MedTIS corridor Evaluation Report

MedTIS III

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List of Abbreviations/Acronyms

- AADT (Annual Average Daily Traffic)
- AID (Automatic Incident Detection)
- BKPI (Benefit Key Performance Indicator)
- CBA (Cost Benefit Analysis)
- C-ITS (Cooperative Intelligent Transport Systems)
- CCTV (Closed circuit television)
- DKPI (Deployment Key Performance Indicator)
- EU (European Union)
- EIP (EU Intelligent Transport System Platform)
- HGV (Heavy Goods Vehicle[1])
- ITS (Intelligent Transport System)
- KPI (Key Performance Indicator)
- MSD (eCall: Minimum Set of Data)
- OCR (Optical Character Recognition)
- NPVB (Net Present Value of Benefits)
- NPVC (Net Present Value of Costs)
- SCADA (Supervisory Control and Data Acquisition)
- SE (Speed Enforcement)
- TCC (Traffic Control Centre)
- TEN-T (The Trans-European Transport Networks in Europe)
- TIS (Travel Information System)
- TMP (Traffic Management Plan)
- TMS (Traffic Management Systems)
- VOT (Value of Time)
- VMS (Variable Message Sign)

[1] http://www.transportpolicy.net/standard/eu-vehicle-definitions/

1 MedTIS III Action presentation

MedTIS III Action is distributed along a 6800 km Corridor embedding the Mediterranean TEN-T Core network together with sections of the Comprehensive network supporting the primary Core route.

MedTIS III corridor is at the heart of Southern Europe's exchanges.

MedTIS III corridor includes a number of mountainous areas in which the infrastructure contains numerous tunnels. It is set up on a continuous stretch European motorways, embedding various typologies of traffic (daily recurrent, seasonal peak migrations, heavy goods vehicle, long distance routes), 10 TEN-T Urban Nodes, 8 cross-border areas and more than 30 major and strategic bottlenecks spots related to network safety and efficiency.

MedTIS III also serves major cities, such as Milan, Lyon, Marseille, Barcelona or Lisbon, and connects major Adriatic or Mediterranean ports to Atlantique ports (Genoa, Marseille, Barcelona, Sinoes, Oporto) and thus constitutes a major axis of transit for people and goods that must operate optimally 24 / 7, in all circumstances.
Thus, MedTIS III corridor is characterised by:

- High volume of daily traffic on critical sections
- High rate of freight traffic (increasing)
- Combined use of long-distance and daily trips
- High volume of international road users
- Peak traffic during summer season (holiday itinerary – seasonal migration)
- Connections and go-through major conurbations (Core Urban nodes) leading to recurrent congestions

Some figures to illustrate MedTIS III network pattern (year 2018: before project implementation):

Estimation of more than 10 Millions of lost hours, 45 Millions of fuel liters over-consumption and 125 000 T of CO2 over-emissions due to congestion

More than 4 000 accidents causing about 5 600 slight injuries, 550 heavy injuries and 140 fatalities

In the following of MedTIS II, the main objectives of MedTIS III are to enhance the actions already deployed in MedTIS II, applying new technical solutions of data collection and data processing, in particular using artificial intelligence, to implement new Road Safety solutions, together with Traffic Management Services in coordinated way on the TEN-T Mediterranean corridor. This consists in the deployment of Intelligent Transport Services on the existing sections of the TEN-T roads with a special emphasis on the deployment of ITS equipments within and around tunnels, which represent strategic security bottlenecks of the corridor.

MedTIS III builds on previous and ongoing actions, co-funded under TEN-T (MedTIS - 2013-EU-50005-P) and CEF (MedTIS 2 - 2014-EU-TM-0588-W). As the deployed ITS included this Actions are different from MedTIS II, there is no overlapping between the two actions.

Figure 1: Road infrastructure covered by MedTIS III Action

In that context, MedTIS III main actions have **the ambition to significantly reduce congestion and improve safety on the whole corridor while using particularly cost efficient solutions.**

In particular, MedTIS III aimed to implement cross-border solutions, such as cross-border traffic management plans or cross-border travel times in order to facilitate the continuity of traffic all along that road axis.

To carry out these deployments, it was necessary to work in a coordinated way, between all the partners, to develop tools and methods allowing a better monitoring and management of the traffic and a better information of the motorists, notably thanks to more performing traffic management centres.

Action's budget is 65.92 M€ (from which 64.44 M€ on ITS deployments).

It consisted in the deployment of ITS Safety solutions, Traffic Management and Traveller Information services and supporting technologies that provide road operators with the relevant tools to optimize the use of the TEN-T network infrastructure in case of saturation or event/accident. TMS and TIS services directly contribute to the operational excellence and cost-efficiency of the TEN-T network.

The Action started in February 2017 and ended in December 2021. It was implemented by a consortium of private and public road operators from each Member State involved in the Action: Italy, France, Spain and Portugal.

The specific targets of MedTIS III Action were to deliver 800 km Road Safety Solutions, 3.200 km of Traffic Management Services deployed and enhanced along the Corridor, plus 2.650 km of supporting Traveller Information Services deployed and enhanced along the Corridor.

Interoperability of ITS services across Member States was ensured through the enforcement of relevant EU standards and in line with Directive 2010/40/EU and its delegated acts.

The challenge of MedTIS III Action was to deliver added-value for European road users along the corridor. The benefits sought by MedTIS III road operators were:

- Improved interoperability, continuity and seamless mobility
- Improved harmonization of services
- Improved operational excellence and cost-efficiency
- More performing Real-time traffic and travel information
- Improved road safety

Besides the implementation of ITS solutions, and in the following of MedTIS II which experimented new evaluation methods, one of the objectives of MedTIS III Actions was to confirm the impact of these implementations and assess if and how they bring the benefits previously mentioned. As for MedTIS II, the evaluation results have to be disseminated to allow other road operators and ITS Corridor Actions to take advantage from lessons learnt during and after the implementation. This work is done in coordination with the EU ITS Platform, following its directives and delivering the results to it.

2 Objectives of the evaluation

As established in coordination with other ITS Corridor Actions and the EU EIP, the objective of this evaluation was to assess MedTIS III Action on two aspects:

- The technical performance of the ITS deployments, to characterize the level of equipment of the Mediterranean Corridor routes
- The benefits of the Action for its target users: road operators and drivers.

After having demonstrated the concrete benefits of MedTis II actions and the profitability of such program, the main objective of MedTIS III is to demonstrate, on enlarged networks, and with more performing tools, how the co-ordinated deployment of ITS services still delivers tangible benefits and impacts on safety, network efficiency and environment.

Using the same innovative evaluation methods which have proofed their efficiency in MedTIS II, the evaluation of MedTIS III impacts focuses on:

- evaluation of progress indicators (progress deployments of TIS services along the corridor),
- evaluation of socio-economic impacts (congestion, safety, the environment).

The evaluation of benefits has been carried out under two angles:

1- The evaluation of individual emblematic deployments of MedTIS III Action (9 deployments were assessed). These projects, of local impact, have been deployed to better respond to the specific issues encountered on MedTIS III network:
   - improving traffic management and reducing congestion on critical spots, such as the approach of big cities, and cross-border areas;
   - improving safety on critical spots in particular in tunnels and their surroundings ;
   - improving fluidity of traffic flow and event information to users, including travel times information.

2- The evaluation of the impact on the whole corridor regarding MedTIS III main objectives of reducing congestion and improving safety

Beyond that, all benefits evaluations have to demonstrate the good cost-efficiency of the deployments and solutions applied and the ROI of the various projects has also to be evaluated.

Impact indicators have been defined, and MedTIS III partners have assessed deployments against the agreed set of indicators.

The report presents in the followings chapters, the results of the evaluations, with the figures from the corridor level evaluation and an overview of the individual deployments' evaluation. The report finishes with the elements on the overall assessment ant the transferability of the results.
The detailed individual evaluation reports can be found in the Annex.

The evaluation will allow all stakeholders (road operators, Member States, European Commission, EU EIP, European citizens and travellers) to understand the nature of investments made and the impact they have for target users. ITS implementers will profit from lessons learnt by MedTIS III partners, so they can better prepare their own deployments, avoid or solve the problems encountered, and choose the solutions most adapted to reach their own objectives.

The following chapter describes the methodology adopted to realize the evaluation, pointing out the difficulties encountered and the solutions proposed to overcome them.

3 Evaluation methodology

3.1 Key Performance Indicators

Two sets of Key Performance Indicators have been adopted to assess each of the two aspects of this evaluation (technical performance and socio economics benefits).

Deployment KPIs

MedTIS III Action focuses on deploying three types of services: Road Safety Solutions (RSS), Traffic Management services (TMS) and Traveller Information services (TIS). The KPI selected at the beginning of the Action to evaluate the success of the Action is the number of kilometres covered by the new systems deployed.

Table 1: Deployment KPIs

	KPI Name	KPI definition	Corridor's objectives by the end of the Action
	RSS deployment progress	Length of TEN-T network on which RSS is deployed and enhanced	800 km of TEN-T network on which Traffic Management Services are upgraded
	TMS deployment progress	Length of TEN-T network on which TMS is deployed and enhanced	3 200 km of TEN-T network on which Traffic Management Services are upgraded
	TIS deployment progress	Length of TEN-T network on which TIS is deployed and enhanced	2 650 km of TEN-T network on which Traveller Information Services are upgraded

To measure this KPI at Corridor level, each individual deployment done in MedTIS III Action is classified either as RSS, TMS or TIS. Road operators then calculate the length of motorway covered by the individual solution at the end of the deployment. The data at Corridor level is obtained through the addition of each individual KPI.

Besides this classification regarding Road Safety, Traffic Management and Traveller Information services, MedTIS III partners aim to deliver a more concrete view of the improvements on level of service due to equipment and operational solutions deployed. To do this, and in coordination with others corridors, in the frame of EU EIP working groups, they have defined a ranking scale to qualify the Level of Service of each motorway of MedTIS III Action. This ranking scale is consistent with the one used for the MedTIS II project evaluation in order to be able to see the evolution on a longer period of time. The ranking scale is the following:

Table 2: Level of Service (LoS) scale

Level	Services	Comments
0	**Nothing is implemented**	There is no ITS deployed with the exception of perhaps emergency telephone. There may be limited traffic counters/loops
1	**Basic travel information**	VMS are implemented with traffic information (e.g. Warning for accident, warning for traffic jam, and warning for meteorological event). The VMS is not repeated on every section. One sign is valid for several sections of the motorway. There will be basic monitoring.

		This can be considered as basic level of ITS service where there may be one or two signs placed over several (long) sections, and information is applicable for over a wide area and not necessarily specific to the immediate location of the sign.
2	**Traffic information and traffic management per section**	There may be a VMS at the start of each section and at the entrance of motorway, and/or a radio station dedicated to traffic information covering the network. Travel time information, including cross border travel time, speed control, overtaking bans may be some of the measures and messages provided on the equipped sections. CCTV cameras may be implemented on specific sectors. This level applies where information for management the network, is applicable to the immediate vicinity of the signing. There will be monitoring using a variety of technologies.
3	H**igh level and sophisticated Traffic information and traffic management**	CCTV cameras are regularly installed along the motorway, with, in some specific cases, an incident detection system. Vehicle tracking systems may be implemented. Floating mobile data can be used on sensitive sections to improve data collection, to facilitate more accurate travel time information, and to make accident detection more reliable. Specific software may be developed on sensitive sections to automatically prepare traffic information delivery and propose to motorway operators even more performing traffic management solutions. This level applies where there is a high level of sophistication with accurate traffic data collection and performing traffic management on long sections. There are various and numerous channels of information delivery, including on board information. This level should be considered as a performing level of specification for inter-urban motorways and the first level of specification for the urban motorways.

MedTIS partners have used this scale to qualify each section[2] of their network.

