the current TEMPO programme, the Project Officers were supported by a TEMPO Secretariat, supporting and assisting the Commission (DG TREN) in particular in administrative issues.

One of the recommendations for a new ITS Deployment Programme is to develop a clear vision and strategy on what should be realised by such a programme. Here lies an active role for the Commission to develop such a vision together with the stakeholders of such a programme.

A stronger steering on the technical direction of a new programme also requires a heavier involvement from Commission officers. The time involved in administrative issues might be reduced by the provision of clear and univocal reporting standards and templates.

10.2.2 Maintain the Euro-Regional Project character

One of the strong points of the current TEMPO programme is the geographic spread of the programme into Euro-Regional Projects (ERPs). The current programme is built around 7 ERPs. The ERPs provide the opportunity for close co-operation with neighbouring regions, which are often confronted by similar problems. Instead of dealing with more than 120 different actors involved in the whole Programme, the ERP structure keeps the group size effective. Each ERP has at least two steering group meetings and several working group meetings per year. The working group meetings are clustered around the same four main domains in all ERPs.

Common or pan-ERP projects and activities

Apart from the actions performed within an ERP, some projects have a common or pan-ERP character. These include:

- Steering and transferring know-how
  - ✓ Yearly conference (I2TERN)
  - ✓ Chair Person Group Meetings: Discussing the way forward, Coordinating, Public relation activities, Stimulating initiatives, Supervising
- Expert group meetings: Common Expert groups currently on:
  - ✓ Monitoring (led by Viking)
  - ✓ Traveller Information Services (led by SERTI, started in 2005)
  - ✓ Information and Data Exchange (led by CENTRICO, just started)
  - ✓ Evaluation (led by Streetwise)

- Long Distance Corridors (LDCs): LDCs are corridors on the Trans-European Road Network (TERN), which cross or connect several regions or countries within the European regional projects. The purpose of LDCs is to go a step further and consider how to manage the traffic over longer distances. A number of cross-border Traffic Management Plans have been carried out, labelled under LDC. LDC is being demonstrated by STREETWISE, CENTRICO and CORVETTE.
- Harmonisation and standardisation issues, like:
  - ✓ MARE NOSTRUM: Harmonisation of Variable Message Signs, being demonstrated on the MARE NOSTRUM LDC (ARTS, SERTI, CORVETTE)
  - ✓ Network of Traffic Centres: Support of DATEX standardisation
  - ✓ OTAP Open Data Travel Access Protocol (STREETWISE, CENTRICO)

New countries and regions

In the current TEMPO programme all EU-15 Member States are involved, with the exception of Greece. Norway and Switzerland are also involved in the ERPs VIKING and CORVETTE). In the seventh CONNECT project, partners from Austria, Czech Republic, Germany, Hungary, Italy, Poland, Slovakia and Slovenia are involved.

For a new ITS Deployment programme for the period 2007-2013, several new member states and candidate countries are expected to join. These are:

- Greece and south Italy
- The Baltic countries Estonia, Latvia and Lithuania
- The candidate countries Romania, Bulgaria and Croatia

This would lead to either an increase of the number of ERPs, or an increase of the number of partners per ERP, or a combination of both. The current geographic structure might be used as a starting point for adding new countries to already existing projects, or the geographic structure might be revised.

Looking at the 'new' countries, the Baltic countries could be combined with the North European region currently included in VIKING.
Greece, the southern part of Italy, Romania, Bulgaria and Croatia cannot easily be included in an existing ERP. It requires a new ERP to cover these countries and regions in South-East Europe.

Looking at the logic of the existing geographical clustering, two main mountainous areas are both split up into two regions:

- The Pyrenees are split into a corridor through the Western part of the Pyrenees (ARTS) and a corridor through the Eastern part of the Pyrenees (SERTI)
- The Alps are split into a Western part (SERTI) and an Eastern part (CORVETTE).

As a result, the regions crossing these two mountainous areas are split up into three ERPs.

An alternative geographic distribution is by defining two mountain crossing regions:

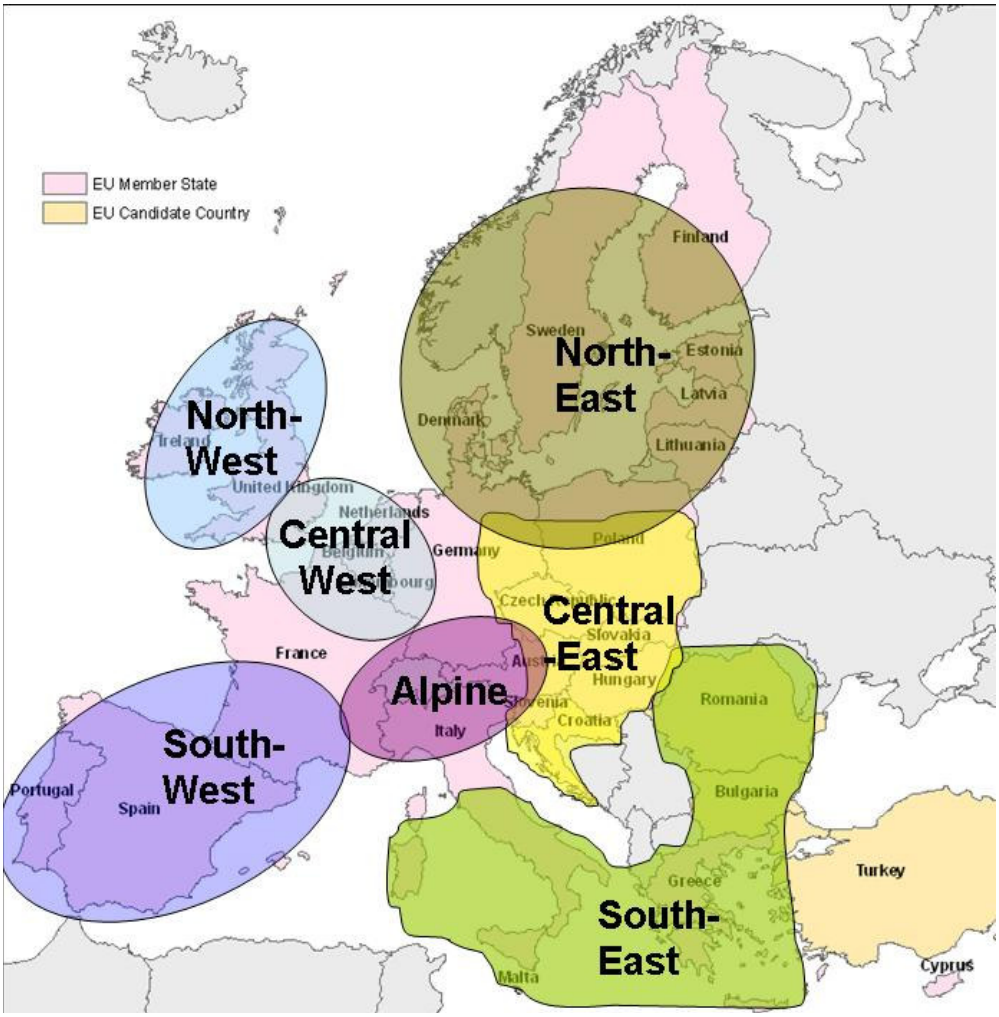
- One region crossing the Pyrenees and connecting Iberia (Spain and Portugal) with France and the rest of Europe. This new region then includes two major North-South corridors.

- One region crossing the Alps and covering Austria, Switzerland, Northern Italy, Southern Germany (Bayern, Baden-Württemberg) and South-East France.

In practice this would mean that the south-western part of the SERTI area will be merged with ARTS, while the Eastern part of the SERTI area will be merged with CORVETTE.

A new constellation could be the following.

Figure 10.1 A possible reorganisation of the Euro-Regional structure



10.2.3 Member State and stakeholder representation

It was already mentioned in the previous section that a number of countries not yet involved in the current ITS Deployment Programme should be involved in a new programme. These include Greece, the new Member States in the Baltic area Latvia, Estonia and Lithuania, and the candidate countries Bulgaria, Romania and Croatia.

The extension of the Programme with these new countries has also budget consequences. This issue has been described in chapter 7.

One of the critics in the current TEMPO Programme is the poor representation and involvement of different stakeholders. The stakeholder consultation process identified a poor representation and involvement of:

- NGO's like CEDR, ERTICO
- DG INFSO
- Private sector involvement from the automobile manufacturers
- Private sector involvement from the Information Service Providers
- Transport operators from non-road modes

There is a clear difference in being actively involved in a new ITS Deployment Programme and having the opportunity to provide useful input for the strategic direction of a new Programme.

Direct involvement of stakeholders

Direct stakeholder participation is currently restricted to National Road Administrations and Road Concessionaires. A pragmatic argument for keeping the direct involvement restricted to Road Administrations and Road Concessionaires is the effectiveness of managing the ERPs. However, it strongly depends on the direction of the scope of a new programme whether other stakeholders should be actively involved in a new ITS Deployment Programme.

In the Full Service intervention strategies, private sector would play an important role in the provision of traveller information services aimed at the individual transport user. When the new Programme would widen the scope on the full service dimension, it would also imply a stronger direct involvement of Information Service Providers (ISPs). The way this could be realised is very difficult, since the funding may not lead to discrimination among private ISPs. The Programme must provide a level playing field for ISPs.

In the multimodal intervention strategies, transport operators from other modes (like air, rail, public transport modes) would play an important role in the data provision and interoperability of systems needed for the realisation of multimodal traveller information services. This is particularly relevant for provision of real time traffic information from non-road transport modes.

Strategic involvement of stakeholders

Developing a clear and effective strategy on what should be achieved by a new ITS Deployment Programme and monitoring whether the direction of the Programme needs adaptation can be achieved by placing a higher priority and importance to the strategy level of the Programme. This can be achieved by creating a High Level Strategy Group (HLG) for ITS Deployment.

It is the role of such a High Level Group to put ITS Deployment high on the European Transport Agenda. This has also consequences for the representation of persons in this High Level Group. It is suggested to create a HLG, at least consisting of:

- EC DG TREN (represented by the Head of Directorate B and/or the Head of Unit B5 Satellite Navigation Systems and Intelligent Transport)

- the National Road Directors of the Member States
- Representation of the Chair Persons of the ERPs
- Representation of the European professional association of tolled motorways companies (ASECAP)
- Representation of the International Road Transport Union (IRU)
- ERTICO representation, a multi-sector, public/private partnership pursuing the development and deployment of Intelligent Transport Systems and Services (ITS).

It is recommended that the High Level Strategy Group meets with a frequency of once per year.

