Digitalisation of road transport in Europe

Highlights from benefits of the ITS program co-funded by CEF

ISBN 9788897212126

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Cover: A10 and A6 motorway in Italy – integration of the transport in mountainous cross-border environment
Previous page: Co-modality of the transport – motorway A15 serving the harbour of La Spezia

Co-financed by the Connecting Europe Facility of the European Union

Herald Ruijters

Director for Investment, Innovative and Sustainable Transport
European Commission
DG MOVE

Digitalisation: a key tool for the palette of the European green deal and digital Europe

Digitalisation has always been the key theme in the Intelligent Transport Systems sector, driving innovative developments that have supported our goals to make travelling safer, less congested and more sustainable. The ITS Directive 2010/40/EU has already laid the foundation to ensure data to feed these developments has become accessible through National Access Point in the Member States and continues to support information services. Projects such as the EU EIP have also contributed to the implementation of the Directive, as data becoming available is (re-) used to support other innovative services, contributing to the establishment of the European Mobility data space announced in February 2020. But the work does not stop there! The European Commission has defined a number of significant pillars upon which our sector will be further developed in the years to come. Some of these are already becoming ubiquitous in our daily life; the European Green Deal and Europe Fit for the Digital Age are at the centre of the political attention and offer us a solid basis to continue developing and deploying ITS throughout the European Union. I look forward to putting these strategies into practice, which line up perfectly with the ambitions we have had with ITS from the beginning. One of the main challenges we face is quantifying the positive impacts that ITS have on our lives and effectively communicating them to a wider audience. I am therefore always very pleased to read about the benefits that the projects executed under the TEN-T programme and Connecting Europe Facility have brought to road users, in terms of less hours spent in (congested) traffic, reduction of injuries and fatalities, but also the reduction of CO2-emissions to the benefit of everyone. I encourage the entire sector to communicate these results and continue highlighting why our work is so important. The harmonised and coordinated approach of the EU EIP has created added value in conjunction with the ITS corridors and TEN-T Core Network Corridors, which form the backbone of our transport and logistics infrastructure, making sure that digitalisation is used to effectively support policy objectives across Europe. This is a good example of the importance of tackling the complex issues in our field in a joint and collaborative manner, each putting their own expertise to the best possible use. I wish to thank and praise the collaborators and all the stakeholders involved in the execution of these projects: you put digitalisation into practice for the benefit of everyone.

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Objectives of Core Network Corridors in European Policy: the case of the Atlantic corridor

The TEN-T Regulation[1] and its financial support provided by the Connecting Europe Facility (CEF) Regulation[2] have the very ambitious goal to integrate the infrastructural systems for mobility of the Member States. The purpose is to develop a real network capable to support the well-functioning of the single market with more efficiency and sustainability for the mobility of citizens and goods. This requires not only the development of interconnected physical infrastructure (especially overcoming missing cross-border links), but also to use it in the best possible way. It is where digitalisation plays a crucial role in allowing the development and deployment of Intelligent Transport Systems (ITS).

In order to develop and deploy ITS, CEF focuses on the implementation of the priority actions of Directive 2010/40/EU and its delegated regulations. CEF funding in this field acts as catalyst for the development of the Corridor concerned, where ITS services have a proven impact on efficiency and safety on its network. Moreover, ITS services are harmonised, interoperable and deployed at Corridor level, so that the European driver can travel seamlessly across several Member States.

Arc Atlantic ITS Corridor (phase 2 and 3), for a total Corridor funding share of euro 13.9 million, targets the implementation of the priority Actions of Directive 2010/40/EU and its delegated regulations. It aims inter alia to deploy ITS that impact directly passengers and goods transport on over 29,000 km of roads of the North Sea-Mediterranean and Atlantic Core Network Corridors. This objective will be met through the installation of the necessary ITS equipment and infrastructure on these Corridors in order to provide new or upgraded harmonised Traffic Management and Traffic Information Services. This is particularly important for the Atlantic Corridor, which has a high maritime component, and where goods imported from overseas through its ports mostly reach the centre of Europe through very long road journeys.
The Atlantic Corridor is a good performer in relation to ITS and C-ITS. Largely benefitting from the support of the EU (i.e. projects Arc Atlantique, MEDTIS, etc.), the Atlantic core roads are already well covered by Traffic Management and Traffic Information Systems, in line with "Action b" of the ITS Directive. Furthermore, from Portugal towards France (through Spain) and further to Germany (although without a road component in the Corridor), the deployment of interoperable C-ITS Day 1 and Day 1.5 services is being achieved through the full engagement of the three countries in the C-Roads Platform. This already allowed several cross-border pilots of interoperable solutions to be carried out,