Two situations have been established to help situate the improvement of level of service due to MedTIS III Action:

- the first one, for year 2018, before project deployment,

- the second one, for year 2021, after full project deployment

At individual deployment level, road operators have used the Deployment KPIs defined by the EU EIP. This has been done for deployments for which a specific evaluation was carried out (see chapter 3.3).

Benefit KPIs

MedTIS III Action focuses on two main objectives: improving road safety by reducing accident number and severity and reducing congestion on strategic bottlenecks of the Corridor, thus reducing CO2 emissions. Indeed, a direct consequence of congestion diminution is a reduction in fuel over-consumption, and a reduction of tons of CO2 emitted, leading to a positive impact on the environment. Therefore, the three benefit KPIs chosen for MedTIS III Action are:

[2] length of motorway between two interchanges

Table 3: Benefit KPIs

	Category	KPI Definition	Corridor's objectives by the end of the Action
	Congestion	Change in bottleneck congestion EU EIP Code: EUEIP-BKPI-N3	reduction of loss hours for road users during congestion on main strategic bottlenecks of the corridor (considering the same level of traffic along time)
	The Environment	Change in CO2 emissions EU EIP Code: EUEIP-BKPI-E1	reduction CO2 emissions on strategic bottlenecks of the corridor
	Safety	Change in accident number and severity EU EIP Code: EUEIP-BKPI-S1	Reduce accident number and severity.

3.2 Perimeter of the evaluation and difficulties encountered

The ambition of this evaluation is to qualify technical performance and impact for end-users of MedTIS III Action on **the whole deployment perimeter** (6 800 km along the Mediterranean corridor), with the permanent concern to deploy investments and methods of performing cost-efficiency. Nevertheless, there are several constraints that make this a difficult exercise:

- Action schedule

The evaluation has to be delivered at the immediate end of the project, whereas the effects of ITS solutions require a long time period for their evaluation.

For example, the evaluation of the impact of the program in terms of safety is carried out through the examination of the accident statistics recorded before and after the implementation of the project. Yet, an accident is, fortunately, a rare statistical element. To show significant results, these statistics must be based on very numerous accidents (hundreds and possibly thousands), which occur over several years (at least 5 years). A significant measure of the safety impact of a program therefore normally requires approximately 5 years after implementation of the program.

As MedTIS III deployments are all finished between 2018 and 2021, real data on impacts observed after the deployment were not always ready or sufficient for their evaluation in 2021.

Therefore, the assessments were conducted using, in addition to real data, data projections or simulated data.

In these cases, the challenge is to establish simulated data that is indeed representative of the real data.

To help the MedTIS III operators to build their evaluation data, calculation models of hours lost in congestion and CO2 over-emissions in congestion, have been developed in the frame of MedTIS III.

Thanks to these developments, the data "before project", calibrated with real data can be considered as very reliable data.

- External factors

Given the extent of the geographical perimeter and the duration of the implementation (5 years taking in consideration the 1 year extension of the Action), there are various external factors that can have an influence on the KPIs previously identified.

Regarding Deployment KPIs, the road operators can have ITS deployment projects that are not covered by the MedTIS III Action, and that are implemented on a similar period of time, thus modifying the Level of Service on MedTIS III roads at the same time as MedTIS III Action.

Regarding Benefit KPIs, the 'natural' evolution of traffic conditions (more or less drivers on the road), of users' driving habits, of vehicles' technologies, and other parameters as new traffic regulation, can all have a positive or negative impact on selected KPIs. Other road projects can also have an influence on these KPIs (for example, the use of new coating materials on the carriageway that have better road/wheel grip for improved safety). It is not always possible to well separate this impact from the Action's one.

Therefore, another important challenge for the evaluators is to verify, at the time of the selection of the individual projects to be evaluated, that the general context of the network where the project applies will remain stable before and after the deployment.

- Important number of individual deployments and their synergies

MedTIS III Action is composed of 49 individual coordinated deployments across the network (53 projects initially considered, 4 have been removed by amendment). Therefore, in order to assess the Action, it is necessary to take into account the global performance and impact of all these individual deployments. It would be pointless to simply assess each individual deployment and add up all results, as there are route sections that were impacted by more than one deployment.

Moreover, a synergy could exist between the systems, modifying the global effect on the route section. It would then be difficult to evaluate the influence of a single system.

To overcome these difficulties and issues, MedTIS III implementers have adopted, as in MedTIS II, a methodology that analyses the global impact of the Action at two levels:

- Corridor level:

At the Corridor level, MedTIS III partners have decided to deliver a global view on all deployment and benefit KPIs. The impact assessment must be based on a comparison between the situations observed in 2018 (before project implementation), and in 2021 and beyond (after implementation of the project).

For Deployment KPIs, all road operators have adopted a single ranking scale that allows them to qualify the Level of Service of each motorway of MedTIS III Action. This work takes into account the real situation of the motorways at the two reference dates (2018 and 2021).

Regarding Benefit KPIs, each road operator has recovered real or rebuilt data for 2018. Consolidated data for the whole network in 2021 is not yet available and, as explained before, it was not always possible to isolate the impact of the Action from other factors that could affect KPIs. Thus, it was decided to make an estimation of the impact of the Action at Corridor level. The detailed calculation

method and its hypothesis are presented in the next chapter. Therefore, the Benefit evaluation at Corridor Level is an ex-ante evaluation.

- Individual deployment level:

MedTIS III network has not got a uniform Level of Service regarding ITS equipment. Even if data regarding MedTIS III Action is not available on the whole network, there are specific points or areas of the motorway network where information on one or more KPIs is available. MedTIS III partners have identified a list of deployment projects for which the information is indeed available. They have carried out individual evaluations of these projects, to assess both deployment and benefits.

Morever, as indicated before, the evaluators have verified, at the time of the selection of the individual projects to be evaluated, that the general context of the network where the project applies will remain stable before and after the deployment.

This list has been established to cover a variety of MedTIS III deployments. It contains projects on all four Member States where the Action is implemented, addresses Road Safety, Traffic Management and Traveller Information services, and covers various site configurations that are considered as sensitive sections of the MedTIS III network: tunnels, cross-border sections, urban areas, and bottleneck sections. The selection also covers a variety of solutions: new generation sensors and equipments to detect incidents and qualify traffic conditions in real-time, especially in tunnels, new software using, in particular artificial intelligence, at Traffic Control Centres to analyse data and help decision-making for road operators, on board information systems, VMS and other dynamic signing solutions for motorway access control, for helping decision-making for road users and to disseminate real-time travel information, amongst others.

In line with the main objectives of MedTIS III, the benefits evaluations mainly focused on the impact of each project in terms of safety, congestion and CO2 emissions. The benefits evaluations are ex-post or ex-ante evaluations, or sometimes a mix of ex-post and ex-ante, depending on the date of operational achieving of the project and its operating time available to exploit the corresponding data.

Impact measurements have been carried out mainly using EU EIP indicators, such as Change in accident numbers and severity, Change in traffic flow/change in bottleneck congestion, Change in CO2 emissions.

For deployment projects at specific spots on corridor routes, and according to the data availability, a “Before and After Traffic/safety/ Conditions” approach has been used. It consists of comparing traffic and accident/incident figures for the periods “before implementation” and "after implementation". It has been completed, when necessary, by estimated data for the period “after implementation”.

For horizontal projects, applying on the whole network, such as softwares for data analysis, data processing and help decision-making in the traffic management centers, an ex-ante approach has been carried out. It is based on a specific evaluation methodology already successfully experimented in MedTIS II

Taking into account that such projects aim at better traffic monitoring, better information to end-users and shortened intervention times in case of events/accidents, they have a direct impact on safety by a potential reduction of secondary accident.

According to the data availabilities, the secondary accidents number reduction due to the project, and congestion volumes reduction related to them has been estimated by applying the innovative methodology already used in MedTIS II which relates the intervention/alert times reduction to the potential secondary accidents reduction.

The different impacts of each project has been calculated by using concrete figures reflecting the reduction in congestion volumes or the safety improvement, such as lost hours savings, CO2 emissions volumes savings or accident figures savings.

The monetarization of safety savings has been calculated from costs presented in “EC Handbook on the external costs of transport” (version 2019); the monetarization of congestion savings has been calculated from costs issued by the DOT of beneficiaries; the monetarization of CO2 or fuel savings is based on the market prices.

A comparison between yearly cost savings due to system implementation and full costs of the system (investment + maintenance,) has been delivered in order to calculate the ROI of the project.

The next sub-chapter presents the list of individual and emblematic projects evaluated, Chapter 4 presents the main results of these individual evaluations, and the detailed reports can be found in the Annex.

3.3 Individual deployments evaluated

The table below contains an overview of individual evaluations carried out for MedTIS III Action. A more detailed presentation of the solutions deployed and the time and type of evaluation can be found afterwards.

Among the deployments evaluated, there are several actions implemented on sensitive sections such as tunnels.

Table 4: Overview of individual projects evaluated

Member State	#Ref	Implementer	Activity's title	Location	Length of network concerned [km]
	CEF16_FRA-1	APRR	**Central Traffic Management Control centre enhancement**	Entire AREA network	385
	CEF16_FRA-4	ASF	**Enhancement of traffic monitoring: Deployment of traffic monitoring gantries and system on ASF network**	A7, A8, A89 East, A63, A62	206
	CEF16_FRA-8	ATMB	**Dynamic signalisation and traveller information**	Entire ATMB network	126
	CEF16_FRA-15	ESCOTA	**Traffic and event management information through mobile phone**	A8	200
	CEF16_ITA-01	ADF-A6 TO-SV	**Upgrade of traffic information systems in tunnels**	A6	124
	CEF16_ITA-03	ADF-A6 TO-SV	**Installation of VMSs in tunnels**	A6	124
	CEF16_ITA-13	SALT_Tronco Autocisa	**Intelligent transport systems for traffic and emergency management in motorway tunnels**	A15	100
	CEF16_ITA-15	SALT	**Intelligent transport systems for traffic and emergency management in motorway tunnels**	A12, A11, A15	155
	CEF16_SEO-2	SEOPAN / AUCAT	**Safety ITS Deployment in Tunnels**	C-32	60

	CEF16_POR-03	Lusoponte, IP, BCR, Ascendi BLA, Ascendi CP	**Enhancement of traffic management and information systems and equipment**	A1, A2, A3, A6, A12, A20, A26/IC33, IP1, A25	920
	CEF16_POR-06	Lusoponte, IP	**Traffic Control Centre Upgrade**	A12, A20, A26/IC33, IP1	83

Nevertheless, some of them, which relate to the same field have been grouped, as for Italy (ITA-01 + ITA-03) and Portugal (POR-03 + POR-06).

In total, 9 projects/deployments have been assessed.