10.2.4 From technology driven to user driven

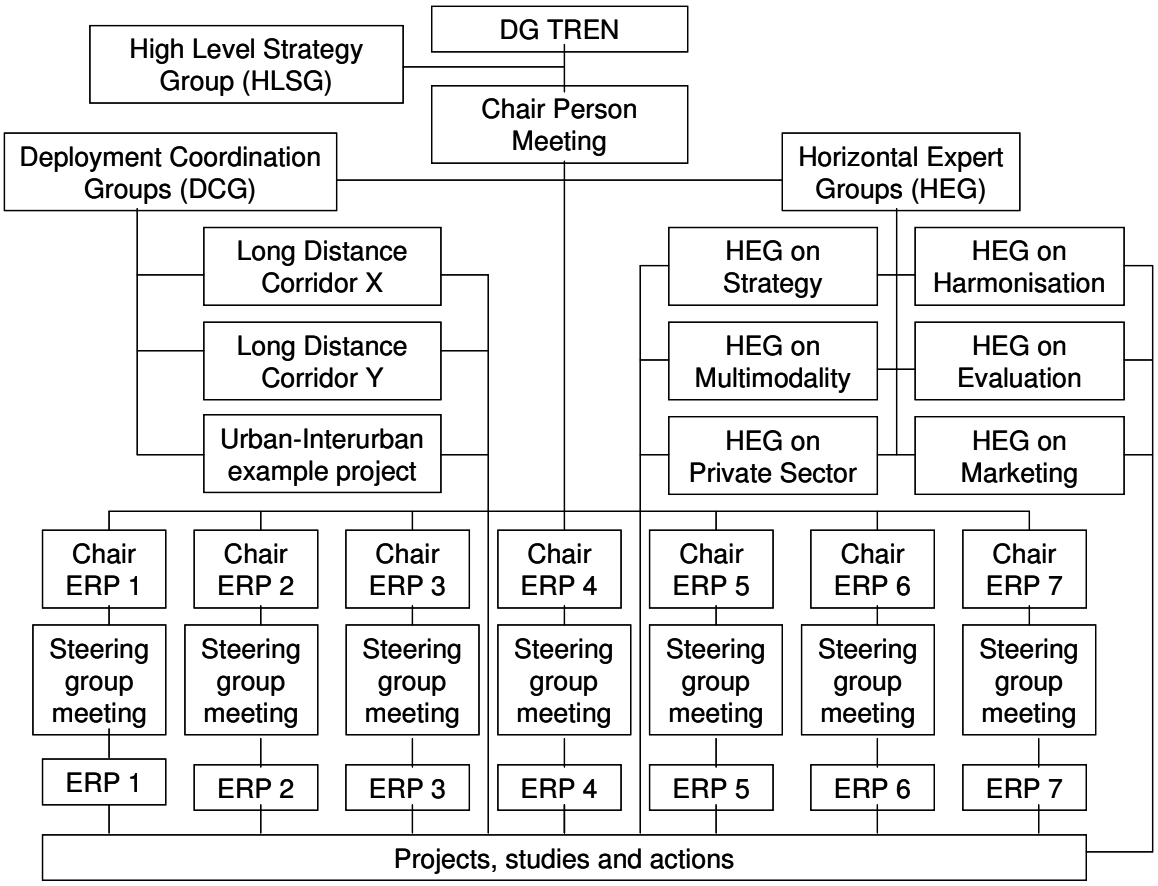
The current TEMPO Programme has a strong technological orientation. Discussions about the deployment of ITS in different domains are often technology driven. Most European ITS experts that are directly involved in the current TEMPO Programme often have a technical background. Too less attention is paid to the socio-economic impacts of ITS deployment. As a consequence, the projects have difficulties in 'showing' the benefits of ITS Deployment to people and policy makers that are not directly involved in the Programme.

It requires another drive to be able to show the benefits of ITS, the Programme should be more user driven than technology driven. The policy makers need to understand what benefits ITS bring to the European transport users. Hat requires a stronger focus on evaluation and impact assessment of projects and actions that take place under a new Programme. This would also have consequences for the knowledge and required skills of the involved ITS experts.

10.2.5 Programme structure

As already described in the beginning of this paragraph, it is strongly recommended to maintain a Euro-Regional structure for the execution of projects within the main domains. However, some activities require a pan-ERP approach. The following figure presents a structure includes both layers of management.

Figure 10.2 Overview of a potential Programme management structure



On the bottom, we have the different projects, studies and actions taking place. Many of these projects and studies take place under the umbrella of a Euro-Regional project. These Euro-Regional Projects have several times a year (e.g. 4 times a year) a Steering Group Meeting, discussing the progress and direction of the projects and studies within the ERP. The Euro-Regional Projects are steered by a Chair Person.

Another group of projects are the common projects falling under Deployment Coordination Groups. These projects have a pan-ERP character. An example is the Long Distance Corridor Project in the corridor between Ireland and Italy. These kinds of long distance corridors developing a.o. long distance border crossing traffic management plans should also be started in other important European long distance corridors with alternative border crossing routes.

A third group of projects are the Horizontal Expert Groups. These expert groups include representatives from the different ERP's and are organised around technical, horizontal or strategic issues. Technical expert groups could deal with issues like:

- Harmonisation of VMS (like MARE NOSTRUM)
- Standardisation of data exchange between Traffic Centres (Like DATEX, or OTAP)
- Other harmonisation or standardisation issues

Horizontal expert groups could deal with issues like:

- Strategy development (e.g. common vision development on multimodality or on private sector participation)
- Monitoring and evaluation
- Marketing and exchange of best practices

The Chair Persons and the Project Officers from DG TREN meet at least twice a year in order to discuss overall progress within the different ERPs and common projects, and coordinate cooperation between ERPs. They also coordinate the progress in the horizontal and technical expert groups and discuss managerial, administrative and financial issues.

The High Level Strategy Group meets once a year.

This is just a possible structure. Each attempt to come up with a potential structure is a battle between simplicity and effectiveness. Our idea is that this structure is a well balanced mixture between the two. Crucial in this structure is the lack of a layer between the ERPs and the individual projects and studies with the particular technical domains. We think the added value of such a domain layer mainly comes from a harmonised approach and could therefore also be covered by an expert group on these harmonisation issues.

10.3 Monitoring

In the current TEMPO Programme monitoring is lacking. As is mentioned in the Mid-term evaluation report[20] the Euro-regional projects are able to provide information about achievements in the projects in terms of installations of road monitoring equipment, number of upgraded TCCs and TICs, implementations of traffic management systems, etc. The problem for the projects is to supply information about level of service. What are the target service levels at the end of the project? How can these target levels be measured and reported in a consistent way? How can it be monitored if implementation is on track? Also no adequate control mechanisms are available to undertake actions if deployment is lacking behind. It is also not possible to compare the reported deployments of the projects. Deployment is measured and reported in different ways in the Euro-regional projects.

The above mentioned issues need to be improved in the new ITS deployment Programme. Monitoring is important. Monitoring information is needed in order to verify whether ITS deployment is on track. If ITS deployment is lacking behind in certain areas it can be investigated what are the reasons for this and adequate measures can be taken to overcome this.

A monitoring system needs to be set-up at the beginning of a new ITS deployment Programme. The first step in a good monitoring system is the definition of objectives and indicators. In chapter 3 three levels of objectives for the new ITS deployment Programme are defined:

[20] TEMPO Deliverable 3.2 Overall assessment Report, Mid-term review of the ITS Deployment Programme (TEMPO) within the multi-annual indicative Programme (MIP), Dec 2003.

1. General objectives
2. Specific objectives
3. Operational objectives.

The definition of the indicators is of course very closely related to definition of the objectives. The indicators are the translation of the objectives into measurable outcomes, serving as a basis for measuring achievements. In chapter 3 possible indicators to monitor the progress in achieving each of the above mentioned objectives are provided. These indicators are related to the three levels of objectives. Therefore three types of indicators can be defined:

1. Impact indicators
2. Result indicators
3. Output indicators.

Monitoring is mainly related to the third level of indicators, output indicators. Output indicators are more practical indicators, related to the fulfilment of actions. The other two indicators are mainly related to evaluation of effects and impacts and will be discussed in the next section. The next step will be the data collection process for the indicators. This needs to be included in Euro-regional projects, which are part of a new ITS deployment Programme.

Monitoring needs to be included in the overall plan for the Euro-regional projects for the whole period of the new ITS deployment Programme (2007-2013). For example for each of the indicators target levels need to be defined which have to be reached at the end of a new Programme.

Monitoring also needs to be addressed in the yearly workplans of the Euro-regional projects. DG TREN could provide assistance to the Euro-regional project by providing a template for the annual workplans with monitoring information they require from the projects. Objectives need to be clearly defined and have to be related to the objectives of the new ITS deployment Programme. Indicators need to be described which will be used to measure if these objectives are achieved. Also the evaluation which will be used needs to be described.

A control mechanism needs to be set-up in order to ensure that monitoring is indeed included in all of the Euro-regional projects and is done in a way which makes it possible to carry out monitoring both at project and programme level. The annual workplans for the Euro-regional projects are based on the planned work for each participant in the project. For each project the Project Chair will be responsible for ensuring monitoring is addressed by each of the participants. The Project chairs together need to arrange that monitoring in the different projects has been adjusted to each other, in order to facilitate comparison of the monitoring results between projects. If needed DG TREN could be involved in this process together with the Project chairs.

Monitoring also needs to be included in the Final reports, which have to be delivered at the end of each year. These Final reports describe the work done in a specific year. An important issue to report should be the progress of ITS deployment in that specific year. Collecting data for indicators is needed to be able to do this. Again DG TREN can

provide assistance to the Euro-regional projects by including monitoring in the Final report template.

Collecting monitoring information every year will require significant efforts from the participants in the Euro-regional projects. Data needs to be collected every year; people with the right expertise need to be found and need to be available to carry out this task; etc. This means budget needs to be allocated in each of the Euro-regional projects to carry out monitoring tasks every year. On the one hand this means additional costs, because this budget cannot be used for actual ITS deployment. On the other hand monitoring is very important. Without data collection this will be very difficult. The collected information can be used to find out which activities are successful and which activities are less successful. The information can be analyzed and used to adapt the planned activities for next years and make better use of the budget for the coming years.

To summarize, the following recommendations have been given:

- Monitoring should be set-up at the beginning of a new ITS deployment programme.
- A control mechanism related to monitoring needs to be developed.
- Monitoring should be clearly included in the Euro-regional projects.
- A template needs to be provided to include monitoring in the yearly workplans and final reports.
- Budget needs to be allocated to monitoring activities.

10.4 Evaluation of impacts

Another issue which is closely related to monitoring is evaluation of impacts. In the current TEMPO programme the projects are not able to provide information about the impacts of the installed systems. What are the actual effects of the new ITS systems on safety, congestion and environment? What are the target levels the projects are aiming for, and are the projects on track compared with these target levels?

The Evaluation Expert Group, which has been established in the TEMPO programme, should be continued in the new ITS deployment Programme to be involved in evaluation of impacts In the TEMPO programme the Evaluation Expert Group has worked on the development of a common evaluation methodology for the Euro-regional projects. Also an evaluation template has been made. However using this template by the Euro-regional projects and collecting evaluation information was difficult. One of the main reasons was insufficient budget for this task. Another reason is that the evaluation methodology was not available at the start of the Euro-regional projects, but became available during the execution of the projects.

In a new ITS deployment programme the Evaluation Expert group should be more involved in the evaluation of effects and impacts. The Evaluation Expert Group can provide support to participants in the Euro-Regional projects which need assistance. The Evaluation Expert Group can also collect evaluation information from all Euro-regional projects. In this way valuable information about project impacts is collected, which can also be used for dissemination activities.

Evaluation of impacts can be included in a new ITS deployment programme in a comparable way as monitoring, which has been described in the previous section. Evaluation of impacts should be added to the overall plan for the whole project period The methodology should be described. Also objectives and related indicators should be described. As mentioned before, evaluation of impacts is mainly related to general and specific objectives. An overview of possible indicators is presented in chapter 3. The activities, which need to be done in a specific year need to be included the workplan for that year. The actual results for each year need to be reported in the Final report for that specific year.

To summarize, the following recommendations have been given:

- The TEMPO Evaluation Expert Group should be continued in a new ITS deployment programme and be more involved in evaluation of impacts.
- Evaluation of impacts should be included in the Euro-regional projects.
- Evaluation of impacts has to be included in the overall plan, the annual workplan and the annual final reports.

10.5 Programme and Project evaluation

For a new ITS deployment programme and the Euro-regional projects within the programme, it is recommended to carry out three types of evaluations:

- Annual evaluation
- Mid-term evaluation
- Ex-post evaluation.

The new ITS deployment Programme is a multi-annual indicative Programme (MIP), just like the current TEMPO Programme. In this way the EC can take indicative decisions on the budget for the Euro-regional projects carried out under the Programme for the whole Programme period. All projects need to provide annual work plans describing the proposed work programme and budget for each year. At the end of each year the projects need to provide final reports, describing the achievements and costs for the work done in the specific year. Also deviation reports need to be provided to describe the difference between the work planned and work actually carried out. Detailed financial reports need to be provided to the EC Financial Department at the end of each year, specifying all expenditures for that year. These reports will be the basis for the annual assessments of the projects under the new ITS deployment Programme. The outcome of this assessment is the basis for the yearly decision specifying the actual funding provided to the Euro-Regional projects for that specific year. The information collected for the Euro-regional projects can be used as a basis for the assessment of the programme as a whole. This assessment can be used to recommend corrective actions on programme level, e.g. redirecting the focus or changing administrative procedures.