1 No 1315/2013, 11 December 2013
2 No 1316/2013, 11 December 2013

Carlo Secchi

Atlantic Corridor
Core Network Corridor
European Coordinator

with upscale planned along the coming years. Moreover, several projects are ongoing along the Atlantic roads regarding road safety and preparation for automation.
Consequently, it can be affirmed that the Atlantic Corridor not only benefits from the deployment of ITS devices in improving safety, sustainability and efficiency in its road network, but also is proving to be a very interesting laboratory for the experience gained and the lessons learned. This will allow to provide very useful indications on how to further enhance the role of ITS within the ongoing revision process of the TEN-T Regulation.
This publication is very welcome; it will spread knowledge and information on ITS in Europe and thus allow not only stakeholders directly concerned, but also all citizens to be more aware on further progresses necessary in the near future for a safer, more sustainable and efficient mobility.

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The Connecting Europe Facility (CEF) for the digitalisation of road transport

The deployment of Intelligent Transport Systems (ITS) services in Europe has been a priority for many years as policymakers realised the potential of making road transport smarter. The EU's TEN-T programme (2007-2013), which marked the beginning of the European ITS Platform and the first "ITS Corridors" in fact, already supported ITS projects across our continent.

Since 2014, the implementation of ITS and C-ITS services at much larger scale is supported by the European Union's infrastructure support programme, the Connecting Europe Facility (CEF). Through more than 50 projects, around €500 million have been allocated to ITS, triggering investments of over €1.3 billion. A significant share of this EU funding has been allocated to the "ITS Corridors": 16 CEF Actions with funding above €160 million, generating investments exceeding €720 million.

The ITS corridors, which are aligned with the TEN-T Core Network Corridors and represent the priority in the investments of the EU for all transport modes, require the close cooperation of Member States. They enable the implementation of long stretches of roads equipped with ITS services, which must therefore be harmonised and interoperable. This is for the benefit of European road users who can enjoy a seamless journey without the technical inconveniences of different ITS services and standards across borders.

In this regard, I am convinced that CEF support has not only supported financially the roll-out of ITS services, but has also helped in the coordination among the numerous ITS stakeholders, especially EU Member States, encouraging their support for this technology.

As Director of INEA, I am very proud of the achievements of CEF in the field of ITS, and I welcome this publication which illustrates some of the concrete results produced by EU funding.

Overall, it is evident that ITS brings a direct and positive impact on citizens (for example the reduction of road accidents and fatalities), on the European economy (less road congestion) and on the environment (a reduction in CO2 emissions).

I would like to thank the Member States' authorities, the Road operators and all stakeholders involved in these CEF Actions for their commitment towards these common objectives, and I look forward to future ITS prospects in the coming years.

Dirk Beckers

Director of the Innovation and Networks Executive Agency (INEA)
European Commission

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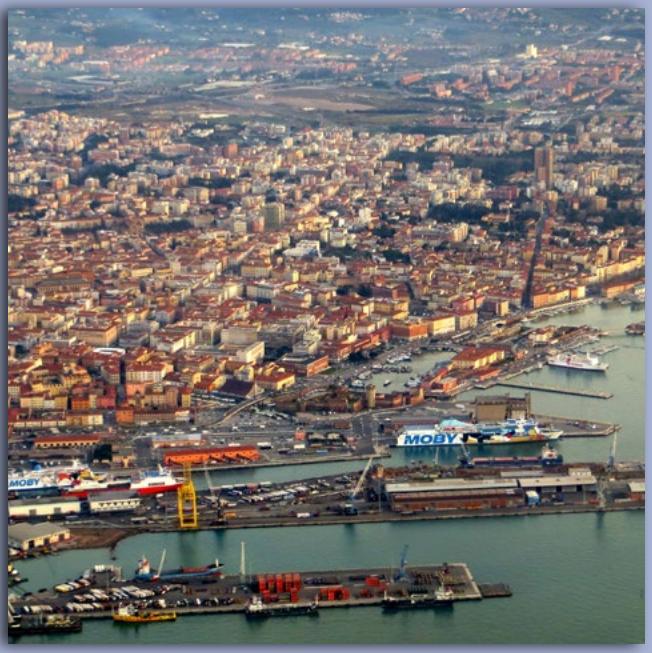
Introduction