CEF16_FRA-1- Central Traffic Management Control centre enhancement

- Description: The deployments are related to the Magellan project, to be applied on the entire APRR/AREA group and to be developed in successive phases. The first phase, to be developed in the frame of MedTIS III has to implement a new data collection system and its associated softwares.
  The implementation of the new modules of that innovative traffic and weather information system uses new technologies for data collection, data processing and data dissemination aiming at enhance a more performing traffic monitoring.
- Location: AREA network
- Evaluation period : 2018
- Evaluation type : ex-ante
- Deployment period: the project started mid 2017 and finished in December 2021.
- Deployment KPI: the project completion rate is 100 %. **It covers 385 km.**

CEF16_FRA-4 - Enhancement of traffic monitoring: Deployment of traffic monitoring gantries and system on ASF network

- Description: The implementation consists in enhancing the ASF traffic monitoring and management systems, particularly on sensitive areas, by completing the coverage of traffic monitoring systems (such as video cameras with capabilities such as ANPR) which, in particular, improve the incident management or waiting time and therefore the overall fluidity.
- Location: A7, A8, A89 East, A63, A62
- Evaluation period : 2017 - 2019
- Evaluation type : ex-post
- Deployment period: project started mid 2017 and finished end of 2020.
- Deployment KPI: the project completion rate is 100 %. **It covers 206 km**

CEF16_FRA-8: Dynamic signalisation and traveller information

- Description: Deployment and equipment of signalisation devices and barriers on ramp motorway interchanges to inform drivers in case of Events/accidents and particularly prevent them from accidents involving ghost vehicles by closing some motorway accesses. The dynamic monitoring of these equipments is made by operating system of the ATMB Traffic Control Center
- Location: Entire ATMB (Autoroute et Tunnel du Mont Blanc) network
- Evaluation period : 2019

- Evaluation type : ex-ante
- Deployment period: project started in 2017 and finished end of 2020
- Deployment KPI: the project completion rate is 100 %. **It covers 126 km.**

CEF16_FRA-15 : Traffic and event management information through mobile phone

- Description: Implementation of a new travel times calculation system on ESCOTA network including deployment of Bluetooth sensors, inductive loops, new software travel time calculation
- Addition of complementary travel time itineraries calculation and display.
- Location: A8 motorway
- Evaluation period : 2017 – 2019
- Evaluation type : ex-post
- Deployment period: project started in 2017 and was finished end of 2020.
- Deployment KPI: the project completion rate is 100 %. **It covers 209 km**.

CEF16_ITA-01: Upgrade of traffic information systems in tunnels and CEF16_ITA-03 : Installation of VMSs in tunnels

- Description: Upgrade of traffic information systems in tunnels through a wider radio coverage in order to guarantee the reception of traffic information by road users. Installation of VMSs at the entrance to 7 tunnels having length > 500m.
- Location: A6 Torino-Savona
- Evaluation period : 2016-2019
- Evaluation type : a mix of ex-ante and ex-post
- Deployment period: project ITA-01 started in 2018 and finished in 2020. Project ITA-3 was implemented during the year 2019.
- Deployment KPI: the project completion rate is 100 %. **It covers 124 km.**

CEF16_ITA-13 : Intelligent transport systems for traffic and emergency management in motorway tunnels

- Description: The systems aims at a better traffic management in tunnels through a new CCTV, Automatic Incident Detection and lane management signs. The equipment is integrated within a general strategy of Autocamionale della Cisa to upgrade the safety of tunnels. This project allows a better traffic management, emergency management and even a sharper information service to motorway's users in the event of accidents/fire/emergency that may occur in tunnels.
- Location: A15 motorway, between Parma and La Spezia cities, North-West of Italy
- Evaluation period : 2017-2020
- Evaluation type : a mix of ex-ante and ex-post
- Deployment period: project started in 2019 and finished end of 2019
- Deployment KPI: the project completion rate is 100 %. **It covers 100 km**. However, the analysis was limited to 21 km of network, that is 3 km downstream of each of the 7 tunnels involved in the intervention.

CEF16_ITA-15 : Intelligent transport systems for traffic and emergency management in motorway tunnels

- Description: The systems aims at a better traffic management in tunnels through a new CCTV, Automatic Incident Detection and lane management signs. The equipment is

integrated within a general strategy of SALT to upgrade the safety of tunnels. This project allows a better traffic management, emergency management and even a sharper information service to motorway's users in the event of accidents/fire/emergency that may occur in tunnels.

- Location: A12 Sestri Levante – Livorno, A11 Lucca – Viareggio, A15 Urban Penetration of La Spezia
- Evaluation period : 2017-2020
- Evaluation type : a mix of ex-ante and ex-post
- Deployment period: project started in 2019 and finished end of 2020
- Deployment KPI: the project completion rate is 100 %. **It covers 155 km**.

CEF16_SEO-2: Safety ITS Deployment in Tunnels

- Description: Implementation of ITS equipment to enhance tunnel traffic safety including, upgrade traffic management system in Traffic Control Center, lighting systems, Ventilation and Radio communications, Roadside and CC Communication equipment and other ITS subsystems.
- Location: C-32 Castelldefells - Vendrell
- Evaluation period : 2016-2018
- Evaluation type : ex-ante
- Deployment period: project started in January 2017 and finished in December 2021
- Deployment KPI: the project completion rate is 100 %. **It covers 60 km**.

CEF16_POR-03 Enhancement of traffic management and information systems and equipment and CEF16_POR-06 Traffic Control Centre Upgrade

- Description: improvement of roadside equipment and of Traffic Control Centre.
  The evaluation focuses on three regions of the Portuguese MedTIS III network, taking into account all deployments in these sections.
- Location: Oporto area (58 km), Lisbon area (75 km) and Algarve region (128 km)
- Deployment period: project started in 2014 and finished in 2017
- Evaluation period: 2013 to 2017
- Evaluation type: ex-Ante
- Deployment KPIs: traffic conditions information and travel time information services
- Benefit KPIs: Change in accident numbers and severity

4 Evaluation results – Corridor level

This chapter presents the evaluation results at Corridor level. The results cover Deployment KPIs and Benefit KPIs.

4.1 Deployment KPIs: Level of Service on MedTIS III network

MedTIS III Action consisted in the implementation of three types of ITS solutions, those addressing Road Safety Solutions, those addressing Traffic Management Services and those addressing Travel Information Services.

- Road Safety Solutions (RSS)

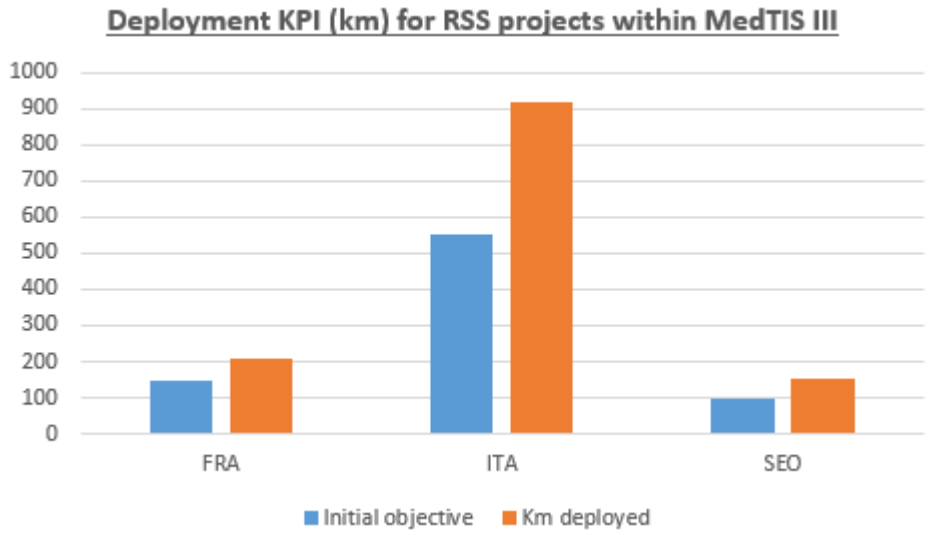
MedTIS III road operators have enhanced road safety including road safety in tunnels thanks to the implementation of dedicated ITS solutions. This includes cross-border sections between France, Italy, Spain and Portugal. This has resulted in an enhancement of the safety level for European road users.

MedTIS III road operators have deployed a set of safety-oriented services and supporting systems in strategic sections of the Mediterranean corridor:

- More performing data collection including traffic data collection and weather data collection
- Automatic Incident Detection for shortened alert times and response times
- Traffic monitoring capacities and devices
- Dangerous goods monitoring
- Communication systems for emergencies
- Traffic Control Centres
- Road user information

MedTIS III Action consisted in 9 individual deployments addressing RSS.

The table below shows the number of kilometres covered by RSS solutions for each beneficiary. In blue, the number of kilometres initially planned in the Work Programme; in red, actual kilometres covered by the end of the Action.



MedTIS III has delivered about **1 300 km of Road Safety Solutions,** thus overpassing its objective of delivering at least 800 km of RSS.

- Traffic Management Services (TMS)

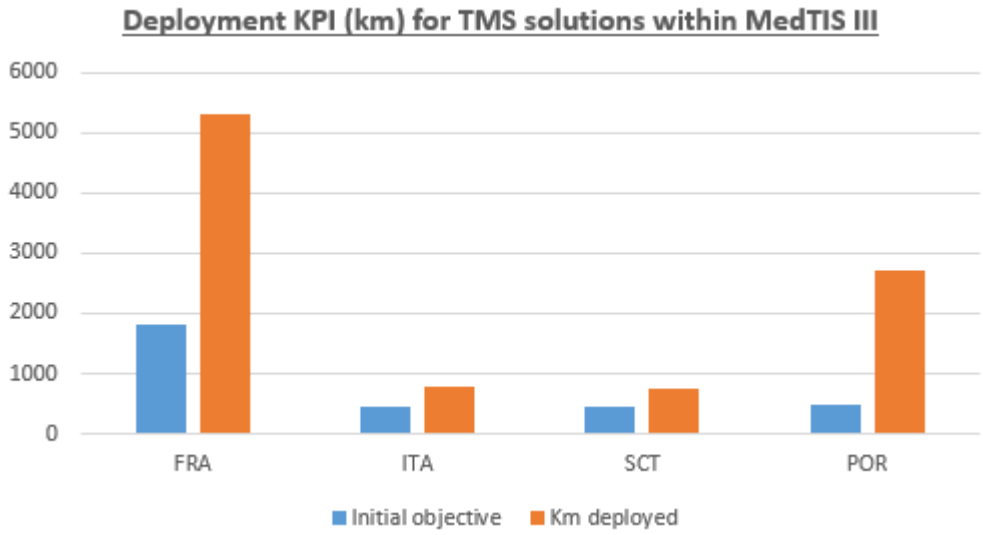
Thanks to MedTIS III, road operators are able to better interconnect themselves and aggregate data thanks to standardised exchanges to **deliver coordinated Traffic Management Services**. A special emphasis has been put on identified **TEN-T bottlenecks as well as on cross-border areas**, thus delivering enhanced levels of services towards European road users.

This MedTIS III deployment activity covers the functional chain of road traffic management and thus focuses on:

- Upgrading data collection including weather data collection: real-time data, on road sensors, Floating Car Data, video monitoring, traffic monitoring
- Upgrading data transmission: communication networks
- Upgrading data processing and consolidation: operating systems and datasets
- Upgrading Traffic Management Centres: calculation, processing, prediction, real-time decision support tools, broadcast, enforcement of Traffic Management Plans including cross border traffic Management Plans
- Upgrading incident management: new detection systems, ghost drivers, end-user information
- Upgrading sensitive sections' coverage: tunnels, cross-border areas

MedTIS III Action consisted in 26 individual deployments addressing TMS.

The table below shows the number of kilometres covered by TMS solutions for each beneficiary. In blue, the number of kilometres initially planned in the Work Programme; in red, actual kilometres covered by the end of the Action.



MedTIS III has delivered about **9 500 km of Traffic Management Services,** thus reaching its objective of delivering at least 3 200 km of TMS.