In the current TEMPO Programme providing the yearly financial details is a very complicated and time-consuming task for the Euro-regional projects. Almost every year there are changes in the financial guidelines specifying the financial information which needs to be provided. The financial information which is required is also very detailed. It is recommended that this administrative burden for the projects is reduced in a new ITS

deployment Programme. One way to realize this could be to use a similar solution as has been used in the FP6 of the EC to reduce the administrative burden for the projects involved in FP6. In the FP6 Programme, during the project the assessment of the detailed costs by an accountant for each project partner of the consortium are the responsibility of the consortium. Only aggregated costs are provided to the EC. At the end of the project all costs are assessed by the EC.

Although the current TEMPO Programme is a multi-annual Programme, shifting budget to other years was very difficult. This should be improved. It is very difficult for the Euro-regional projects to allocate budget for the whole Programme period at the beginning of the Programme. A clear indication should be given by the EC under which conditions budget can be shifted to another year. It should also be possible to shift budget between domains within one project. There can be very good reasons why some activities in one domain cannot be carried out, but other activities in another domain should be carried out instead.

It is proposed to carry out the mid-term evaluation in 2010. Its aim is to review the functioning of the programme. It should cover issues such as the efficiency, effectiveness and impact of the programme. The mid-term evaluation should address the contribution of the various activities executed during the programme towards the goals of the programme. Its conclusions could lead to adjustments in procedures and budget allocations.

The ex post evaluation of the new ITS deployment programme is important in the light of accountability towards the Council and Parliament. The aim of the evaluation is to review the whole process of activities carried out during the execution of the programme, as well as to review the programme in its entirety. It will enable the drawing of lessons with a view to future (similar) programmes. In the ex post evaluation the effectiveness, efficiency and impact of the programme is to be reviewed, as well as issues regarding Community Value Added (dissemination, innovativeness).

To summarize, the following recommendations have been given:

- A yearly assessment of the Euro-regional projects needs to be done based on the workplan, deviation report and final report for that specific year.
- The process of providing yearly financial details could be improved.
- A clear indication should be given by the EC under which conditions budget can be shifted to another year.
- Mid-term evaluation cover issues like efficiency, effectiveness and impact of the programme.
- Ex-post evaluations are intended to carry out the activities carried out and to the review the programme in its entirety

11 Conclusions and recommendations

11.1 Main conclusions

ITS Deployment faces several problems

A series of problems in the ITS domain has resulted in a too slow deployment and in not reaping the full potential benefits that could be realised without these problems. These problems are:

- Lack of interoperability of ITS;
- Huge initial investments required;
- Lack of knowledge on the impacts of ITS;
- Lack of clarity in ITS deployment objectives;
- Lack of coherence between ITS deployment at European, national, regional and local level;
- Lack of economies of scale;
- Many actors involved with different jurisdictions;
- Role of the private market and lack of understanding the complementarities;
- Weak link with multimodality.

Four good reasons for a role of the EC in ITS Deployment

There are four main reasons that point at a role for the Commission in ITS deployment:

- Ensuring interoperability of ITS systems across the EU, thereby stimulating the TEN-T development and uninterrupted movement of goods and persons.
- Stimulating standardisation of the ITS networks, resulting in lower total transport costs and thus higher efficiency of the transport system.
- Integrating the management of the various national road networks into one European network, thus allowing a true optimisation of the network in stead of sub-optimisation per country.
- Deployment of ITS helps to bring forward the policy objective of efficient and sustainable transport system, thereby increasing the competitiveness of Europe. ITS also allows transport policies (e.g. pricing policies, demand constraint policies) to be effective and efficient.

Consequences of an exit strategy

This policy option is the most radical change compared to the current EU position in the deployment of ITS. Within this option, the European ITS deployment programme will not be continued. The intention of this delivery mechanism is to shift control and responsibility completely to the Member States. This will have a serious impact on the following three aspects:

- The leverage function of co-funding and the speed of deployment; The leverage function of co-funding guarantees deployment on border crossing sections and

development of long distance traffic management plans. Without a European Programme, these kinds of projects will not be realised as a consequence of a focus on national priorities.

- Harmonisation of ITS services; International road transport is increasing rapidly, which puts a greater importance on providing unambiguous information provision to international road users, regardless the country they drive in. Without European harmonisation and standardisation of ITS, economies of scale will not be realised, leading to higher costs of ITS and a lower cost effectiveness of ITS applications. It is not expected that another international organisation (e.g. CEDR) could fulfil this coordinating and steering role, since other organisations lack the financial resources and the legislative tools.
- Best Practice and knowledge exchange; A European ITS Deployment Programme speeds up ITS deployment through the exchange of best practices and knowledge across Member States. Countries with a well developed ITS infrastructure pull countries with a weaker developed ITS infrastructure. It is questionable whether the benefits of knowledge and best practice exchange as well as the pulling factor (strong countries pull weaker countries) would be realised without a coordinated European ITS Deployment Programme. The network of NRA's and concessionaires, built up during the current ITS Deployment Programme proved to be valuable not only with respect to harmonisation and best practice transfer, but also for cross-border traffic management. When the Exit Strategy will be followed, initially the contacts will be maintained, but after some time people will change positions and face-to-face contacts will be reduced, thus leading to an ending of the network and its associated benefits.

Limited European Added Value from urban-interurban integration

Currently, ITS Deployment is strongly linked to the TERN. Since major congestion problems occur in conurbations, the impact of ITS Deployment on urban-interurban integration and network management is expected to be huge and very cost effective. However, the European Added Value is limited since many congestion problems are mainly caused by commuter traffic and not by European long distance travellers. The European added value here comes from the exemplary function of certain projects on urban-interurban integration for other European regions with the same type of problems and which are committed to support these kind of exemplary projects.

Hard evidence on the impact of multimodal traveller services is lacking

A common vision on multimodality can only be developed when there is clear evidence of the impact and added value of multimodal traveller information services. So far, this evidence is lacking. There is no hard evidence on the effect of multimodal traveller information services on changes in modal choice. In addition, multimodal traveller information services mainly deal with urban traffic and the integration of urban and interurban traffic. Therefore, the European Added Value of these services is limited anyhow, even if they would be effective in terms of balancing the transport modes.

Lessons from the current programme (TEMPO)

Some lessons that can be learned from the current ITS Deployment Programme correspond with the problems identified in the ITS domain, like the lack of common vision & strategy for ITS deployment, the inability to clearly show the benefits of ITS,

and the priority given to ITS. Other important lessons learned from the current programme are:

- Programme structure. One of the strong points of the current TEMPO programme is the geographic spread of the programme into Euro-Regional Projects (ERPs). The ERPs provide the opportunity for close co-operation with neighbouring regions, which are often confronted by similar problems. However, some issues (e.g. strategic issues, harmonisation issues) and projects (e.g. LDC, pilot projects aimed at knowledge transfer) require a pan-ERP approach.
- Monitoring and evaluation. Clear target levels are missing. As a consequence it is not possible to monitor the progress of ITS deployment and take corrective actions. The impact on the contribution of ITS Deployment projects and actions on network efficiency, traffic safety and environmental sustainability is in many cases unknown. Evaluation is therefore often restricted to technical validation of the implemented systems and services.
- Project and programme management. Most time of DG TREN project offficers in the current TEMPO programme is allocated to administrative tasks, and insufficient time is available for technical guidance of the projects. The yearly Decision process is too slow, and should be speeded up. Though reporting guidelines and templates already exist in the current MIP, not all participants stick to the reporting guidelines or comply to the templates.
- Programme participants and their orientation. The type and number of partners in the current TEMPO programme is considered to be right. Practically all road authorities are present. However, most involved ITS experts have a technical background. As a consequence, the programme is very technology driven, while ITS deployment remains a tool helping to solve policy objectives. The focus on these policy objectives, and the impact of ITS deployment on realising these objectives is underexposed.
- Dissemination and marketing. Several stakeholders involved in ITS (e.g. people interviewed from DG INFSO, national (road) transport politicians, ITS service providers, transport system researchers and transport consultants) were not familiar with the TEMPO Programme for ITS Deployment. Apart from the project results, which are mainly marketed among the involved ITS experts, also the ITS Deployment Programme itself should be marketed better.

11.2 Recommendations

Continue with a European ITS Deployment Programme

Based on the four main reasons for a European role in ITS Deployment and the three main consequences of an Exit strategy, it is recommended to continue with a European Programme for ITS Deployment for the period after 2006 (2007-2013).

Five main prerequisites for an effective new ITS Deployment Programme

In order to guarantee an effective Programme in its contribution to the general transport policy objectives as well as more specific objectives, the following aspects have to be taken into account:

- Vision and strategy: Common understanding of what should be achieved by a new ITS Deployment Programme

- Focus: A programme scope focused on road transport users
- An effective and efficient Programme Management Structure
- Effective Programme monitoring and evaluation
- Challenge to release the required financial means

A common vision and strategy

A High Level Strategy Group could help shaping the common vision and strategy of a new programme and could guarantee the right strategic direction of the Programme. Such a High Level Group would also help getting the priority of top politicians on ITS deployment and maintaining ITS deployment on the political agenda. This High Level Strategy Group should consist of at least representatives of DG TREN, National Road Directors, representation of the Chair Persons of the ERP's, IRU, ASECAP and ERTICO. The latter two will guarantee a sufficient involvement of the private sector.

A focused Programme on road transport

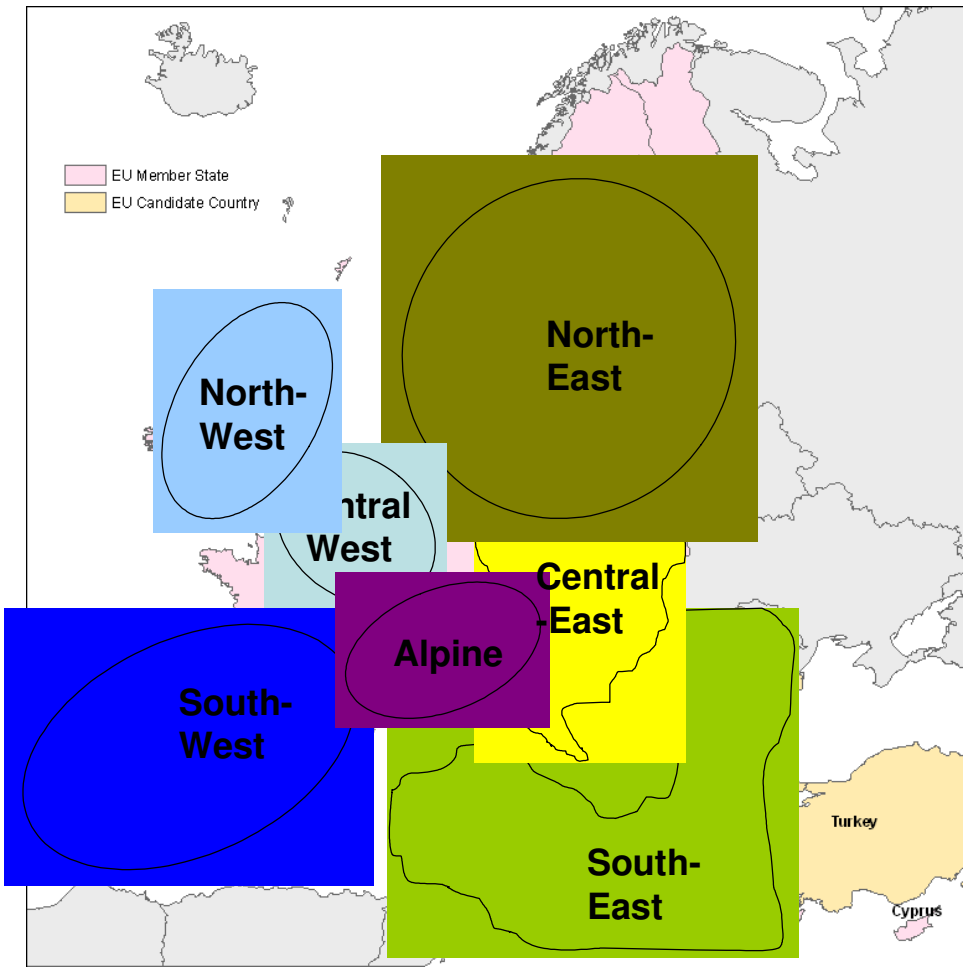
A new Programme scope should be primarily aimed at European road transport users, not only on the TERN network but also on missing e-road sections. Urban-interurban integration should be included in a new Programme, but only limited to specific cases (exemplary projects) with a high degree of transferability. The same applies to pilot demonstration projects that clearly demonstrate the impacts on multimodality. The Programme should facilitate data requirements from private sector in a non-discriminating way and follow the development of personalised traveller information services by private organisations. Strategic expert groups need to develop a common vision and strategy on multimodality and on private sector developments and the role of private sector in ITS Deployment.