Achieving a single transport area in the European Union demands coordinated and concerted effort across all modes and by key actors within Member States. Road transport remains pre-eminent, and its development must respond to changing demands and needs of users, stakeholders and policy. Technical and scientific litterature, including the EU EIP Evaluation Library[1] clearly indicates that Intelligent Transport Systems (ITS) and the digital processes behind ITS, delivers significant benefits to road authori-

1 The evaluation library of the European ITS Platform is discussed in page 20 of this report.

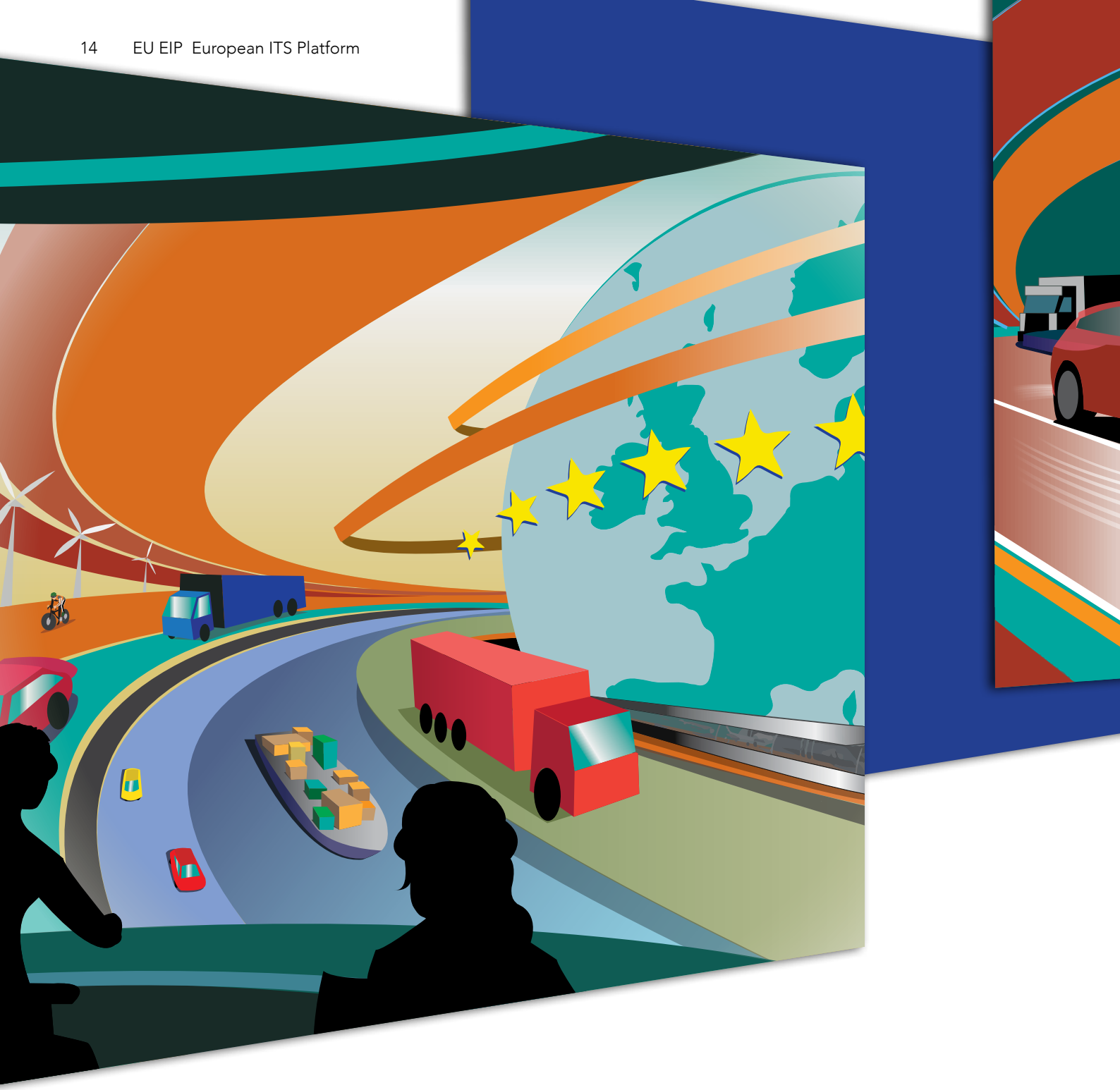


ties, operators as well as to users and the whole of society.
This publication provides an insight into the achievements of EU co-funded projects where implementation of ITS has been used to target mobility inefficiencies, mitigate safety risks and environmental pollution on the trans-European road network.

Images of this report showcase examples of results, implementations at European scale within the Platform and CEF ITS corridors. In the front page: examples from motorways and multimodal services addressed by corridors

Background

DG MOVE, INEA and European road authorities have been working together for several years to implement ITS systems and services supported by the ITS Directive 2010/40/EU, in particular the wider deployment of Safety-Related Traffic Information (SRTI) and Real-Time Traffic Information (RTTI), better traffic management and services relating to the freight industry. This has been achieved through formation of five 'ITS Corridors' which comprise largely linear stretches of the trans-European Core and Comprehensive networks. In many cases the ITS corridors are coinciding with the CEF Multimodal Core Network Corridors (CNC). Together these entities provide a powerful mechanism to implement policy objectives for transport across Europe.
The importance of a coordinated and harmonised approach to implementing digital ITS services is being addressed by the European ITS Platform (EU EIP) whose members comprise of road authorities, operators and research organisations as well as other beneficiaries of the ITS Corridors projects. The key benefit of this approach is to achieve knowledge share, harmonisation and uniquely, maintain a direct link between policy makers, those responsible for delivering policy objectives and organisations who implement mature ITS and wider digital services in real life situations.