- Traveller Information Services (TIS)

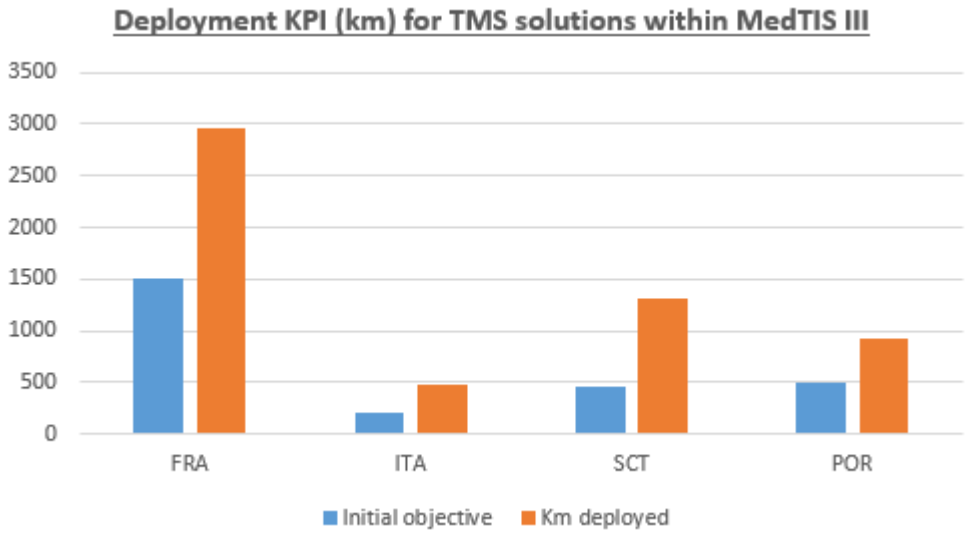
This activity consists in deploying Traveler Information Services to support the enforcement of Road Safety Solutions and Traffic Management measures (covered by A21 and A22) towards European road users. MedTIS III partners intend to reinforce the information means and streams on strategic sections to ensure drivers' understanding and compliance with traffic management measures.

MedTIS III road operators have deployed a set of end-user oriented services and supporting systems:

- Road-user warning: dynamic signaling, real-time alert information
- Traveller information: website, on board information, isoradio, improved travel time calculation, weather information, co-modal information
- VMS networks increase, upgrade and displayed harmonization
- Upgrading of the interconnections between traveller services and Traffic Management Centres
- Coverage of sensitive sections

MedTIS III Action consisted in 14 individual deployments addressing TIS.

The table below shows the number of kilometres covered by TMS solutions for each beneficiary. In blue, the number of kilometres initially planned in the Work Programme; in red, actual kilometres covered by the end of the Action.



MedTIS III has delivered **5 700 km of Traveller Information Services,** thus reaching its objective of delivering at least 2 650 km of TIS.

- Level of Service

As already done in MedTIS II and, in order to deliver a more concrete view on the kind of equipment and services deployed through the network, road operators have established two Level of Service situations, one in 2018, showing the LoS of MedTIS III network at the end of MedTIS II, before the start of the Action, and one in 2021, showing the LoS at the end of the Action. Each section of the network is described using the following ranking scale.

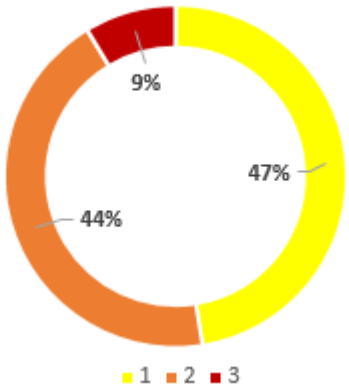
Level	Services	Comments
0	**Nothing is implemented**	There is no ITS deployed with the exception of perhaps emergency telephone. There may be limited traffic counters/loops
1	**Basic travel information**	VMS are implemented with traffic information (e.g. Warning for accident, warning for traffic jam, and warning for meteorological event). The VMS is not repeated on every section. One sign is valid for several sections of the motorway. There will be basic monitoring.
2	**Traffic information and traffic management per section**	There may be a VMS at the start of each section and at the entrance of motorway, and/or a radio station dedicated to traffic information covering the network. Travel time information, including cross border travel time, speed control, overtaking bans may be some of the measures and messages provided on the equipped sections.
3	**High level and sophisticated Traffic information and traffic management**	CCTV cameras are regularly installed along the motorway, with, in some specific cases, an incident detection system. Vehicle tracking systems may be implemented. Floating mobile data can be used on sensitive sections to improve data collection, to facilitate more accurate travel time information, and to make accident detection more reliable. Specific software may be developed on sensitive sections to automatically prepare traffic information delivery and propose to motorway operators even more performing traffic management solutions.

Beneficiaries have measured the following evolutions between 2018 and 2021 on MedTIS III network:

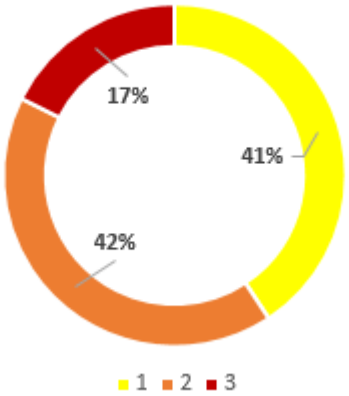
- Nearly **14 % of the network classified Level of service 1 switched to classification 2**.
- Nearly **20 % of the network classified Level of service 2 switched to classification 3**.
- **These changes of level of service lead to roughly doubling the linear of the network classified 3, showing the contribution of MedTIS III towards more performing ITS full equipped motorways.**

		ASFA		Italy		SCT		SEOPAN		Portugal		Total	
Level	Level description	KM covered in 2018	KM covered in 2021	KM covered in 2018	KM covered in 2021	KM covered in 2018	KM covered in 2021	KM covered in 2018	KM covered in 2021	KM covered in 2018	KM covered in 2021	KM covered in 2018	KM covered in 2021
0	**Nothing is implemented**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
1	**Basic travel information**	1 574.4	1 529.5	406.8	290.3	353.9	338.2	0.0	0.0	884.4	604.2	**3 219.4**	**2 762.2**
2	**Traffic information and traffic management per section**	1 397.7	1 339.1	323.6	184.3	508.6	490.3	171.2	171.2	574.3	640.4	**2 975.4**	**2 825.3**
3	**High level and sophisticated Traffic information and traffic management**	105.2	208.7	196.7	452.6	283.6	317.6	0.0	0.0	0.0	214.0	**585.6**	**1 193.0**
Total		3 077.34	3 077.34	927.17	927.17	1 146.09	1 146.09	171.17	171.17	1 458.64	1 458.64	**6 780.42**	**6 780.42**

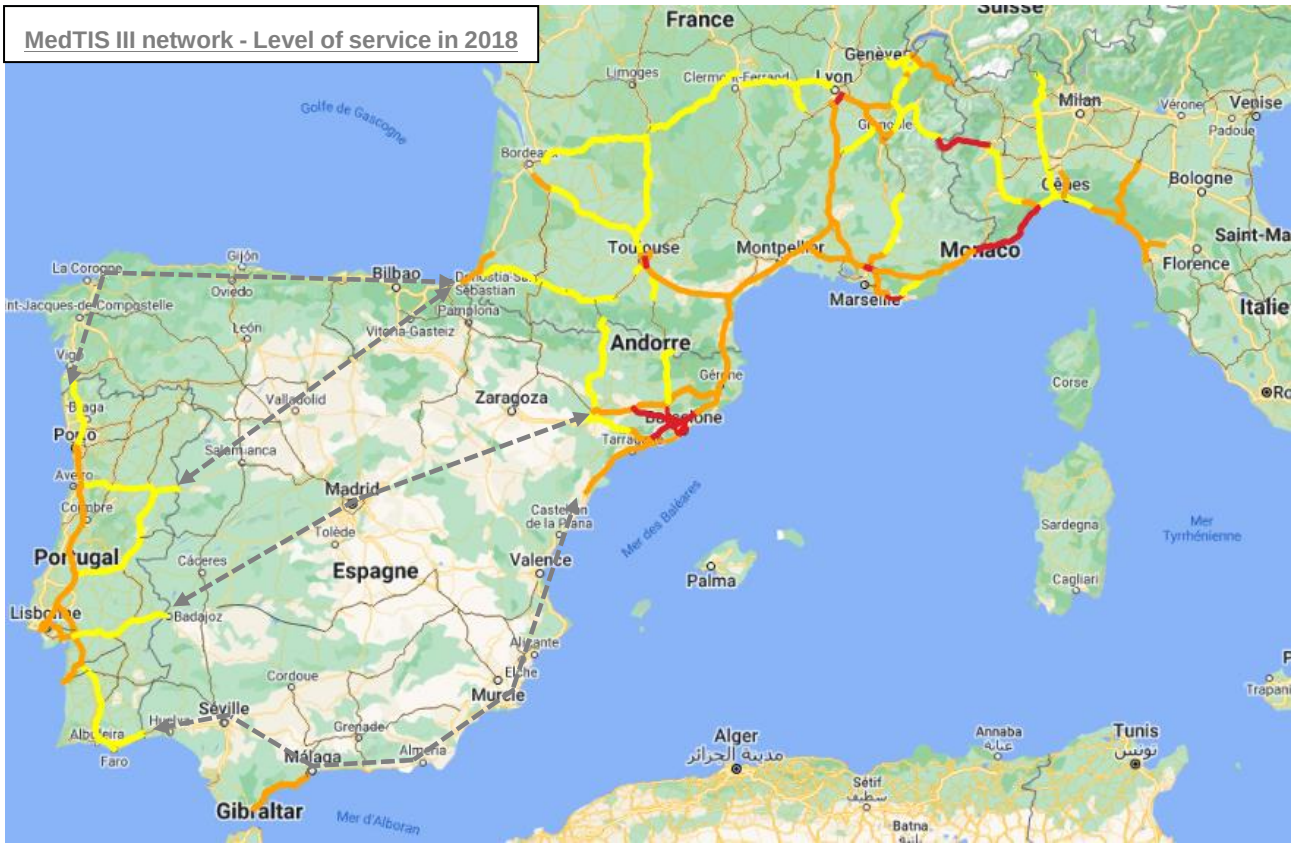
MedTIS III Level of service distribution in 2018



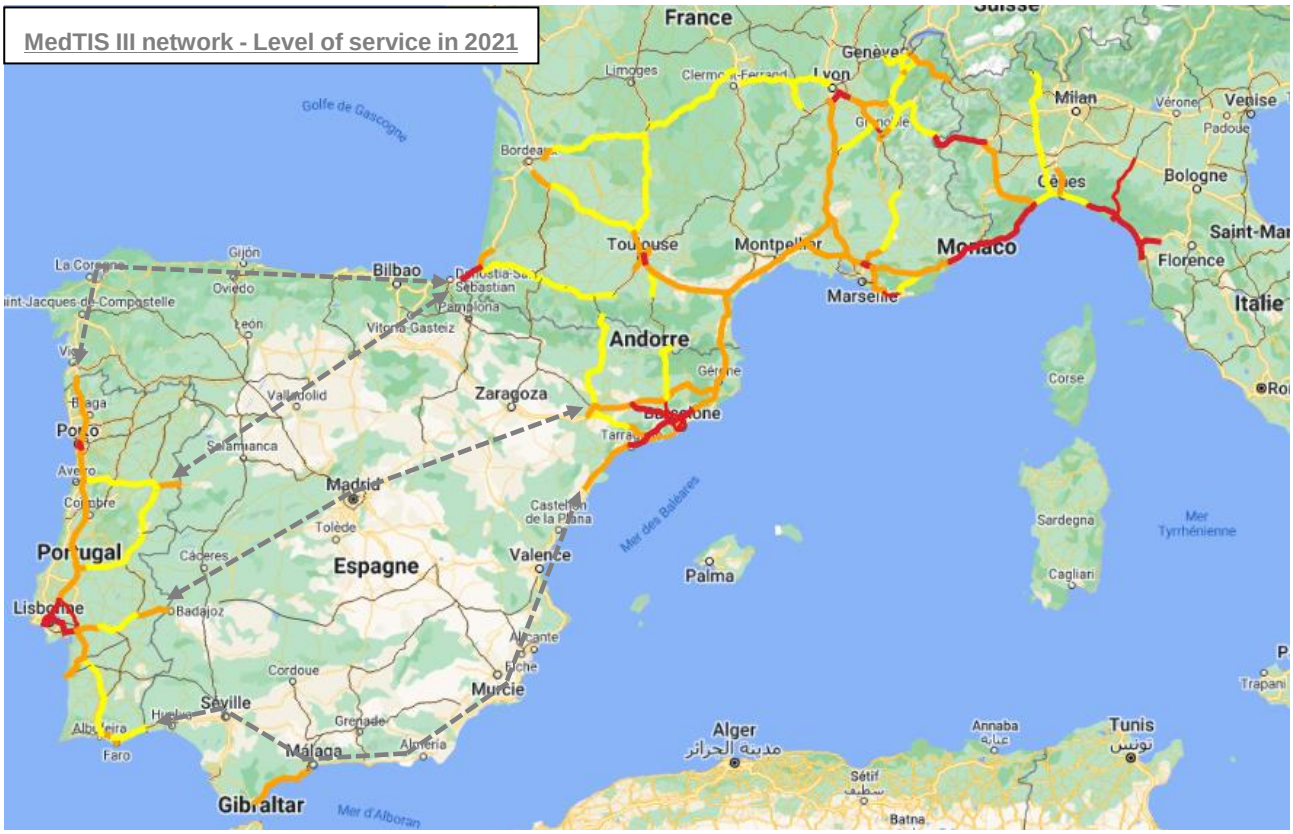
MedTIS III Level of service distribution in 2021



MedTIS III network - Level of service in 2018



MedTIS III network - Level of service in 2021



4.2 Benefits at Corridor level

As noted above, and since MedTIS III is composed of multiple and sometimes interdependent projects, the results of which cannot simply be summed up, the benefits' evaluation of the entire Corridor Program needs to be addressed using a methodology that aggregates the effects of the deployment of each of the actions of this program.