An effective Programme structure

One of the strong points of the current TEMPO programme is the geographic spread of the programme into Euro-Regional Projects (ERPs). The ERPs provide the opportunity for close co-operation with neighbouring regions, which are often confronted by similar problems.

A new Programme needs to be open for New Member States and Candidate Countries that are not yet involved in the current ITS Deployment Programme. This means creating new Euro-Regional projects, geographic rearrangement and/or joining new countries to already existing ERPs. Though each geographic arrangement will have advantages and disadvantages, the following rearrangement of regions, mainly based on specific geographic characteristics (e.g Alpine-crossing, Pyrenees crossing), is recommended.

Figure 1.1 A possible reorganisation of the Euro-Regional structure



It is recommended that a new Programme structure maintains the successful Euro Regional Project (ERP) structure, but also Pan-ERP groups on two levels:

- Deployment Coordination Groups (like the current Long Distance Corridors)
- Horizontal Expert Groups on strategic issues, multimodality, the role of the private sector, harmonisation and standardisation, evaluation and marketing.

Effective monitoring and evaluation

The need and challenge is to measure the impact of ITS Deployment activities on impact indicators, corrected for potential other causes. An evaluation expert group can support in applying a common evaluation methodology throughout the projects, exchange best practices and provide common templates. But in order to really embed a common evaluation methodology in the Programme, the project participants and actors involved must apply this methodology and report on the planned evaluation activities in yearly workplans and report on the achieved impacts of the actions in the yearly reports. That requires allocating sufficient budget to evaluation activities, like measurement studies within the project plans.

Challenge to release the required financial means

Obviously, a new ITS deployment Programme would require significant investments and co-funding budget. The total costs of a new European wide Programme for the period

2007-2013 is estimated to be in the range of € 1.7 – 2.9 billion, of which € 1.4-2.4 billion has to come from Member State funds. Member States therefore have to commit to challenging but realistic target levels for deployment.

Annex A Stakeholders' consultation

The Stakeholders' consultation process includes two main elements:

- In-depth interviews with a number of key stakeholders
- Questionnaire distributed among a network of many stakeholders that are directly or indirectly involved in ITS deployment

In-depth interviews with key stakeholders

In collaboration with DG TREN Unit B5, the following 36 persons were selected for in-depth interviews, representing all relevant types of stakeholders and with most of them interviews were held.

Table A.1 Overview of interviewed people

Category	Name	Organisation	Role	Date and place
European Commission	Mr. P. Verhoef	DG TREN Unit B5	Head of Unit B5	09-09-2005 in Brussels
European Commission	Mr. K. Keen	DG TREN Unit B5	Project manager ex-ante evaluation ITS Deployment, project manager VIKING & Streetwise	06-09-2005 in Brussels
European Commission	Mr. B. Radia	DG TREN Unit B5	Project manager ARTS	08-09-2005 in Brussels
European Commission	Mr. P. Hamet	DG TREN Unit B5	Project manager Corvette and SERTI	02-09-2005 in Brussels
European Commission	Mr. J. Berry	DG TREN Unit B5	Project manager Centrico and CONNECT	09-09-2005 in Brussels
European Commission	Mr. D. Theologitis	DG TREN Unit E3	Head of Unit E3 Road Safety	09-09-2005 in Brussels
European Commission	Mr. W. Maes	DG TREN Unit E3	Steering Committee project ex-ante evaluation of ITS Deployment, Project officer Unit E3	24-08-2005 in Brussels
European Commission	Mr. E. Thielmann	DG TREN Unit B2	Head of Unit B2	06-09-2005 in Brussels
European Commission	Mr. J. C.Merciol	DG TREN Unit B4	Head of Unit B4	20-10-2005 in Brussels

Category	Name	Organisation	Role	Date and place
European Commission	Mr. W. Elsner	DG TREN Unit J4	Head of Unit J4	24-08-2005 in Brussels
European Commission	Mr. A. Vits	DG INFSO Unit G5	Head of Unit G5	08-09-2005 in Brussels
European Commission	Mr. F. Minarini	DG INFSO Unit G5	Project officer Unit G5	02-09-2005 in Brussels
Arts	Mr. F. Soriano	University of Valencia – LISITT	ARTS Manager	23-09-2005 in Dublin
Centrico	Mr. R. Dölger	Ministry Transport Rheinland Pfalz	CENTRICO Chair	22-09-2005 in Dublin
Centrico	Mrs. S. Kleine	Ministry Transport Rheinland Pfalz	CENTRICO Secretariat	22-09-2005 in Dublin
Centrico	Mr. M. Dinter	AS&P	CENTRICO Manager	22-09-2005 in Dublin
Connect	Mr. D. Herenda	Ministry of Transport Slovenia	CONNECT Chair	29-09-2005 in Ljubljana
Connect	Mr. R. Pfliegl	Via Donau	CONNECT Manager	14-10-2005 in Vienna
Corvette	Ms. L. Iorio	Italian Ministry of Infrastructure and Transport	CORVETTE Chair	30-09-2005 in Rome
Corvette	Mr. G. Luccitti	Ernst & Young Italy	CORVETTE Manager	30-09-2005 in Rome
Serti	Mr. P. Malejacq	French Ministry of Transport	SERTI Chair (until September 2005)	22-09-2005 in Dublin
Serti	Mr. J. Coldefy	Algoe	SERTI Manager	22-09-2005 in Dublin
Serti	Mr. N. Schwab	ASF	SERTI Stakeholder	22-09-2005 in Dublin
Streetwise	Mr. L. James	Ministry of Transport Wales	STREETWISE Chair until September 2005)	17-10-2005 in Amsterdam
Streetwise	Mr. B. Maxwell	Transport Telematics Agency, Dept of Reg Development, Northern Ireland	Streetwise Chair since September 2005	17-10-2005 in Amsterdam
Streetwise	Mrs. K. Charlesworth	Faber Maunsell	Streetwise Manager	17-10-2005 in Amsterdam
Expert	Mr. S. Morello	ISIS	TEMPO evaluation support	23-09-2005 in Dublin
Expert	Mr. J.W. Tierolf	Dutch Ministry of Transport and Public Works – AVV	Involved in CENTRICO	10-11-2005 in Rotterdam
Expert	Mr. J. vd Valk			
Expert	Mr. K. Perrett	Rapp UK	Former TEMPO Secretariat (by P. Potters)	03-11-2005 in San Francisco
Expert	Mr. W. Walker	RAND Europe/ TU	(by P. Potters)	

Category	Name	Organisation	Role	Date and place
		Delft		
Expert	Prof. Dr. Baum Dr. T. Geißler	Univ of Cologne	CBA experts	By telephone/e-mail
CEDR	Mr. P. vd Kroon	Dutch Min of Transport and Public Works - AVV / CEDR	Involved in CEDR working group on ITS	10-11-2005 in Rotterdam
Siemens	Mr. Metz	Siemens NL	Technology provider	27-10-2005 in Zoetermeer
Vialis	Mr. F. vd Valk	Vialis	Involved in Centrico meetings/workshops, technology provider	18-10-2005 in Haarlem

The questionnaires

Consultation on experience with ITS deployment has been carried out with the aim of collecting the views of stakeholders and other experts regarding the development of a new ITS deployment programme and the role of DG TREN. In order to collect information from the wider ITS community, the consultants' team has sent questionnaires to a list of stakeholder organisations in the field of energy and transport. Among these were national road authorities, national ITS organisations (FR, UK, IT, NL, CZ, HU, RO, USA), ERTICO and its members, Automobile Clubs, ITS software and service providers, and consultants. Besides that the same questionnaire has been provided to all participants of the I2TERN conference on the Euro Regional Projects on 21-23 September 2005 in Dublin. Parallel to that, the consultants have explicitly asked the project chairs of all Euro-Regional Projects to distribute the questionnaire among the organisations directly involved in the Euro Regional Projects.

Response was received from 60 stakeholders:

- 21 public authorities and ITS organisations,
- 22 consultants,
- 8 ITS service providers,
- 5 others.

In the questionnaire the stakeholders' views on the following issues were asked:

- Experiences with the current ITS deployment programme (TEMPO)
  - ✓ Strong and weak points of the current programme
  - ✓ Problems and needs assessment
  - ✓ Contribution to Community objectives
  - ✓ The role of the EU and of Member States
- Views on a new ITS deployment programme (2007-2013)
- Multimodality
- Stakeholder involvement (private sector participation)
- The domain structure and inclusion of new topics
- The leading role of road authorities
- The funding principles

- The budget requirements
- Programme structure
- Programme management
- Alternative delivery mechanisms and risks

At the end of this annex, the questionnaire that has been sent to the stakeholder organisations has been attached.

Questionnaire results

In this next section the results of the stakeholder questionnaire is presented.
During the analyses of the responses given by the stakeholders a division was made between respondents that filled out the questionnaire on behalf of a Public party and those that filled out the questionnaire on behalf of a Private party.
In the case that this division explains fluctuations in the results shown in the tables and diagrams corresponding to the different questions, the results of the Public and Private parties are separately discussed.

Question 2

The current the TEMPO programme is expected to contribute to solving a number of transport problems in Europe.
The respondents were asked to give their opinion on the impact of the TEMPO programme on 10 different categories. They were given 6 different options as response:

- None (no impact at all)
- Low
- Moderate
- High
- Very high
- Don't know

Table A1.1 shows the opinion of the respondents concerning the impact of the TEMPO programme on 10 different issues.
The answers given by the respondents are shown as a percentage of the total replies per category.
The average opinion of the respondents concerning the 10 listed categories is shown in the final row.

Table A.2 Perceived impact of the TEMPO programme

	none	low	moderate	high	very high	don't know
Reduction of congestion	0%	4%	25%	43%	24%	4%
Reduction of environmental damage caused by traffic	2%	16%	41%	27%	6%	8%
Accessibility of cities/regions (regional cohesion)	0%	14%	35%	39%	8%	4%

	none	low	moderate	high	very high	don't know
Interoperability of transport modes	2%	27%	33%	27%	4%	6%
Interoperability of ICT systems (ITS) that support the transport system	0%	10%	22%	37%	24%	8%
Speeding up deployment of ITS	0%	0%	14%	29%	53%	4%
Implementation and user acceptance of balanced charging system	6%	25%	25%	10%	2%	31%
Realization of the internal market	2%	24%	39%	24%	2%	10%
Safety in transport	0%	2%	25%	47%	14%	12%
Security (vulnerability of transport systems, e.g. tunnels and bridges)	2%	10%	18%	43%	16%	12%
Average	**1%**	**13%**	**28%**	**33%**	**15%**	**10%**

As the average of the 10 categories shows, 48% of the respondents is of the opinion that the impact of the programme is either 'high' or 'very high'. Especially the impact on 'speeding up deployment of ITS', 'safety in transport', 'interoperability of ICT systems (ITS)' and the 'reduction of congestion' is 'high' according to the respondents.