As technological change accelerates and the benefits of digital services in the transport domain become more apparent and achievable, the EU EIP has responded with a series of activities. Using expertise from within the European operator and supplier communities, the EU EIP compiles supporting guidance and advices to assist road authorities and operators to accelerate implementation of digital services. These works extend from more traditional and proven effect ITS through to newer areas of C-ITS and beyond, and addressing a wide range of topics and services such as National Access Points (NAP), data quality, data exchange as well as roadmaps towards wider digitalisation of the network.
A key benefit of the EU EIP is its reach into real life implementation of ITS across Europe, and its work to evaluate its beneficial impact on road efficiency, safety and the environment in support of European policy objectives for transport.



The Future

Notwithstanding the achievements and the real life benefits of the EU EIP and ITS Corridors as summarised in this publication, transport and its infrastructure must become more digitalised to deliver better services to users, as well as meeting key objectives for the environment, safety, European safety, cohesion through a better transport system and the improved functioning of the Common Single Market in the transport domain. The ITS Corridors and EU EIP's work to date will assist, as it addresses how, to capitalise on an increasingly data dense domain. The new and improved services that increased digitalisation can be accounted as a valuable result: the EU EIP and corridors have a role in achieving greater multimodality across Europe.

As such the EU EIP[1] and ITS Corridors' objective is to support the optimisation of the single transport area through harmonised deployment of digital ITS systems and services, contribute to the formation of the digital transport layer, whilst ensuring interoperability, and continuity of services on the European transport network. This document illustrates some of these achievements to date.

1 The EU EIP and Corridors are a transmission chain from policy to implementation. They started as a road operators community, later opened to harbours and freigh villages, achieving already some best practices in multimodality.