Given the time constraints that require evaluation results to be delivered at the end of the project, road operators have developed an ex-ante evaluation method. This innovative method, successfully used in MedTIS II, seeks to respond to the commitment of verifying, by a socio-economic analysis, that MedTIS III program fully responds to the objectives assigned in terms of congestion reduction, environmental impact, and safety improvement; and with a good level of economic balance of investments. The results must be concrete, significant and meaningful for decision-makers and stakeholders.

Moreover, the methodology should rely on as most individual deployments as possible, and allow the measurement of impacts common to all of them and significant for the entire program.

Overall and considering individual deployments of MedTIS III Action, the operational and practical impact of most of the projects deployed in MedTIS III program is to shorten response times in the case of an event or accident (70% of the total number of projects)

That is due to:

- Better and Faster detection (CCTV, incident detection system …)
- Better and Faster information (VMS, on board information …)
- Better and Faster intervention (on site protection)

These projects therefore make it possible to reduce the occurrence of secondary accidents.

Indeed, by alerting drivers approaching the primary accident, these ITS systems contribute to more prepare them to avoid a secondary accident

In fact and to summarize, the operational goal sought by the operators in deploying these projects is to improve the alert time and the response time in case of incident or accident, and thus reduce the occurrence of secondary accidents.

Impact on safety (Benefit KPI: change in accident number and severity)

Given the above, impact on safety is estimated by calculating the potential reduction of secondary accidents, which can be induced by reducing alert and response times.

Founded on that basis, the methodology already developed for the MedTIS II evaluation, demonstrated that the ITS deployment programme has potentially reduced the number of accidents on the concerned motorway networks by 1,6%.

Taking into account the previous positive effects of MedTIS II deployments, that improvement rate should be lower, in average, on MedTIS III; as assumption, one can estimate it, at 1,2%, in average:

-One assumes that the project aims to reduce potentially response times by 1 min.

- If the response times before deployment was 5 min, in average on such networks, the potential reduction in the number of secondary accidents is: 1/5 = 20%

- Since secondary accidents account for 6% of total accidents (see ASFA accident database for such networks) the potential reduction, due to the project, in the total number of motorway accidents is:

6%X20%=1,2%

This figure, which is well in line with those already produced by other European reports delivered on the subject (e.g., OECD report: *Impact of new technologies on Road Safety*) leads to very significant impact results of the program.

Using that figure of accident reduction percentage, the methodology developed allows to estimate the potential savings on safety due to MedTIS III program implementation

Impact on congestion (Benefit KPI: change in bottleneck congestion)

One assumes that there is a straight relation between congestion volumes and accidents.

One assumes that inter-urban highway congestion is mainly related to accidents that occur there: a potential reduction of 1,2% in the number of accidents leads to a potential reduction of 1,2% in congestion volumes

That hypothesis leads to a congestion reduction volume calculation to be considered as a minima result. In practice, the congestion volume reduction should be more favourable. Thus, our hypothesis should be rather conservative.

According to that hypothesis and using that same reduction rate of 1,2%, the methodology developed below allows to estimate the potential savings on congestion volumes due to MedTIS III program implementation

Impact on CO2 emissions (Benefit KPI: change in CO2 emissions)

One assumes that there is a straight relation between congestion volumes (expressed in lost hours) and fuel over-consumption (expressed in fuel litters) and therefore CO2 over-emissions (expressed in CO2 Tons).

Applying that 1,2% improvement rate to the safety figures and congestion figures, before deployment (year 2018) and considering the calculations already made for MedTIS II:

1 km congested traffic for 1 hour on 1 lane, running 50 km/h in average =

20 hours lost, 83,125 l of fuel over-consumption, 0,224 T of CO2 over-emissions

Thus, 1 hour congestion= 83,125/20 l fuel over-consumption, =0,224/20 T of CO2 over-emissions

One can calculate the socio-economic savings due to MedTIS III Program.

Using the social costs of « Handbook of external costs of Transport 2019 » for safety figures,

Using national costs of beneficiaries for congestion costs,

Using Market prices for Fuel and CO2,

One can calculate the value of socio-economic savings and the ROI of the MedTIS III Program, with the following tables:

Consolidated Figures for Year 2018 (year before project, figures for All MedTIS III beneficiaries)

Accidents	Congestion volumes
Accident number: 4 111 Slight injured number: 5 632 Seriously injured number: 542 Fatalities: 140	Hours lost: 10 827 857

Social costs according to the different countries

Accidents	Congestion
Slight injured : from 29 81 5€ to 38 735 € Seriously injured : from 385 934 € to 501 498 € Fatality : from 2 541 032 € to 3 122 354 € (source : Handbook of external costs of transport)	Hour lost : from 18,34 € to 22,54€ (source : DOT of beneficiaries) Fuel liter : 0,8 €(out of tax) (source : market price) CO2 Ton : 40 € (source : market price)

Applying the social costs, used in the different beneficiaries networks, related to each of the savings, and summing those savings, it is possible to monetarize the gains of the whole project.

Medtis III Estimation of Impact and Results (Summary version)

beneficiaries	Main Medtis III Network
Congestion Volume Year 2018	
Hours lost number	10 827 857,00
Congestion volume reduction due to project (-1,2 %)	
Hours lost number reduction	129 934,28
Fuel over-consumption reduction (Liters)	540 039,37
CO2 over-emissions reduction (Tons)	1 455,26
Accident Number Year 2018	4 111,00
Sligtly injured number	5 632,00
Seriously injured	542,00
Fatalities	140,00
Sligtly injured number per accident	1,37
Seriously injured per accident	0,13
Fatalities per accident	0,03
Accident Number reduction due to project (-1,2 %)	49,33
Sligtly injured number reduction	67,58
Seriously injured number reduction	6,50
Fatalities number reduction	1,68

Social costs savings	
1 Hour lost cost (€)	
hour lost savings (€)	2 830 966,64
1 fuel Liter cost (out of tax) (€)	
Fuel over-consumption reduction savings (€)	432 031,49
1 C02 Ton cost(€)	
CO2 over-emissions savings (€)	58 210,56
1 slightly injured cost (€)	
Sligthly injured savings (€)	2 401 818,02
1 seriously injured cost (€)	
Seriously injured savings(€)	3 062 927,42
1 fatality cost (€)	
fatalities savings(€)	5 059 772,06
Total savings	13 845 726,21

Table 5: Potential savings on MedTIS III main network

This table therefore makes it possible to draw the following overall potential results per year after MedTIS III implementation:

Safety	**Congestion**	**Environment**
Potential Reduction : about 50 accidents, 75 injured, 2 fatalities	Potential reduction : about 130 000 Hours	Potential reduction : about 540 000 fuel liters, 1 460 CO2 emissions Tons

These savings account for a total of roughly **13,8 million € per year.**

Comparing this with MedTIS III total deployment cost of about 66 million €, **the return on investment of the whole Action is less than 5 years.**

Insofar as the hypotheses retained are very conservative, as indicated above, these results, to be considered as minima, are therefore very positive and well demonstrate the significant impact of the MedTIS III implementation.

In the line of those of MedTIS II, they confirm the efficiency of the program.

5 Evaluation results – Local level

This chapter presents the evaluation results at a local level through some specific examples. The results cover Deployment KPIs and Benefit KPIs.

This section presents, for each individual deployment assessed, the main results of the evaluation regarding both Deployment and Benefit KPIs.

It is important to notice that these evaluations do not necessarily cover the whole deployment perimeter of projects, as they are often composed of different actions and applications. As example, for the Corridor level evaluation, the analysis was made for certain situations only (reduction of accidents due to secondary accidents occurrence diminution and reduction of congestion related to accidents for projects addressing road safety). Therefore, for most of the cases, the benefits calculated in these reports can be considered as a minimum benefit; the impact of each project is potentially greater than shown in the evaluation, when taking into account all the solutions deployed and all situations addressed (primary accidents for example). Moreover, deployment dates and costs might slightly differ from those announced in the initial workplan of MedTIS III.

5.1 CEF16_FRA-1- Central Traffic Management Control centre enhancement

Evaluation period	Evaluation type	Deployment KPIs	Benefit KPIs
2018	Ex-ante	EUEIP-DKPI-O2 : Traffic conditions and travel time information services EUEIP-DKPI-R5: weather conditions information services	EUEIP-BKPI-S1 : Change in accident numbers and severity, EUEIP-BKPI-N1 : Change in traffic flow EUEIP-BKPI-N3 : change in bottleneck congestion EUEIP-BKPI-E1 : Change in CO2 emissions

ITS Deployment status

- Description: The deployments are related to the Magellan project, to be applied on the entire APRR/AREA group and to be developed in successive phases. The first phase, to be developed in the frame of MedTIS III has to implement a new data collection system and its associated softwares.
  The implementation of the new modules of that innovative traffic and weather information system uses new technologies for data collection, data processing and data dissemination aiming at enhance a more performing traffic monitoring.
- Location: AREA network
- Deployment period: the project started mid 2017 and finished in December 2021.
- Deployment KPI: the project completion rate is 100 %. It covers 385 km.

Impact on Traffic Flow

A better traffic monitoring, a better information to end-users and shortened intervention times in case of incidents/events/accidents have a direct impact on congestion volume reduction.

The enhancement of traffic management system, on an area particularly sensitive to traffic flow issues, contributes to improve the efficiency of the network operator's interventions and offers a higher level of service to motorists.

The project allows the road operator to inform user in faster and better way and then to fulfil more efficiently its mission.

Impact on Safety

A better traffic monitoring, a better information to end-users and shortened intervention times in case of incidents/events/accidents have a direct impact on safety (potential reduction of secondary accidents).

Indeed, the upgrade of the traffic management should improve the efficiency of the network operator's interventions and contribute to fulfil its objectives of safety thanks to a better fluidity and reduction of consequences (multiple collision for instance).

Impact on Environment

A reduction of congestion volumes linked to incidents/events/accidents allow fuel over-consumption reduction and consequently CO2 over-emissions reduction.

Impact on Modal Integration

This project has got no particular impact in modal integration.

Impact on Efficiency

The deployment of this system, in a sector particularly sensitive to traffic flow issues allows a real permanence of the service and thus a real efficiency of the whole operational chain of motorway network management.