The opinions of the respondents concerning the impact of the TEMPO programme on the 'interoperability of transport modes' and the 'realization of an internal market' is highly divided.

Dividing the respondents into Public parties and Private parties does not explain this spread in opinions, because the opinions amongst the Public and the Private parties are divided themselves.

However what can be concluded after analysing the results, is that the Private parties value the impact of the TEMPO programme on average higher than the Public parties (respectively 55% and 39% of the responses is either 'high' or 'very high').

Question 3

The respondents were asked what they thought were the weak points and the strong points of the TEMPO programme.
Table A1.2 gives an overview of the opinions of the respondents, shown as a percentage of total responses per category.
Again the last row of this table shows the average of the responses, of the listed 11 categories, in percentages of total replies.

Table A.3 Perceived strong and weak points of the TEMPO programme

	Very weak	Weak	Neutral	Strong	Very strong	Don't know
Programme management	2%	31%	39%	20%	4%	4%
Project management	0%	8%	35%	49%	4%	4%
Scope and focus of the programme (domains)	0%	6%	35%	43%	8%	8%

	Very weak	Weak	Neutral	Strong	Very strong	Don't know
Involvement of relevant stakeholders in the programme	0%	20%	29%	31%	16%	4%
Clarity of deployment targets	0%	18%	45%	25%	6%	6%
Clarity of work plans	2%	12%	43%	35%	4%	4%
Realization of ITS deployment	0%	4%	18%	53%	24%	2%
Contribution to standardization and interoperability of ITS in Europe	2%	10%	24%	35%	25%	4%
Cooperation with national ITS deployment programmes/projects in EU-25 member states	2%	10%	20%	43%	25%	0%
Dissemination of project results	2%	8%	49%	41%	0%	0%
Cross fertilization within ERP and between ERP	2%	6%	2%	12%	8%	70%
Average	**1%**	**12%**	**31%**	**35%**	**11%**	**10%**

Table A1.2 shows that an average of 46% values the listed categories either as being 'strong' or 'very strong' and an average of 13% values them either as 'weak' or 'very weak' (1%).
'Programme management' is valued by the respondents as being one of the weaker elements of the TEMPO programme and 'realization of ITS deployment' is seen as one of the strongest points of the programme.

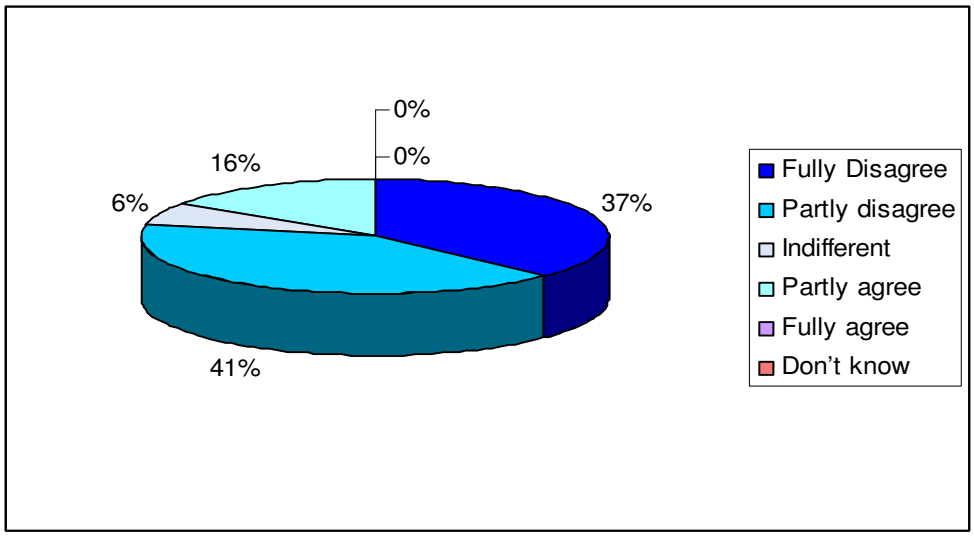
Question 4

The respondents were asked to give their opinion on the following proposition:

> "The objectives of the TEMPO programme would also have been achieved by carrying out ITS deployment through national ITS deployment programmes in the Member States"

The following diagram shows the opinion of the respondents concerning the proposition, depicted in percentages of total responses.

Figure A.1 Responses to proposition 1, question 4



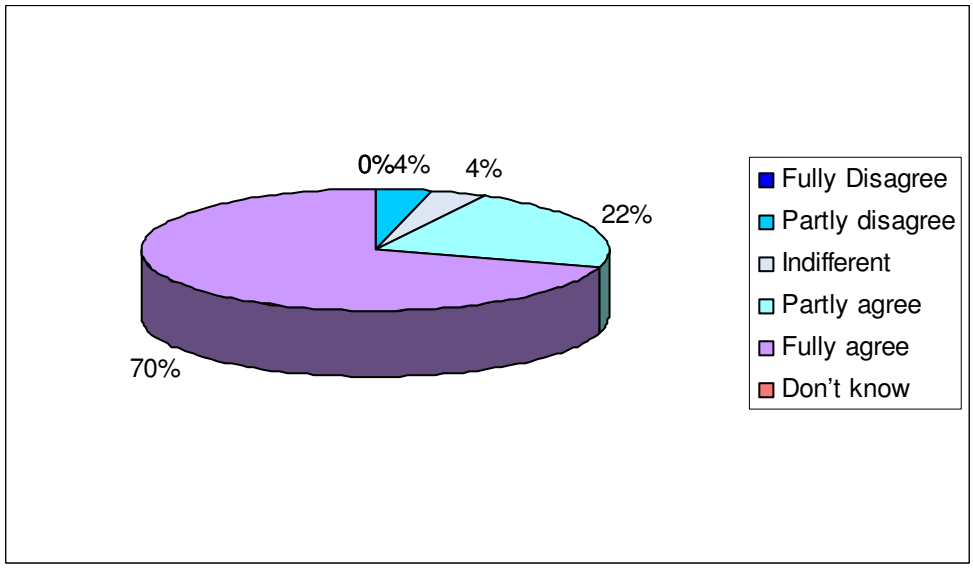
As is shown by the diagram 78% of the respondents do not agree (either 'partly' or 'fully' with the proposition and only 16% partly agrees with the proposition.
Analyzing the responses of the Public and the Private parties shows that 25% of the Public parties 'partly agree' with the proposition compared to only 3% of the Private parties.

The respondents were also asked their opinion concerning the following proposition:

> "A common European ITS deployment programme creates European Added Value that could not have been realized by Member State programmes"

Diagram A1.2 shows the division of the answers given by the respondents in percentages of total responses.

Figure A.2 Responses to proposition 2, question 4



This diagram shows that 70% of the respondents fully agree with the proposition and 22% partly agree.
The 4% of respondents that partly disagrees with the proposition fully consists of Public parties.

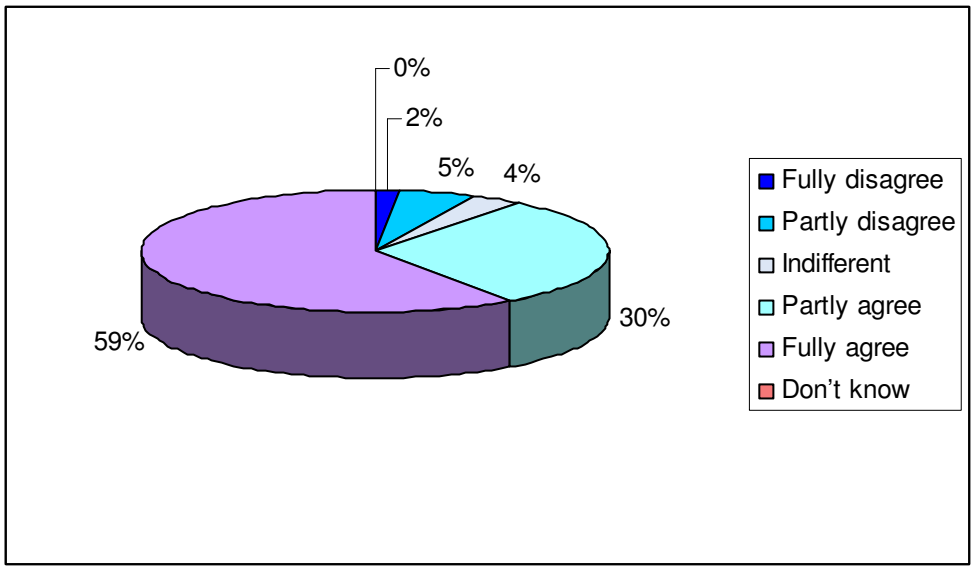
Question 5

The respondents were asked to give their opinion on the following proposition:

> The follow-up of the current TEMPO programme should be focused more on multimodal traffic (information exchange between traffic control centers, traveller information services, etc.)

The following diagram shows the result of the responses in percentages of total responses.

Figure A.3 Responses to proposition, question 5



As the diagram shows, the combined answers 'partly agree' and 'fully agree' make up for almost 90% of the responses given.
Only a small percentage of both the Public parties and the Private parties did not agree with the proposition.

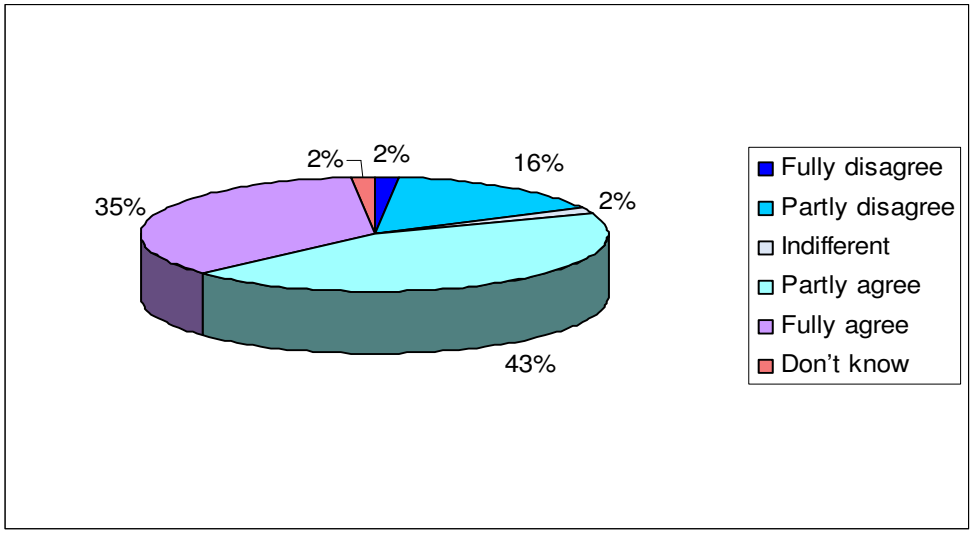
Question 6

The respondents were asked to what extent they agree with the following proposition:

> "The follow-up of the current TEMPO programme should be opened up for non-public parties to deliver traveller information services"

The responses given can be shown in the following diagram as percentages of total responses.

Figure A.4 Responses to proposition 1, question 5



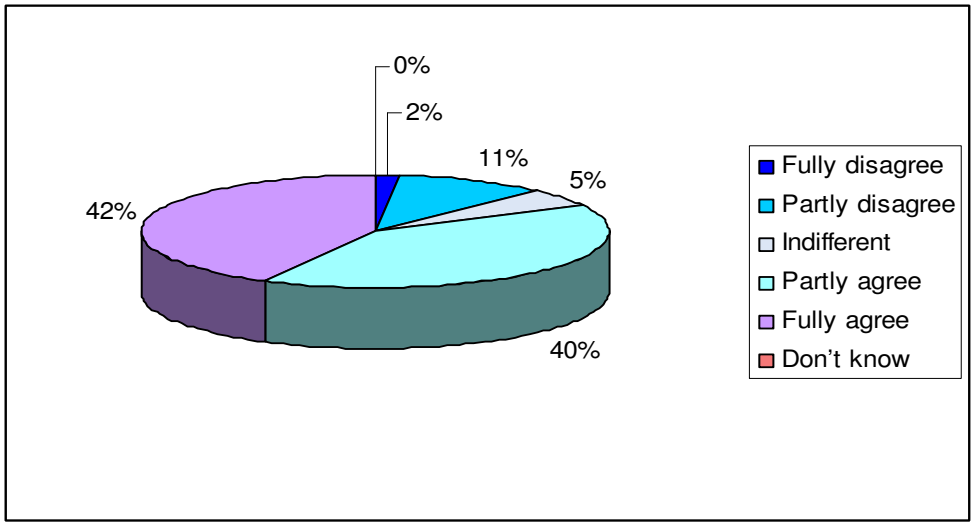
The diagram shows that overall the respondents agreed with the proposition, however 16% of the respondents partly disagreed with the proposition.
The respondents that partly disagreed with the proposition consisted almost entirely of Public parties.