Cost-Benefit Analysis

Based on realistic estimations of response times reduction in case of events/accidents (1mn reduction), the calculation of safety savings due to project leads to the following annual gains:

-0,07 fatalities

-0,3 seriously injured

-0,74 slightly injured

Considering the congestion reduction related to accident reduction only, the calculation of annual congestion gains leads to nearly 5 000 hours lost saved , 24 000 L of fuel saved, and 65 Tons of CO2 saved.

Using the costs indicated in the Handbook of external costs of transport (v 2019) for safety, the costs used by the French DOT for congestion costs, and the market prices for fuel and CO2, that leads to a yearly benefit of 512 K€.

Considering a deployment cost of 5 667 k€, that yearly benefit generates a **ROI of slightly more than 10 years.** This is still a satisfactory ROI regarding the fact that, this part of the project which is the first phase that has been carried out, does not represent the most profitable part of the whole project to be deployed in the next phases.

5.2 CEF16_FRA-4 - Enhancement of traffic monitoring: Deployment of traffic monitoring gantries and system on ASF network

Evaluation period	Evaluation type	Deployment KPIs	Benefit KPIs
2017 - 2019	Ex-post	EUEIP-DKPI-R1: Incident detection and incident management	EUEIP-BKPI-N3 : Change in bottleneck congestion; EUEIP-BKPI-E1 : Change in CO2 emissions

ITS Deployment status

- Description: The implementation consists in enhancing the ASF traffic monitoring and management systems, particularly on sensitive areas, by completing the coverage of traffic monitoring systems (such as video cameras with capabilities such as ANPR) which, in particular, improve the incident management or waiting time and therefore the overall fluidity.
- Location: A7, A8, A89 East, A63, A62
- Deployment period: project started mid 2017 and finished end of 2020.
- Deployment KPI: the project completion rate is 100 %. **It covers 206 km**

Impact on Traffic Flow

The system is deployed on areas which are particularly sensitive to traffic flow issues. A better traffic monitoring and a better traffic information directly impact traffic flow, allowing users to divert their routes and avoids congested areas and consequently reduces congestion volumes.

Impact on Safety

A better and precise traffic monitoring allows a faster alert in case of event and consequently reduce response time and secondary accidents risks. By contributing to the reduction of congestion, which is generally accompanied by an increased occurrence of mainly material accidents, this system contributes, at its height, to improving safety.

Impact on Environment

A better and precise traffic information contributes to reduce congestion and consequently reduces fuel over-consumption and CO2 over-emissions.

Impact on Modal Integration

This project has got no particular impact in modal integration.

Impact on Efficiency

The deployment of this system, in a sector particularly sensitive to traffic flow issues, and its high level of reliability, allows a real permanence of the service and thus a real efficiency of the whole operational chain of motorway network management

Cost-Benefit Analysis

Based on comparisons made between periods “before and after project deployments”, the calculation of yearly savings in term of congestion leads to nearly 14 500 hours lost saved, 60 000 fuel litters, and 160 CO2 Tons.

Using the costs of congestion used by the DOT, these figures reveal significant socio-economic gains estimated at 388 K€ per year. The deployment costs are 1 835 k€, which means a **ROI of less than 5 years**. That is a very favourable ROI, which shows the efficiency of the project.

5.3 CEF16_FRA-8: Dynamic signalisation and traveller information

Evaluation period	Evaluation type	Deployment KPIs	Benefit KPIs
2019	Ex-ante	EUEIP-DKPI-O2: Traffic status and travel time information service EUEIP-DKPI-C1: Adaptive Traffic Control or Prioritization	EUEIP-BKPI-N3 - Change in bottleneck congestion; EUEIP-BKPI-E1 - Change in CO2 emissions EUEIP-BKPI-S1-Change in Accident Numbers and Severity

ITS Deployment status

- Description: Deployment and equipment of signalisation devices and barriers on ramp motorway interchanges to inform drivers in case of Events/accidents and particularly prevent them from accidents involving ghost vehicles by closing some motorway accesses. The dynamic monitoring of these equipments is made by the operating system of the ATMB Traffic Control Center
- Location: Entire ATMB (Autoroute et Tunnel du Mont Blanc) network
- Deployment period: project started in 2017 and finished end of 2020
- Deployment KPI: the project completion rate is 100 %. **It covers 126 km.**

Impact on Traffic Flow

The project contributes to a better flow of road traffic in case of traffic bottleneck on A40 motorway, as the vehicles diverted before entering the A40 do not increase the congestion generated by the motorway traffic bottleneck.

Impact on Safety

The project contributes to a better safety of motorists in the case of event on the motorway, as the users diverted before entering the A40 will not risk an accident, particularly in the case of a vehicle travelling in the wrong direction.

Impact on Environment

By contributing to road congestion reduction, linked to accidents reduction, which generates excessive gas consumption and CO2 emission, the project deployment has a direct impact on environment.

Impact on Modal Integration

This project has got no particular impact in modal integration.

Efficiency

The dynamic signing and traveler information project, on an area particularly sensitive to traffic flow issues, contributes to improve the efficiency of the network operator's interventions and offers a higher level of service to motorists.

The deployment of these systems, in a sector particularly sensitive to traffic flow issues allows a real permanence of the service and thus a real efficiency of the whole operational chain of motorway network management.

Cost-Benefit Analysis

Based on realistic estimations of accident reduction due to project deployment, the calculation of safety savings leads to the following annual gains:

-0,025 fatalities

-0,03 seriously injured

-0,07 slightly injured

Considering the congestion, the calculation of annual congestion gains leads to nearly 800 hours lost saved, 500 L of fuel saved, and 1,3 Tons of CO2 saved.

Using the costs indicated in the Handbook of external costs of transport (v 2019) for safety, the costs used by the French DOT for congestion costs, and the market prices for fuel and CO2, that leads to a yearly benefit of 113 K€.

Considering a deployment costs of 193 k€, that yearly benefit generates a **ROI** that is less than two years, which is very satisfactory, but it is explained by the direct impact of the project on traffic and the moderate costs of deployment.

5.4 CEF16_FRA-15: Traffic and event management information through mobile phone

Evaluation period	Evaluation type	Deployment KPIs	Benefit KPIs
2017 - 2019	Ex-post	EUEIP-DKPI-O2 : Traffic Condition and travel Time Information Service :	EUEIP-BKPI-N1 : Change in traffic flow EUEIP-BKPI-N3 : Change in bottleneck congestion EUEIP-BKPI-E1 : Change in CO2 emissions

ITS Deployment status

- Description: Implementation of a new travel times calculation system on ESCOTA network including deployment of Bluetooth sensors, inductive loops, new software travel time calculation
- Addition of complementary travel time itineraries calculation and display.
- Location: A8 motorway
- Deployment period: project started in 2017 and was finished end of 2020.
- Deployment KPI: the project completion rate is 100 %. **It covers 209 km**.

Impact on Traffic Flow

A better travel time information has a direct impact on traffic flow, allowing users to divert their routes and avoid congested areas and consequently reduces congestion volumes.

The system deployment, particularly on areas which are very sensitive to traffic flow issues, contributes to improve traffic management, and thus offers a higher level of service to motorists.

Impact on Safety

A better and precise traffic information alleviates the tiring driving of those specifics peak periods of traffic and contributes to a better traffic safety.

By contributing to the reduction of congestion, which is generally accompanied by an increased occurrence of mainly material accidents, this system contributes to improving safety.

Impact on Environment

A better and precise traffic information contributes to reduce congestion and consequently reduces fuel over-consumption and CO2 over-emissions.

By contributing to road congestion reduction, which generates excessive gas consumption and CO2 emission, the system installation has a direct impact on environment.

Impact on Modal Integration

This project has got no particular impact in modal integration.

Impact on Efficiency

The deployment of this system, in a sector particularly sensitive to traffic flow issues, and its high level of reliability, allows a real permanence of the service and thus a real efficiency of the whole operational chain of motorway network management

Cost-Benefit Analysis

Considering that quantitative socio economic benefits are mainly due to congestion reduction in that project, the ex-post analysis has shown that one can expect, annually, nearly 2 400 hours lost saved, more than 11 000 litters of fuel and more than 30 CO2 Tons.

Using the costs of congestion used by the French DOT, those benefits are estimated at 64 k€ per year.

For an investment of 86 K€, **the project ROI is therefore less than 2 years.**

That is a very favourable ROI, which is explained by the particularity of the project, which is mainly a software project. In that case the project costs are mainly software costs for a specific application (travel time calculation). The VMS costs are not taken in account, due to the fact that VMS costs, are mainly compensated with VMS other functionalities.

5.5 CEF16_ITA-01: Upgrade of traffic information systems in tunnels and CEF16_ITA-03: Installation of VMSs in tunnels

Evaluation period	Evaluation type	Deployment KPIs	Benefit KPIs
2016 - 2019	a mix of ex-post and ex-ante	EUEIP-DKPI-R1 : Incident Detection and Incident Management EUEIP-DKPI-R4 : Variable Speed Limits EUEIP-DKPI-O3 : Forecast and Real Time Event Information	EUEIP-BKPI-S1 - Change in Accident Numbers and Severity EUEIP-BKPI-N3 - Change in bottleneck congestion;

ITS Deployment status

- Description: Upgrade of traffic information systems in tunnels through a wider radio coverage in order to guarantee the reception of traffic information by road users. Installation of VMSs at the entrance to 7 tunnels having length > 500m.
- Location: A6 Torino-Savona
- Deployment period: project ITA-01 started in 2018 and finished in 2020. Project ITA-3 was implemented during the year 2019.
- Deployment KPI: the project completion rate is 100 %. It covers 124 km.

Impact on Traffic Flow

The ITS deployments allow a better traffic monitoring and management. Together with the other installation realized within MedTIS III, the Traffic Control Center is able to receive data from the systems in order to monitor traffic flow, reduce intervention/Alert/ times and consequently occurrence of secondary accident. The reduction of accident numbers allows the reduction of congestion volumes linked to accidents

Impact on Safety

The ITS deployments are beneficial in reducing accidents, since they keep road users constantly informed and consequently reduce the occurrence of secondary accidents, which has a direct impact on safety.

Impact on Environment

A reduction of congestion volumes allows fuel over-consumption reduction and consequently CO_2 over-emissions reduction.

Impact on Modal Integration

This project has got no particular impact in modal integration.

Impact on Efficiency

The equipment is able to give information to users about incidents, traffic flow, emergency situations providing precise and reliable traffic data to central supervisory systems, such as vehicular data (traffic data collection), information and alarms on incident detection.

Cost-Benefit Analysis

Based on realistic estimations of response times reduction in case of events/accidents (25% reduction in that case), the calculation of safety savings due to project leads to the following annual gains:

-0,02 fatalities

-0,08 seriously injured

-0,86 slightly injured

Considering the congestion reduction related to accident reduction only, the calculation of annual congestion gains leads to nearly 3 048 hours lost saved.

Using the costs indicated in the Handbook of external costs of transport (v 2019) for safety, and the costs used by the DOT for congestion costs, that leads to a yearly benefit of 214 K€.

Considering a benefit of 214 k€ per year and a total project cost of € 1 522 k€, the ROI of the project is around 7 years, which is rather satisfactory for such ITS project.

However, this analysis must be taken with caution since the Covid-19 pandemic has seen a traffic volume drop compared to the years prior to 2020. This reduction certainly has an impact that is difficult to quantify on the results of the analysis.

5.6 CEF16_ITA-13: Intelligent transport systems for traffic and emergency management in motorway tunnels

Evaluation period	Evaluation type	Deployment KPIs	Benefit KPIs
2017-2020	A mix of ex-ante and Ex-post	EUEIP-DKPI-R1 : Incident Detection and Incident Management	EUEIP-BKPI-S1 - Change in accident numbers and severity EUEIP-BKPI-N3 - Change in bottleneck congestion;

ITS Deployment status

- Description: The systems aims at a better traffic management in tunnels through a new CCTV Automatic Incident Detection and lane management signs. The equipment is integrated within a general strategy of Autocamionale della Cisa to upgrade the safety of tunnels. This project allows a better traffic management, emergency management and even a sharper information service to motorway's users in the event of accidents/fire/emergency that may occur in tunnels.
- Location: A15 motorway, between Parma and La Spezia cities, North-West of Italy
- Deployment period: project started in 2019 and finished end of 2019
- Deployment KPI: the project completion rate is 100 %. **It covers 100 km**. However, the analysis was limited to 21 km of network, that is 3 km downstream of each of the 7 tunnels involved in the intervention.

Impact on Traffic Flow

The ITS deployments allow a better traffic monitoring and management, reducing intervention/Alert times and consequently the occurrence of secondary accidents.

The accident numbers reduction allows the congestion volumes reduction related to accidents.

Impact on Safety

The ITS deployments allow a better traffic monitoring and management, reducing intervention/Alert times and consequently occurrence of secondary accidents, which has a direct impact on safety.

Impact on Environment

A reduction of congestion volumes allows a fuel over-consumption reduction and consequently CO_2 over-emissions reduction.

Impact on Modal Integration

This project has got no particular impact in modal integration.

Impact on Efficiency

The equipment can transmit traffic data and images that are useful for detecting incidents. The integrated video analysis engine is automatically able to detect and classify traffic conditions, and promptly identify and signal vehicle or off-road alarms, providing precise and reliable traffic data to central supervisory systems, vehicular data (traffic data collection), information and alarms on incident detection (AID).

The new fire detection systems, based on image processing and hardware sensors, also contributes to significantly accelerate intervention and rescue operations and therefore can provide an indirect contribution to reducing the number of accidents, especially secondary ones.

Cost-Benefit Analysis

Based on realistic estimations of response times reduction in case of events/accidents (25% reduction in that case), the calculation of safety savings due to project leads to the following annual gains:

-0,03 fatalities

-0,08 seriously injured

-0,81 slightly injured

Considering the congestion reduction related to accident reduction only, the calculation of annual congestion gains leads to nearly 562 hours lost saved.

Using the costs indicated in the Handbook of external costs of transport (v 2019) for safety, and the costs used by the DOT for congestion costs, that leads to a yearly benefit of 191 K€.

Considering a benefit of 191 k€ per year and a total project cost of 2 300 k€, The ROI of the project is more than 10 years, which is in the mean low for such ITS project.

However, this analysis must be taken with caution since the Covid-19 pandemic has seen a traffic volume drop compared to the years prior to 2020. This reduction certainly has an impact that is difficult to quantify on the results of the analysis.

5.7 CEF16_ITA-15: Intelligent transport systems for traffic and emergency management in motorway tunnels

Evaluation period	Evaluation type	Deployment KPIs	Benefit KPIs
2017-2020	A mix of ex-ante and ex-post	EUEIP-DKPI-R1 : Incident Detection and Incident Management EUEIP-DKPI-O3 : Forecast and Real Time Event Information	EUEIP-BKPI-S1 - Change in Accident Numbers and Severity EUEIP-BKPI-N3 - Change in bottleneck congestion;

ITS Deployment status

- Description: The systems aims at a better traffic management in tunnels through a new CCTV, Automatic Incident Detection and lane management signs. The equipment is integrated within a general strategy of SALT to upgrade the safety of tunnels. This project allows a better traffic management, emergency management and even a sharper information service to motorway's users in the event of accidents/fire/emergency that may occur in tunnels.
  Deployment of CCTV system with AID systems and new bi-directional SOS posts.
  Each tunnel has been equipped with VMS at the entrance and on the opposite side for cars driving on the wrong side of the road; in some tunnels a VMS has been installed also at half-way
- Location: A12 Sestri Levante – Livorno, A11 Lucca – Viareggio, A15 Urban Penetration of La Spezia
- Deployment period: project started in 2019 and finished end of 2020
- Deployment KPI: the project completion rate is 100 %. **It covers 155 km**.

Impact on Traffic Flow

The deployment of equipment, installed in the road side of motorways, combined with a set of equipment and systems installed in traffic control rooms allows a better monitoring and management of the traffic flow, a better information to the users and consequently a reduction of congestion volumes.

Impact on Safety

A better traffic monitoring, a better information to end-users and shortened intervention times in case of events/accidents have a direct impact on safety such as a potential reduction of secondary accidents.

Impact on Environment

A reduction of congestion volumes allows fuel over-consumption reduction and consequently CO_2 over-emissions reduction.

Impact on Modal Integration

This project has got no particular impact in modal integration.

Impact on Efficiency

The equipment can transmit traffic data and images that are useful for detecting incidents. The integrated video analysis engine is automatically able to detect and classify traffic conditions, and promptly identify and signal vehicle or off-road alarms, providing precise and reliable traffic data to central supervisory systems, vehicular data (traffic data collection), information and alarms on incident detection (AID).

The new fire detection systems, based on image processing and hardware sensors, also contributes to significantly accelerate intervention and rescue operations and therefore can provide an indirect contribution to reducing the number of accidents, especially secondary ones.

Cost-Benefit Analysis

Based on realistic estimations of response times reduction in case of events/accidents (25% reduction in that case), the calculation of safety savings due to project leads to the following annual gains:

-0,03 fatalities

-0,28 seriously injured

-2,8 slightly injured

Considering the congestion reduction related to accident reduction only, the calculation of annual congestion gains leads to nearly 9443 hours lost saved.

Using the costs indicated in the Handbook of external costs of transport (v 2019) for safety, and the costs used by the DOT for congestion costs, that leads to a yearly benefit of 582 K€.

Considering a benefit of 582 k€ per year and a total project cost of € 5 700 k€, The ROI of the project is less than 10 years, which is rather satisfactory for such ITS project.

However, this analysis must be taken with caution since the Covid-19 pandemic has seen a traffic volume drop compared to the years prior to 2020. This reduction certainly has an impact that is difficult to quantify on the results of the analysis.

5.8 CEF16_SEO-2: Safety ITS Deployment in Tunnels

Evaluation period	Evaluation type	Deployment KPIs	Benefit KPIs
2016 to 2018	Ex-Ante	EUEIP-DKPI-R1: Incident detection and incident management;	EUEIP-BKPI-S1 : Change in accident numbers and severity

ITS Deployment status

- Description: Implementation of ITS equipment to enhance tunnel traffic safety including, upgrade traffic management system in Traffic Control Center, lighting systems, Ventilation and Radio communications, Roadside and TCC Communication equipment and other ITS subsystems.
- Location: C-32 Castelldefells - Vendrell
- Deployment period: project started in January 2017 and finished in December 2021
- Deployment KPI: the project completion rate is 100 %. **It covers 56 km**.

Impact on Traffic Flow

It has been considered that this project has got no particular impact on congestion.

Impact on Safety

The Project's impact on safety has been very high thanks to the improvement in the management of possible incidents in the tunnel by reducing the response time and improving the implementation time of the management plans.
The important points in the evaluation are based on the number of secondary accidents which were avoided as well as the reduction in the severity of the occurred accidents thanks to the ITS systems implanted and the tunnels safety equipment.

The project deployment contributes to shorten response time for detection and closure of the tunnels in case of events/accidents

Impact on Environment

At an environmental level, the system improves the carbon footprint due to the efficiency of the new technologies installed.

An environmental benefit has also been achieved thanks to renewing the equipment for another one with more efficient technology (ventilation systems, LED technology for the luminaires, ...).

Impact on Modal Integration

This project has got no particular impact on modal integration.

Impact on Efficiency

It is estimated that the new Horus system, together with the detection systems, means an improvement in reaction time of 4 seconds; on the other hand, the new barrier systems installed at the tunnel portals mean that the tunnel closes 34 seconds earlier. Thus, the improvement time used to calculate the number of vehicles that stop entering the tunnel thanks to the installed sub-systems is 38 seconds.

Cost-Benefit Analysis

The project deployment contributes to shorten response time for detection and closure of the tunnels in case of events/accidents.

The realistic estimation of that response time reduction presented above shows that a 38 seconds reduction is expected for the operation of incident detection + tunnel closure.

Based on average daily traffic measured in the tunnels, one can estimate the number of people avoiding to be in those tunnels, in case of events/accidents, due to project deployment.

Considering safety data bases for tunnels, and based on accident occurrence compared to daily traffic, that leads to estimate safety savings in terms of fatalities, seriously injured and slightly injured.

Using the costs indicated in the Handbook of external costs of transport (v 2019) for safety, that leads to a yearly benefit of 292 K€.

The costs of the project installation 5 years after completion of the project, including yearly maintenance, are estimated to 896 k€ and the benefits (based on safety only) are estimated to 292 k€ per year. The resulting ROI of the project installation 5 years after completion of the project is 2,28.

5.9 CEF16_POR-03 Enhancement of traffic management and information systems and equipment and CEF16_POR-06 Traffic Control Centre Upgrade

Evaluation period	Evaluation type	Deployment KPIs	Benefit KPIs
2017	Ex-ante	EUEIP-DKPI-R1: Incident detection and incident management; EUEIP-DKPI-O3 : Forecast and Real Time Event Information EUEIP-DKPI-O2 : Traffic Condition and travel Time Information Service	EUEIP-BKPI-S1 - Change in Accident Numbers and Severity. EUEIP-BKPI-N3 - Change in Bottleneck Congestion EUEIP-BKPI-E1- Change in CO2 emissions (Savings of CO2 over-emissions in congestion)

ITS Deployment status

- Description: Upgrade, extension and renewal of ITS sub-systems and road equipment, supporting more advanced traffic management, information services and incident detection features. Upgrade and renewal of FO network active equipment and devices. Renovation and improving of traffic management equipment to support advanced management and information services.
- Location: A1, A2, A3, A6, A12, A20, A26/IC33, IP1 + IC17, A25.
- Deployment period: project POR-03 started in 2017 and finished end of 2021. POR-06 started in 2018 and finished by end of 2021.
- Deployment KPI: the project completion rate is 100 %. **It covers 920 kms.**

Impact on Traffic Flow

A set of equipment installed in the roadside of motorways involved in the project, combined with a set of equipment and systems installed in traffic control rooms permits to monitor the traffic flow; analyse and proceed with control measures; process and disseminate traffic information through all possible channels and information devices. All these actions contribute to improve traffic flow and reduce congestion.

Impact on Safety

Through the implementation of new telematic devices it is possible to monitor and cover the whole road sections included in the project, which account for a significant part of the Portuguese core network.

The renovation traffic control centres with interactive videowalls have enabled full integration of video and data inputs from telematic systems.

The development of advanced road assistance services and communications required a transition from radio communication technology to a more evolved solution involving GSM technology.

These various deployments allow shortened response times in case of events/accidents, thus contribute to reduce the secondary accident numbers, for a better motorway safety.

Impact on Environment

With the new equipment and systems, it is possible to monitor the traffic flow and in case of alert, incidents or queues to give information to users and reroute vehicles so reducing the emissions and the impact on environment.

Impact on Modal Integration

This project has got no particular impact in modal integration.

Cost-Benefit Analysis

Based on realistic estimations of response times reduction in case of events/accidents (in that case 2min compare to 10 min either 20% reduction), the calculation of safety savings due to secondary accidents reduction, leads to the following annual gains:

-0,24 fatalities

-0,768 seriously injured

-13,62 slightly injured

Considering the congestion reduction related to accident reduction only, the calculation of annual congestion gains leads to nearly 24 334 hours lost saved, 122 000 fuel litters saved and 316 CO2 Tons saved

Using the costs indicated in the Handbook of external costs of transport (v 2019) for safety, the costs used by the DOT for congestion costs, and market prices for fuel and CO2, that leads to a yearly benefit of 1 882 K€.