The respondents were also asked to give their opinion on the following proposition:

> "If the follow-up of the current TEMPO programme will be multimodal, this new programme should be opened up for private actors such as public transport companies and traffic information service provider."

The diagram depicted below provides an overview of the answers given by the respondents in percentages of total responses

Figure A.5 Responses to proposition 2, question 5



82% of the respondents partly or fully agreed with the proposition. The 11% that partly disagree with the proposition is spread evenly between Public and Private parties.

Question 7

The respondents were asked what they thought the advantages and disadvantages would be of providing the TEMPO programme with the following domain structure:

- Network Operation, incorporating traffic monitoring, data exchange and traffic management.
- European ITS services centred on the provision of multimodal traveller information and other user oriented services.

Table 3 shows the advantages that the respondents expect from the proposed domain structure, in absolute figures (number of times the argument was mentioned by the respondents).

Table A.4 Expected advantages of proposed domain structure

Advantages:	Response
less fragmentation in domains and projects (synergy)	17
more important role multimodality	7
Easier to set and assess goals	4
Facilitates European cooperation and information flows within ITS	4
No advantages	4
Simplification of the current structure, monitoring and reporting	3

As table A1.3 clearly shows, the respondents expect positive outcomes for the TEMPO programme if the domains and projects are less fragmented than is currently the case. This could be explained by the expected synergy effects that could come from larger domains.
The Private parties mentioned this advantage of the proposed domain structure 11 times of the total 17 times it was mentioned.
The expectation that it would be easier to set and assess goals in the proposed domain structure was only mentioned by the Public parties.

Table A1.4 shows the disadvantages that the respondents expect to arise from the proposed domain structure. Again the numbers shown in the table are absolute figures (number of times the argument was mentioned by the respondents).

Table A.5 Expected disadvantages of the proposed domain structure

Disadvantages	Response
No disadvantages	9
Breaking up existing (well functioning) networks	8
Hard to manage such large domains	8
Time consuming implementation of new management structures & working principles	3
Focus **within** domain could cause less cooperation **between** domains	3

Table A1.4 shows that the respondents mostly saw no disadvantages in introducing the new domain structure in the TEMPO programme.
However the two biggest disadvantages that the respondents did see were that a new domain structure would mean that new networks would have to be established and that it would be harder to manage larger domains than the current (smaller) domains.
Especially the Public parties mentioned that it would be harder to manage larger domains (6 of the 8 times it was mentioned).

Question 8

The respondents were asked if they could think of new domains/topics that should be covered in the follow-up of TEMPO.
Table 5 gives an overview of the domains/topics that the respondents expect to be of added value to the programme.
The numbers given in table 5 are percentages of the total domains/topics that were mentioned.

Figure A.6 Domains/Topics to be included in follow-up of TEMPO

Multimodality	19%
Transport safety	17%
(Heavy) freight transport	13%
Cooperation with private industries, i.e. car industry	10%
Long Distance Corridors	9%
Urban/interurban links	9%
Environment	5%
Cooperation/networking between parties	4%
Quality of service	4%
Galileo	4%
Electronic Fee Collection	1%
Marketing	1%
Linking communication systems	1%
ITS for elderly & disabled	1%

As can be concluded from table A1.6, a large part of the respondents would like more attention to be paid in the TEMPO programme to multimodality and transport safety.
'Urban/Interurban links' was only mentioned by Private parties as were 'Long distance corridors'.

Question 9

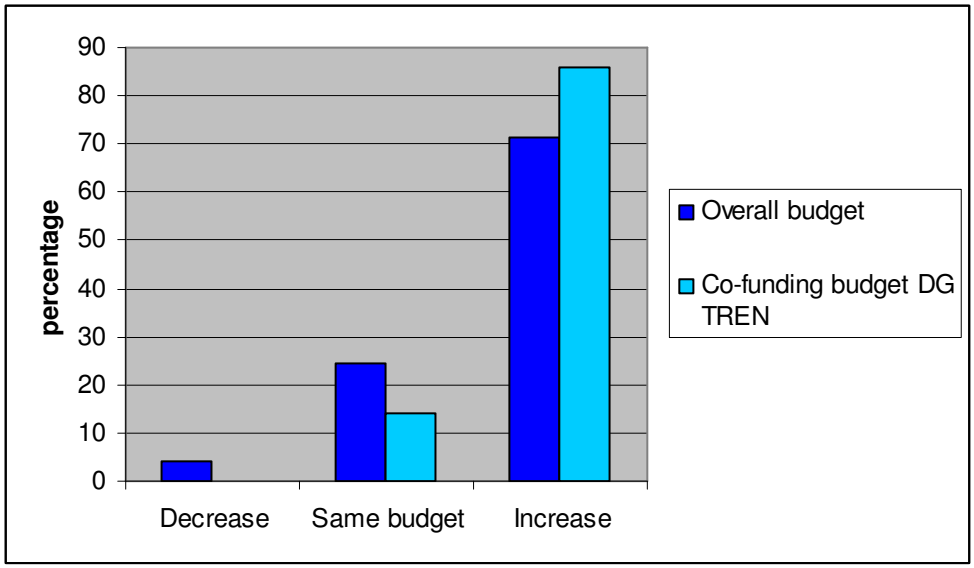
The respondents were asked if they thought the leading role of the road authorities in the 7 Euro-Regional projects should be continued in the follow-up of the TEMPO programme.
Almost all respondents answered this question with yes, there was however a large part of the respondents that also stated that if the TEMPO programme would focus more on multimodality, this would require the active involvement of other authorities (for example a ministry of transport).

Question 10

Diagram 7 shows in what way the respondents think the overall budget and co-funding budget of the TEMPO programme should change. The staffs indicate the percentages of respondents that wanted the overall budget and co-funding budget either to decrease, stay the same or increase

For example, no respondents wanted the Co-funding budget to decrease.

Figure A.7 Opinion of the necessary change in TEMPO budget



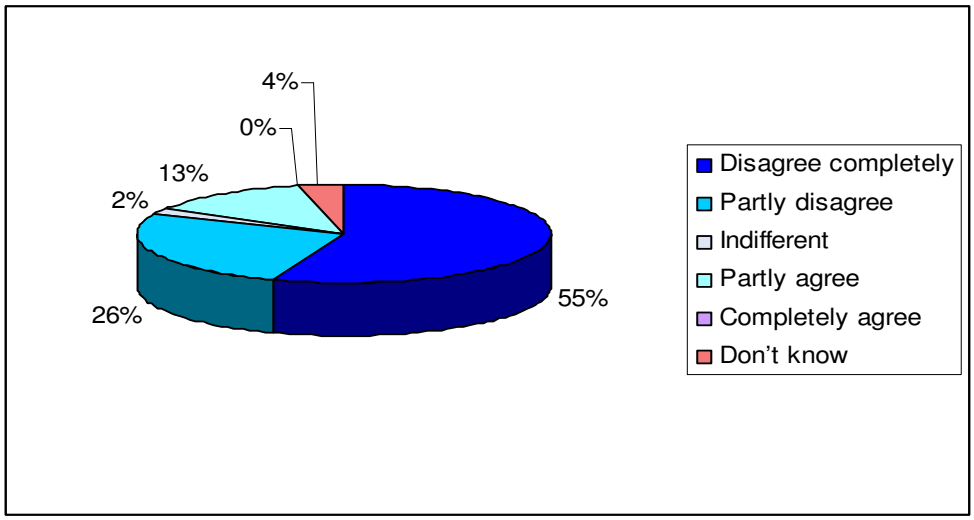
As the diagram makes clear a large percentage of the respondents want both the overall budget as the co-funding budget to increase. One of the reasons the percentage is lower for the overall budget than for the co-funding budget, is because some respondents say that because of the limited national budget, an increase in the overall budget of the TEMPO programme will have only a limited effect.

The respondents were also asked to give their opinion of the following proposition:

> "The level of service is appropriate on large parts of the TERN in Europe, the programme budget for ITS deployment on roads can thus be reduced for a new programme"

The answers the respondents provided led to figure A1.8, where the answers are depicted in percentages of total responses.

Figure A.8 Responses to proposition 1, question 10



The majority of the respondents disagreed with this proposition, only some of the respondents partly agreed. These respondents were mostly Public parties.

The respondents were also asked to give their view towards the following proposition:

"Extended modal coverage requires additional budget"

The answers of the respondents are shown in figure A1.9, where again the answers are given as a percentage of total responses.

Figure A.9 Responses to proposition 2, question 10

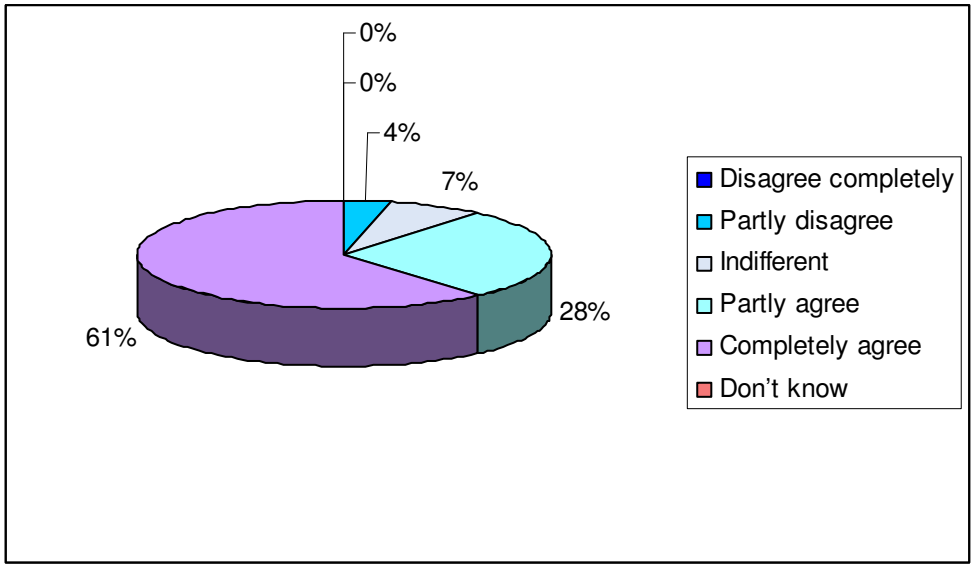


Figure A1.9 shows that the vast majority of the respondents agree with the proposition. The respondents that partly disagreed with the proposition are evenly spread over Public and Private parties.