Considering that implementation costs are 3 477 k€ and a yearly saving of 1 882 k€, one can calculate a ROI of about 2 years, which is a very satisfactory ROI for a such project.

6 Overall Assessment & Transferability of the Results (European Dimension)

MedTIS III Action was designed with a very ambitious programme: an investment of 64.44 M€ in the deployment of ITS solutions to cover more than 6 800 km of motorways going through 4 European Member States (Italy, France, Spain and Portugal), in difficult operating context (numerous urban areas, numerous tunnels, numerous cross border interfaces, etc.)

In this context, the Action seeks to bring following added-value to road operators and drivers:

- Improved road safety
- Improved interoperability, continuity and seamless mobility
- Improved harmonization of services
- Improved operational excellence and cost-efficiency
- Real-time traffic and travel information

The work programme was broken down in 49 individual ITS deployments that were implemented by different road operators in their own network, on existing road sections and without interrupting operations. These individual deployments were classed in three families of services: Road Safety Solutions (RSS), Traffic Management Services (TMS) and Traveller Information Services (TIS).

MedTIS III included 9 individual RSS deployments that focused on improving safety especially in tunnels. The delivered projects have allowed to cover about **1 300 km of Road Safety Solutions.** The Action has reached its objective of delivering at least 800 km of RSS.

MedTIS III included 26 individual TMS deployments that focused on upgrading and implementation of new generation solutions: data collection, data processing, data transmission, data consolidation, and, on a broader level, incident management and Traffic Management Centres. The solutions implemented covered a wide panel of technologies such as real-time data, weather data, Floating Car Data, video monitoring and the development of hardware and software needed to treat and disseminate this information.

The delivered projects have allowed to cover about **9 500 km of Traffic Management Services.** The Action has reached its objective of delivering at least 3 200 km of TMS.

Likewise, MedTIS III included 14 individual deployments addressing TIS. These services included mainly road-user warning (accidents, road works,…) and travel information (travel time, weather conditions, co-modal information). Information is disseminated through various supports: websites, mobile phone applications, radio broadcasting solutions and VMS, and is supported by the upgrade of interconnections between traveller services and Traffic Management Centres.

The delivered projects have allowed to cover about **5 700 km of Traveller Information Services.** The Action has reached its objective of delivering at least 2 650 km of TIS.

Some projects faced some delays, consequent to some technical or administrative issues, as works were more complex than initially planned, approval procedures were longer than expected or tendering process was unfruitful. However, these delays have not affected the final outcome of the project, as it has reached its objectives in terms of kilometres of infrastructure covered with Road Safety Solution, Traffic Management and Traveller Information services.

From an end-user point-of-view, the successful deployments have led to a significant improvement of the Level of Service throughout the whole MedTIS III network. Between 2017 and 2021, motorway

sections have been equipped with a higher number of Road Safety Solutions and Traveller Information systems (VMS, isoradio, mobile phone apps). Moreover, better monitoring systems upstream of the traffic management chain allow to collect and treat a wider range of real-time information (traffic conditions, warnings, travel time, …) that is then disseminated through the denser network of information supports.

Through the implementation of these solutions, MedTIS III partners sought to bring mainly three type of benefits, as foreseen:

- Reduce congestion at bottlenecks
- Reduce CO2 emissions
- Reduce accident number and severity

They had to face several issues to measure all the various impacts of MedTIS III Action regarding those benefits: schedule problems, difficulties to isolate the Action's impact from other external factors and other improvements made to the infrastructure, real data availability and the important number of individual deployments and their synergies.

Despite these difficulties, MedTIS III partners have managed to evaluate a representative panel of individual deployments and to estimate the impact of the whole Action.

The individual evaluations show that ITS solutions deployed have indeed a very positive local impact on the chosen indicators.

Deployments concerning *Traffic condition and Travel time information services* or *Incident detection and Incident management* systems have allowed to reduce lost hours in strategic bottlenecks of MedTIS III network. The reduction in lost hours translates in a positive impact on the environment, as a more fluid traffic means a reduction in fuel over-consumption and thus a reduction of CO2 (and NOx) over-emissions.

Furthermore, *Incident detection and incident management* deployments have proven to have a positive impact on road safety, as they allow to inform drivers of incidents, reducing alert time/response times and thus reducing the number of secondary accidents, especially in sensitive zones such as tunnels or bridges.

The deployments chosen for individual evaluations cover different road configurations (cross border sections, inter-urban sections, urban sections, mountain areas with tunnels), and different levels of equipment. It is then normal that impact on benefit KPIs is different from one deployment to another.

Regarding impact on congestion and on environment, the benefits can go from a reduction of about 2 000 lost hours and 36 Tons of CO2 for a project covering 200 km of motorway, to a reduction of more than 24 000 lost hours and 200 Tons of CO2 for a project covering about 1 000 km of motorway.

Concerning safety, the benefits can go from 1 accidents with victims potentially avoided over 100 km of motorway, to 7 accidents with victims potentially avoided over 1 000 km of motorway. When comparing an individual deployment's costs and benefits, the results can be equally diverse, but all satisfactory:

ROI are between 2 and 10 years, but more than half of them (6/10) are between 2 and 5 years.

This diversity of positive results measured allows to state that the ITS solutions tested can have positive impact on a large variety of road configurations. As the road configurations considered for this evaluation can be found in most of European Member States, it means that ITS solutions such as incident information upstream of sensitive sections like tunnels or bridges, can be suitable solutions for European road operators seeking to reduce congestion and/or improve safety on their road network.

Finally, at Corridor level, MedTIS beneficiaries have estimated the impact of the Action following the same three indicators:

Category		MedTIS III impact estimation at Corridor level
	Congestion	**Reduction on lost hours by roughly 130 000 hours**
	The Environment	**Reduction of CO2 emissions by roughly 1460 Tons of CO2**
	Safety	**50 accidents and 75 victims including 2 fatalities potentially avoided**

It should be noted that this estimation is considered as the minimal expected impact of the project, as the calculation hypothesis do not cover the full perimeter of the Action (however, it covers almost 80% of these actions) and are mostly based on the reduction of the number of secondary accidents, leaving aside primary accidents and other incidents, on which ITS solutions also have a positive impact.

Following the previous figures, the **impact of the Action at Corridor level is estimated at 13,9 M€**, for a total final cost of 64 M€ on deployment activities. This represents a **ROI less than 5 years for the whole Action.**

It should be noted that the estimates made in this assessment reflect realistic and pragmatic approaches.

Inspired by those used in MedTIS II, they have been perfected in MedTIS III, particularly in terms of data qualification and thus prove to be very reliable and efficient.

On the basis of solid concrete and operational bases, they deliver, from a methodology to the innovative approach, results very close to those in the OECD report: “road safety: impact of new technologies” produced by the OECD working group on safety and technologies.

The convergence of these two types of approaches thus reinforces the credibility and value of that evaluation methodology, now well proofed, to be shared with our corridors partners, in order to prepare the future projects and future projects evaluations.

7 Liaise with EU-EIP Platform (from 01/01/2019)

MedTIS III Corridor contributed strongly to the EU-EIP Platform, particularly in the evaluation group and the cross corridor cooperation group.

Project has continually interfaced with the EU ITS Platform with a continuous communication or monitoring and results of the evaluation.

The evaluation methodology developed in the frame of MedTIS III has been presented to the EU EIP members and has been adopted by most of them for their corridor evaluations, demonstrating a fruitful cross fertilization.

A calculation model for building the missing evaluation data has been developed in the frame of MedTIS III and has been put at disposal of all EU EIP members. As example, that model has also been used for Arc Atlantique III evaluation.

MedTIS III partners have contributed to structure European monitoring and provided appropriate data to the EU ITS Platform.

Data to deliver consolidated results to the EU ITS Platform have been collected and processed, to then deliver consolidated results for the overall corridors via the EU ITS Platform.

MedTIS III road operators have complied with the ITS Deployment Guidelines of the EU ITS Platform. Road operators will pursue the objective of delivering the most relevant and quality-driven ITS services towards EU road users. In that sense MedTIS III partners monitor the ITS Deployment Guidelines implementations and report to the EU ITS Platform as part of the Impact Evaluation activity.

On cross corridor cooperation, ITS Deployment Corridors have successfully been established as an instrument to implement EU transport policy regarding ITS on roads. ITS deployment on European Scale requires a European level harmonisation layer, which is implemented by the European ITS Platform (EU EIP). But on top of that, practitioners in the ITS corridors are interested in direct, working level cooperation with other corridors or projects regarding concrete ITS deployment activities.
Thus, MedTIS III team was deeply involved in the work of the CCC EU EIP group to present its working methods and the results obtained, particularly in terms of program evaluations and in terms of best practices deployed.

The action will address such direct liaison needs. It can be used to address direct cooperation of different ITS Deployment Corridors, but also cooperation with other corridors or relevant ITS deployment actions, like C-ITS corridors and the C-Roads platform, ITS deployment projects co-funded by the EC from cohesion funds, or between CEF Core Network Corridors.

MedTIS III will provide impact evaluation to the EU ITS Platform.

In the table below, a list of Best practices was delivered to the EU EIP platform, in the frame of “best practices dissemination”

Implementer	Best Practice Title	Best practice availability
APRR	Secure trucks parks (MedTIS II)	x
APRR	"SOS Autoroute" smartphone application update (MedTIS II)	x
ASF, ESCOTA	Truck Parking (MedTIS II)	x
ASF, ESCOTA	Deployment of varible speed limit systems on the Vinci Autoroutes motorways (MedTIS II)	x
ATMB	A new innovative traffic management and information system on ATMB network (MedTIS III)	x
ASF, ESCOTA, ACESA, ADF	Cross-border travel time continuity between Italy, France and Spain (MedTIS II)	x
SITAF	Upgrade of highway tunnels' traffic management services (MedTIS III)	x
AUCAT	Lighting systems solutions based on LED Technology (MedTIS III)	x
Lusoponte, BCR, IP, Ascendi BLA, Ascendi CP	Enhancement of traffic management and information systems and equipments (MedTIS III)	x

On the other hand, the highlights of the main projects of MedTIS III have been established and communicated to the EU EIP platform, for the purpose of a good cross-communication of the results obtained.

The list below remind those highlights

Project	Implementer	Project Name	Highlight Title
FRA-8	ATMB	Dynamic signalisation and traveller information	A new innovative traffic management and information system on ATMB network
FRA-15	ESCOTA	Traffic and event management information through mobile phone	A new travel time information system on ESCOTA network
ITA-13	SALT	Intelligent transport systems for traffic and emergency management in motorway tunnels	Intelligent transport systems for traffic and emergency management in motorway tunnel
SEO-2	AUCAT	Safety ITS Deployment in AUCAT Tunnels	Safety ITS Deployment in AUCAT Tunnels
POR-3	Lusoponte, BCR, IP, Ascendi BLA, Ascendi CP	Enhancement of traffic management and information systems and equipment	Enhancement of traffic management and information systems and equipments

Annexes

- CEF16_FRA-1- Central Traffic Management Control centre enhancement

- CEF16_FRA-4 - Enhancement of traffic monitoring: Deployment of traffic monitoring gantries and system on ASF network

- CEF16_FRA-8: Dynamic signalisation and traveller information

- CEF16_FRA-15: Traffic and event management information through mobile phone

- CEF16_ITA-01: Upgrade of traffic information systems in tunnels and CEF16_ITA-03: Installation of VMSs in tunnels

- CEF16_ITA-13: Intelligent transport systems for traffic and emergency management in motorway tunnels

- CEF16_ITA-15: Intelligent transport systems for traffic and emergency management in motorway tunnels

- CEF16_SEO-2: Safety ITS Deployment in Tunnels

- CEF16_POR-03 Enhancement of traffic management and information systems and equipment and CEF16_POR-06 Traffic Control Centre Upgrade