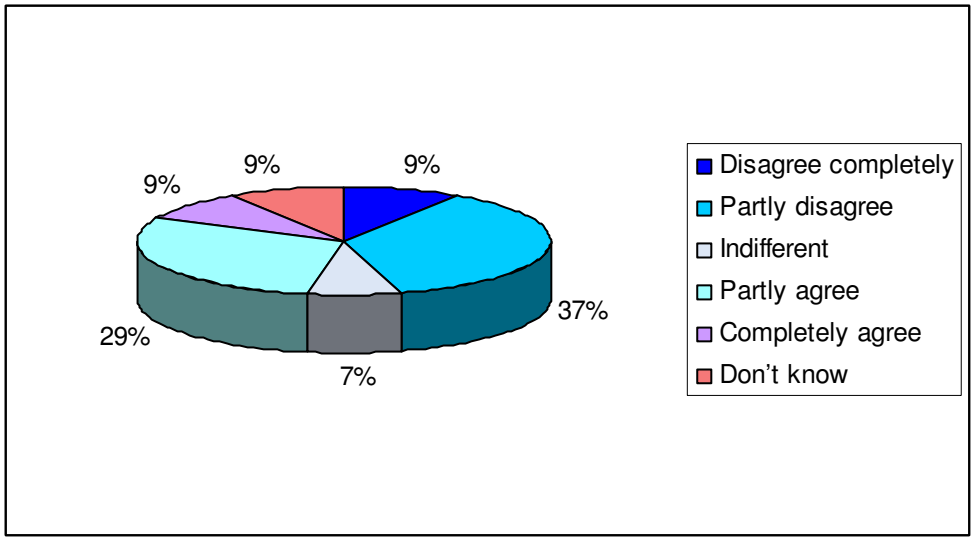
Question 11

The respondents were asked to give their opinion on the current funding mechanism of the TEMPO programme (10% for 'works' and 50% for 'studies').
One of the propositions that the respondents were asked to comment on is:

> "The funding mechanism should remain the same"

The diagram shown below is the division of answers given in percentages of the total responses given.

Figure A.10 Responses to proposition 1, question 11



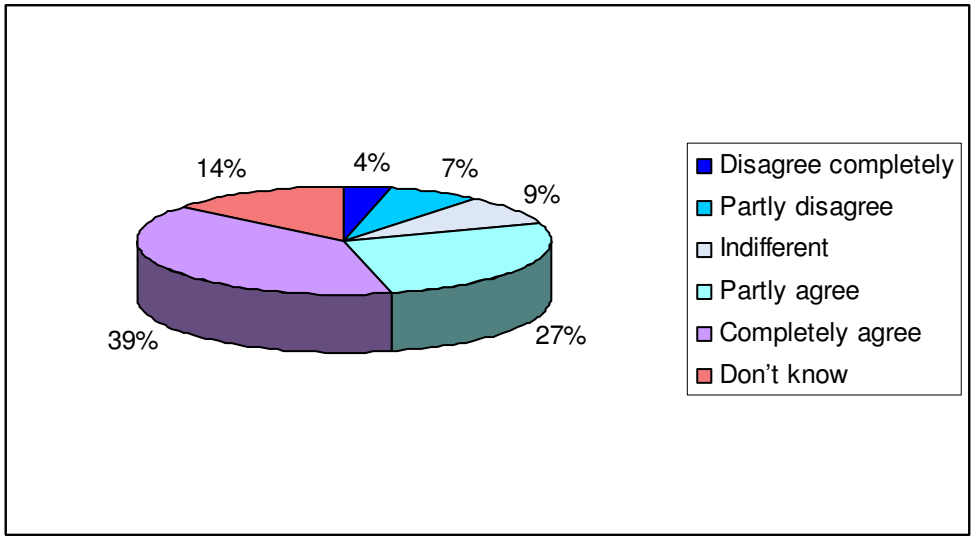
As the figure shows, the majority of the respondents disagrees with the proposition, but there seems to be a large spread in the answers. 38% of the respondents agrees with the proposition and 46% of the respondents disagrees with the proposition.
The reason for this spread is the fact that the majority of the respondents of the Public sector were of the opinion that the funding mechanism, could more or less, remain the same, whereas the majority of the Private parties respondents mostly disagreed with the proposition.

Another proposition that was presented to the respondents was the following:

> "The 10% co-funding for works is not sufficient for some new Member States to cover the remaining funding for works"

Diagram 10 shows to what degree the respondents agree with the proposition, given in percentages of the total responses

Figure A.11 Responses to proposition 2, question 11



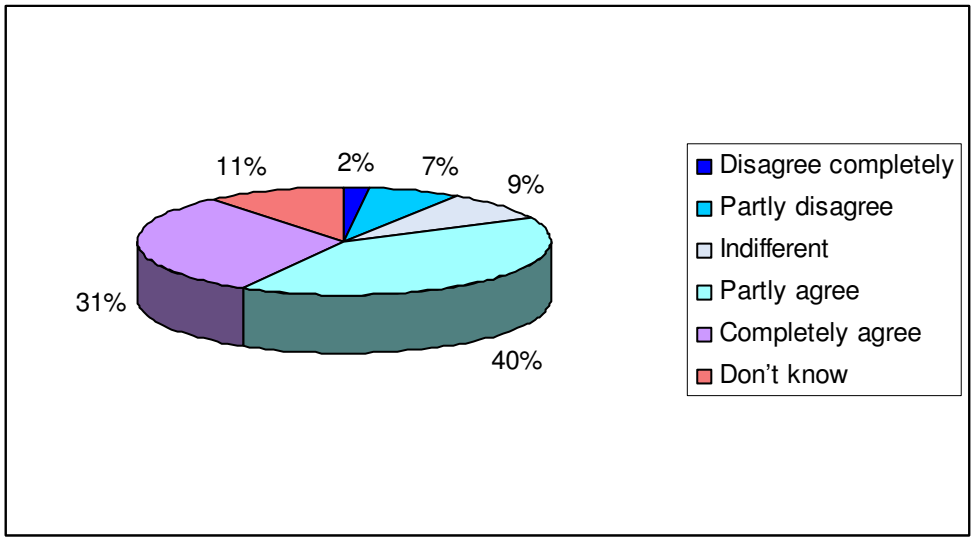
The figure shows that 66% of the respondents partly or completely agree with this proposition.
The 11% of the respondents that disagree with the proposition is evenly made up out of Public and Private parties.

The final proposition that was presented to the respondents was the following:

> Private parties (service providers) will be only attracted to the follow-up of the current TEMPO programme, if the EC-funding for ITS services will be 35% or more

In figure A1.12 the answers given by the respondents are depicted as a percentage of the total responses.

Figure A.12 Responses to proposition 3, question 11



The majority of the respondents agree with the proposition. Taking a closer look at the Public parties shows that a substantial part (12%) of the Public parties' respondents disagrees with the proposition. This partly results in the 9% of total respondents that does not agree with the proposition.

Question 12

The respondents were asked what they thought would be the key success factors of the new TEMPO programme 2007-2013
Table 6 shows the answers that were given in percentages of the total factors that were mentioned.

Table A.6 Expected success factor of the follow-up TEMPO programme

Interoperability	16%
Clear targets & results	14%
Cooperation between member states	12%
Reduction of administrational burden	11%
Focus on multimodality	11%
Sufficient funding	8%
Increase of flexibility in project planning	5%
Focus on traffic safety	4%
Support and facilitate PPP	3%
Be open to developments outside the transport sector	3%
Information & training	3%
Focus on harmonized European Road User Charges	2%
Focus on movement through Corridor	2%
Make transport user part of the programme	2%

The key factor that was mentioned the most by the respondents is 'Interoperability'. Clear standards and quality management should contribute to the 'interoperability' of the programme and projects.
Other key factor that were mentioned often are the 'setting clear targets and clear results', 'cooperation between member states', the 'reduction of the administrational burden' and the 'focus on multimodality'.

Question 13

The respondents were asked if they know any similar types of programmes that are aimed at ITS deployment, implemented at member state level (EU-25):

- Polis programme
- Clean urban transport
- Transumo
- Marco Polo Programme
- Interreg III Programme

- eContent[21]
- eSafety[14]
- European ITS Framework architecture, KAREN
- ERA-NET
- The Tispol programme

- In Germany (the BMBF Ministry of Education and Research supports ITS projects)
  - ✓ MOTIV
  - ✓ INVENT
  - ✓ AKTIV
  - ✓ 'Mobilität in Ballungsraeumen'
  - ✓ 'Verkehrsmanagment 2010'
  - ✓ Initiative Mobility 21
  - ✓ INTREST

- In Sweden: Finland
  - ✓ IVSS programme

- In Finland
  - ✓ AINO programme22

- In Austria
  - ✓ telematics masterplan for austria 2004

Websites of interest mentioned by respondent:
- www.staufreieshessen2015.de.
- http://www.mobiball.de/
- http://www.bmvbw.de/Verkehr/Integrierte-Verkehrspolitik-,1416/Programme-zur-Verkehrs-beeinflu.htm
- http://www.frame-online.net/home.htm (European ITS Framework architecture, KAREN)
- Austria www.bmvit.gv.at and www.via-donau.com

Question 14

The respondents were asked if they had any knowledge of ITS deployment outside Europe:

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21 " With the decision now from the European Parliament and the EC to go for a new eContentPlus programme 2005-2008 with a budget of 149 M€. I think a strong liaison to this multi-annual programme of DG-INFSO should be established at least in the traveller information domain. The same argument holds for traffic management and eSafety of DG-ENT and DG-INFSO, especially activities in the current call on "Cooperative Systems for Road Transport"."

22 In Finland AINO, the R&D programme for transport telematics services. AINO is concerned to develop the collection, management and use of real-time transport information and in this way to provide a foundation for transport telematics services with a view to improving the safety, efficiency and sustainability of the transport system, promoting well-being in society and strengthening the competitiveness of Finnish industry. Ultimately the aim is to develop the Finnish information society in line with the Government's transport policy objectives. Special emphasis is given to the development of permanent services for end-users.

- PIARC

- The USA[23]
  - ✓ The ITS benefits and costs database of FHWA and the IDAS system for evaluation
  - ✓ PATH Berkeley, DOT, ITS America

- Japan
  - ✓ various Japanese programmes, particularly their ability to involve private parties.

- Iran
- China
- Canada[16]
- Australia[16]

Websites of interest mentioned by respondent:
http://www.iteris.com/itsarch/index.htm United States, Department of Transportation. (2005). National ITS Architecture, Version 5.1.

Question 15
The respondents were asked if they had any other issues they would like to mention. Below are the answers that were given, divided into Private parties and Public parties:

Private parties
Workplans and decisions should cover a longer period than one year, since most projects have a longer duration and the financial basis should be clear for the whole duration.

The strategic importance of ITS needs more promotion and political awareness. This instead of building new roads. ITS can highly contribute to solve the environmental problem due to traffic.

Find support for further TEMPO financing by the Commission.

Again, I would like to see a stronger statement from the ERPs towards standardisation, including a better collaboration on strategy level with CEN.

The Decisions at the current moment lie at the Member State level (FAC Committee), with the Decision negotiations every year, despite MIP multi-annual theory, taking place, with the major transport infrastructure projects competing with ITS projects and taking a big portion. More needs to promote ITS deployments and projects within the Member States and the EC.

The regional coverage of the Euro-Regional Projects should also be improved. For example it's well known that Baden Württemberg wants to go to CENTRICO. It should also be discussed if it is a good idea to have a single project with the new MS or perhaps

[23] According to one of the respondent evidence from these countries shows that "you can only co-ordinate with money"

its better to insert the new MS into the old projects. Better knowledge transfer and its easier for them to learn about handling such kind of projects

The financial management and the screening procedures are extremely tedious and require a lot of work from participants, even though the main parties involved are member states governmental organisations. This seems excessive and causes so much extra burden that some participants have considered seriously to withdraw from the programme just because of this.

Funding should be possible in a short time cycle. For private companies it will be not possible to finance in advance for such a long time.
Workplans and decisions should be for a longer period than one year.

The website, including public documentation and activity reports seem not really up to date. Presentation to public may increase awareness of the programme and progress.

ITS is needed to solve many problems, building new infrastructures and roads is expensive. Naturally new roads are needed, but also the existing ones could be used more effectively with the help of ITS.

Public parties
ITS in connection with other modes is much more than information distribution, just to name “e-ticketing” and “booking/ticket buying possibilities” via internet.

Programme and the administration of the programme should be more supple and flexible. Instead of the budget being tied up according to domain structure the budget and the co-funding should be allocated to larger integrated projects. The projects shall be selected and assessed by the Commission on the basis of clear and concrete priorities and criteria defined by the Commission.
It is still important that the Commission allocated budget and co-funding for the common work and co-operation in the domains as it is of fundamental value.

Less dealing with administration aspects in the project management boards. The members should be confronted with more technical-economic-organizational aspects.
Additional expert groups are not useful.

Yes, the “Big Shift” (CEDR, the network and traffic management becomes more and more important).

The development of ITS in the participating countries varies very highly from country to country. It would be useful to obtain European-wide standards and adaptations on a high level that a “competition” between the member states like in the PISA-study would be established.

The work we have started ten years ago, must go on, also in the old member states. In TEMPO Programme the main focus should be on road operation, linked to attendant measures.

New Deployment Programme for ITS (2007-2013)

Ex ante evaluation - Stakeholders' consultation questionnaire

General information

Name: ……..
Organisation: ……..
Phone: ……..
E-mail: ……..
Experience with current TEMPO Programme? ☐ Yes ☐ No
Please note that all information will be used anonymously. This information will be used to see who returned the questionnaire and to be able to contact you for clarification purposes when necessary.

Section 1: Experiences with the current TEMPO programme (2001 – 2006)

NOTE: THIS SECTION ON THE CURRENT TEMPO PROGRAMME CAN BE SKIPPED IF YOU HAVE NO EXPERIENCE/INVOLVEMENT WITH THE CURRENT TEMPO PROGRAMME.

1. Can you describe your experiences/involvement with the current TEMPO programme?

2. The current TEMPO programme is expected to contribute to solving a number of transport problems in Europe. Please indicate your assessment of the impact of the TEMPO programme by ticking the box.

	none	low	moderate	high	very high	don't know
Reduction of congestion						
Reduction of environmental damage caused by traffic						
Accessibility of cities/regions (regional cohesion)						
Interoperability of transport modes						
Interoperability of ICT systems (ITS) that support the transport system						

Speeding up deployment of ITS						
Implementation and user acceptance of balanced charging system						
Realization of the internal market						
Safety in transport						
Security (vulnerability of transport systems, e.g. tunnels and bridges)						

3. What in your opinion are strong and weak points of the TEMPO Programme?

	Very weak	Weak	Neutral	Strong	Very strong	Don't know
Programme management						
Project management						
Scope and focus of the programme (domains)						
Involvement of relevant stakeholders in the programme						
Clarity of deployment targets						
Clarity of workplans						
Realization of ITS deployment						
Contribution to standardization and interoperability of ITS in Europe						
Cooperation with national ITS deployment programs/projects in EU-25 member states						
Dissemination of project results						
Others, please specify: - … - …						

4. The key objective of the TEMPO programme concerned with ITS in the road sector is to stimulate a harmonised and synchronised deployment of ITS systems and services on the trans-European road network (TERN) and to contribute to convergence between national/regional planning and the overall implementation of the Information Society in the field of road transport in Europe. Please answer the following statements concerning the role of the EU and the Member States in deployment of ITS.

	Fully Disagree	Partly disagree	Indif-ferent	Partly agree	Fully agree	Don't know
The objectives of the TEMPO programme would also have been achieved by carrying out ITS deployment through national ITS deployment programmes in the Member States						
A common European ITS deployment programme						

creates European Added Value that could not have been realized by Member State programmes						
Explanation:						

Section 2: The follow up of the TEMPO programme (for 2007 – 2013)

5. The current TEMPO programme is very much focussed on 'Road'. A possible modal extension may be included in the future programme. Please answer the following statement.

	Fully disagree	Partly disagree	Indif-ferent	Partly agree	Fully agree	Don't know
The follow-up of the current TEMPO programme should be focused more on multimodal traffic (information exchange between traffic control centers, traveler information services, etc.)						
Explanation:						

6. The current TEMPO programme is very much focussed on public authorities. Please answer the following statement.

	Fully disagree	Partly disagree	Indif-ferent	Partly agree	Fully agree	Don't know
The follow-up of the current TEMPO programme should be opened up for non-public parties to deliver traveler information services						
If the follow-up of the current TEMPO programme will be multimodal, this new programme should be opened up for private actors such as public transport companies and traffic information service providers.						
Explanation:						

7. The current TEMPO programme has four domains (*Road Monitoring Infrastructures*, *European Network of Traffic Control Centres*, *Traffic Management & Control* and *Traveller Information Services*). A possible idea is to introduce a different domain structure, e.g.:
   - Network Operation, incorporating traffic monitoring, data exchange and traffic management.

- European ITS services centred on the provision of multimodal traveller information and other user oriented services.

What is your opinion about this change of domain structure? What would be the advantages/disadvantages?

Advantages:	Disadvantages:

8. Can you think of new domains/topics that should be covered in the follow-up of TEMPO?

9. The current TEMPO programme is carried out through 7 Euro-Regional projects, which are all lead by (public) road authorities. Do you think the role of road authorities in the project management should be continued in the follow-up of TEMPO?

10. a) The overall budget of the current TEMPO programme (2001-2006) is 1.2 billion euro, of which 192 million euro funded by DG TREN. What should be the budget for the next programme (2007-2013) and why?

	Decrease	Same budget	Increase	Explanation (why, to what extent)
Overall budget				
Co-funding budget DG TREN				

b) The size of the budget may depend on the scope of the programme. To what extent do you agree with the following statements?

	Disagree completely	Partly disagree	Indifferent	Partly agree	Completely agree	Don't know
The level of service is appropriate on large parts of the TERN in						

Europe, the programme budget for ITS deployment on roads can thus be reduced for a new programme						
Extended modal coverage requires additional budget						

11. The current programme gives a grant of 10% for 'works' and a grant of 50% for 'studies'. To what extendt do you agree with the following statements?

	Disagree completely	Partly disagree	Indifferent	Partly agree	Completely agree	Don't know
The funding mechanism should remain the same						
The 10% co-funding for works is not sufficient for some new Member States to cover the remaining funding for works						
Private parties (service providers) will be only attracted to the follow-up of the current TEMPO programme, if the EC-funding for ITS services will be 35% or more						
Explanation:						

12. What will be the key success factors for the new programme 2007-2013?

Other issues

13. Do you know similar type of programmes aimed at ITS deployment which are implemented at member state level (EU-25)? If possible, give reference or web-address of the programme.

14. Do you have any experience with/knowledge of ITS deployment programmes outside Europe?

15. Are there any other issues that you would like to mention?

If you have any questions, please contact Gerwin Zomer (phone: +31 10 453 8647, e-mail: gerwin.zomer@ecorys.com).

You are kindly asked to **return the completed questionnaire at the latest on September 30th, 2005.** This can be done by e-mail to gerwin.zomer@ecorys.com , by postal service to: ECORYS Transport, Attn. Mr. G. Zomer, PO box 4175, 3006 AD Rotterdam, The Netherlands or by fax to +31 10 452 3680.

THANK YOU FOR YOUR CO-OPERATION!

Annex B Logical Framework Matrix

Intervention Logic	Verifiable Indicators	Means of Verification	Assumptions/Risks
General objective (overall objective) To contribute to an efficient and sustainable transport system	• Weighted average of the transport costs per passenger kilometre and per tonne kilometre over all transport modes • Total level of emissions of all transports (road, air, rail, waterways, sea, pipeline transport) • Total number of traffic deaths and traffic injuries of all transport modes	Statistics on environmental performance, congestion and traffic safety of the transport system in EU-25.	
Specific objective (purpose) 1. To stimulate deployment of ITS measures that improve network efficiency, enhance traffic safety and consequentially improve the environmental performance of the transport system 2. To harmonise the ITS systems and services in Europe.	• Reduction of growth of road congestion • Increase in average speed • Reduction in average number of daily traffic jams • Reduction in average length daily traffic jams • Reduction in congestion time losses • Reduction in CO_2 emissions road transport per annum • Reduction in NOx emissions road transport per annum	Statistics on environmental performance, congestion and traffic safety of the transport system in EU-25 Project and programme Monitoring Interim/mid-term evaluations of	• Development of international transport in period 2007-2013 in line with forecasts • Risk of measuring other causes for improved safety (e.g. safer cars), for congestion reduction (e.g. pricing policy) or for environmental damage (e.g. cleaner transport by increased

Intervention Logic	Verifiable Indicators	Means of Verification	Assumptions/Risks
	• Reduction in number of people affected by traffic noise • Reduction in range of area affected by traffic noise • Reduction in traffic deaths in EU 25 per annum • Reduction in traffic injuries in EU25 per annum • Reduction in traffic accidents in EU25 per annum in relation the number of vehicles • Reduction in the ratio between traffic deaths and number of accidents in EU25 per annum • Budget expenditure on ITS Deployment (works, not studies) • Number of different systems implemented in each domain • Number of agreements resulting from harmonisation activities • Number of standardisation proposals for ITS services in Standardisation Bodies	projects and Programme Ex-post evaluations	engine efficiency)
<u>Operational objectives (results)</u> 1. To further implement high quality road monitoring infrastructure for reliable ITS services 2. To further establish a European network of road traffic centres 3. To remove bottlenecks and ease traffic flows through road traffic management and control measures 4. To deploy systems that give easy access to high quality traveller information services,	• Distribution of installed equipment that is being used (e.g. traffic counting stations, weather stations, and cameras) per distance/area • Number of operational traffic control centres/traffic information centres • Number of cross-border data exchange links • Number of operational traffic management plans • Number of traffic management systems in tunnels • Number of websites and portals for Traveller information services of predefined quality level	Ex-ante, interim and ex-post assessment of impacts of each project	• Technical risk • Management risk (competence and capability of project participants) • Political risk (on programme and project level) • Country risk (level to which EC subsidy is spent effectively, efficiently and without risk of loss or fraud)

Intervention Logic	Verifiable Indicators	Means of Verification	Assumptions/Risks
including the interface with other modes of transport 5. To deploy other ITS services like EFC, Emergency and Incident Management, etc 6. To coordinate ITS deployment at European level and support for standardisation efforts	• Availability of services at different times • Extent to which the TERN is covered by EFC • Extent to which incident management is implemented on the TERN • Extent to which emergency response is implemented on the TERN • Number of tunnels on the TERN equipped with safety systems • Number of different systems implemented in each domain • Number of agreements resulting from harmonisation activities in each domain of ITS deployment • Number of standardisation proposals for ITS services in Standardisation Bodies		
<u>Actions (activities)</u> 1. Installation of road monitoring equipment (e.g. traffic counting stations, weather stations and cameras) 2. Deployment and upgrading of traffic control centres and traffic information centres 3. Data exchange between traffic centres and sharing data with traffic and transport operators 4. Implementation of international/cross-border exchange of traffic data 5. Implementation of traffic management and control systems 6. Development and implementation of traffic	1. Number of installed equipment (weather stations, camera's loops, etc) 2. Number of traffic control /information centres 3. Number of working interfaces and data links between TCCs and TICs 4. Number of countries exchanging traffic data with other countries 5. Number of implemented new traffic management systems 6. Number of implemented traffic management plans 7. Number of installed VMS devices providing real time traveller information, coverage by RDS-TMC, number of customers making use of real time traveller information services (e.g. by SMS)	Number of projects and actions submitted and approved Approved workplans	• Success rate of projects in terms of achieving the expected impact on congestion, safety and environment • Strong quality proposals

Intervention Logic	Verifiable Indicators	Means of Verification	Assumptions/Risks
management plans 7. Provide real time traffic information to the user (e.g. by VMS, RDS-TMC) 8. Development of websites and portals to provide traffic information to the user 9. Implementation of other ITS services (like EFC, Emergency and Incident Management, etc) 10. Harmonisation of ITS systems and services in each of the domains of the ITS deployment program (e.g. Protocols for exchange of traffic data, harmonisation of variable message signs, electronic fee collection, incident and emergency management, etc)	8. Number of realised websites offering real time traveller information, number of hits or information requests on traveller information websites 9. Availability of other ITS services 10. Number of different systems implemented in each domain, number of agreements resulting from harmonisation activities in each domain of ITS deployment, number of standardisation proposals for ITS services in Standardisation Bodies		