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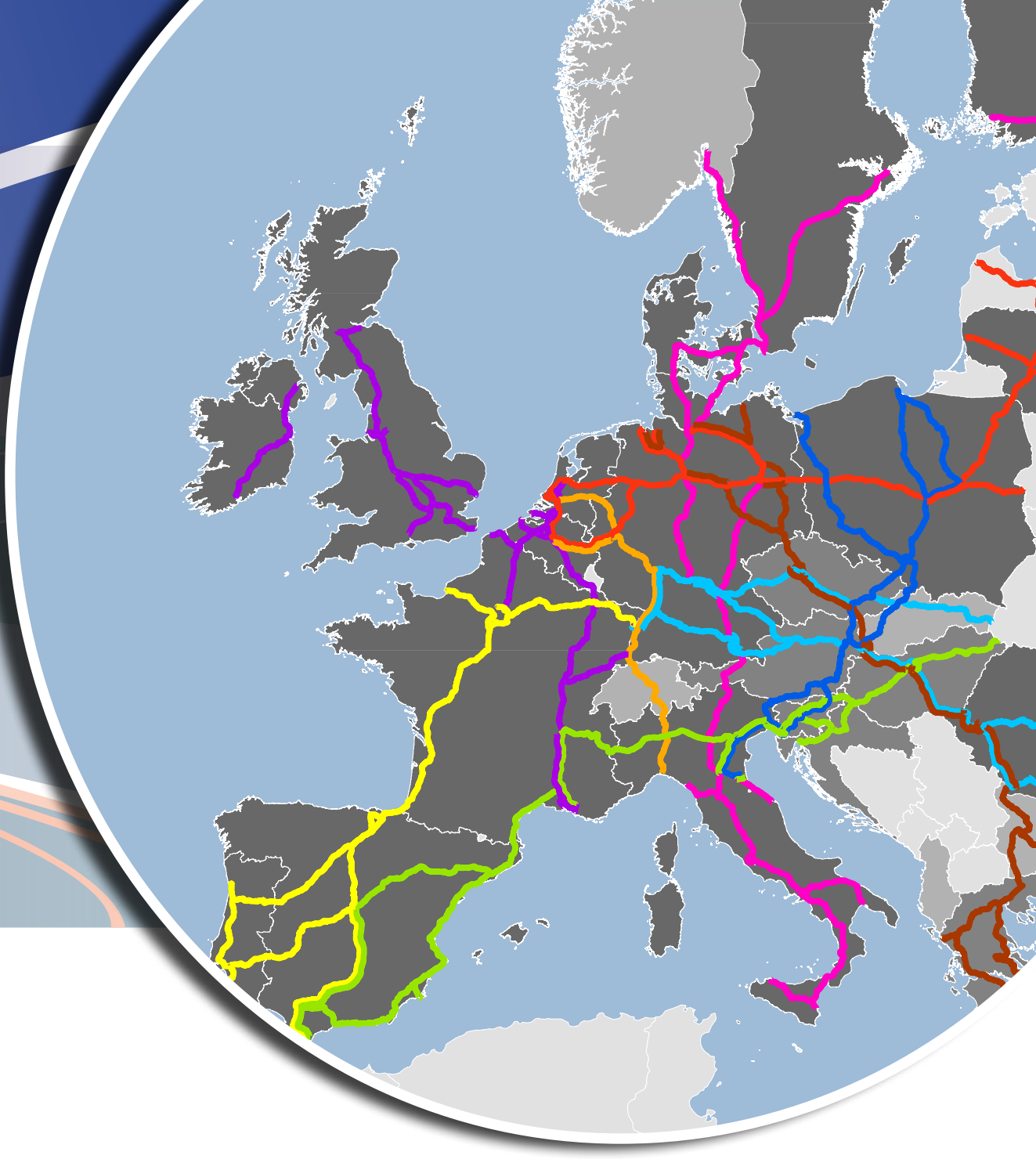
EU EIP
European ITS Platform

- Austria
- Belgium
- Croatia
- Cyprus
- Czech Republic
- Denmark
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland
- Lithuania
- Netherlands
- Norway
- Poland
- Portugal
- Romania
- Slovenia
- Spain
- Sweden
- Switzerland
- United Kingdom
- Italy (Coordinator)

■ Platform Beneficiaries ● Corridor Partners



The European ITS Platform

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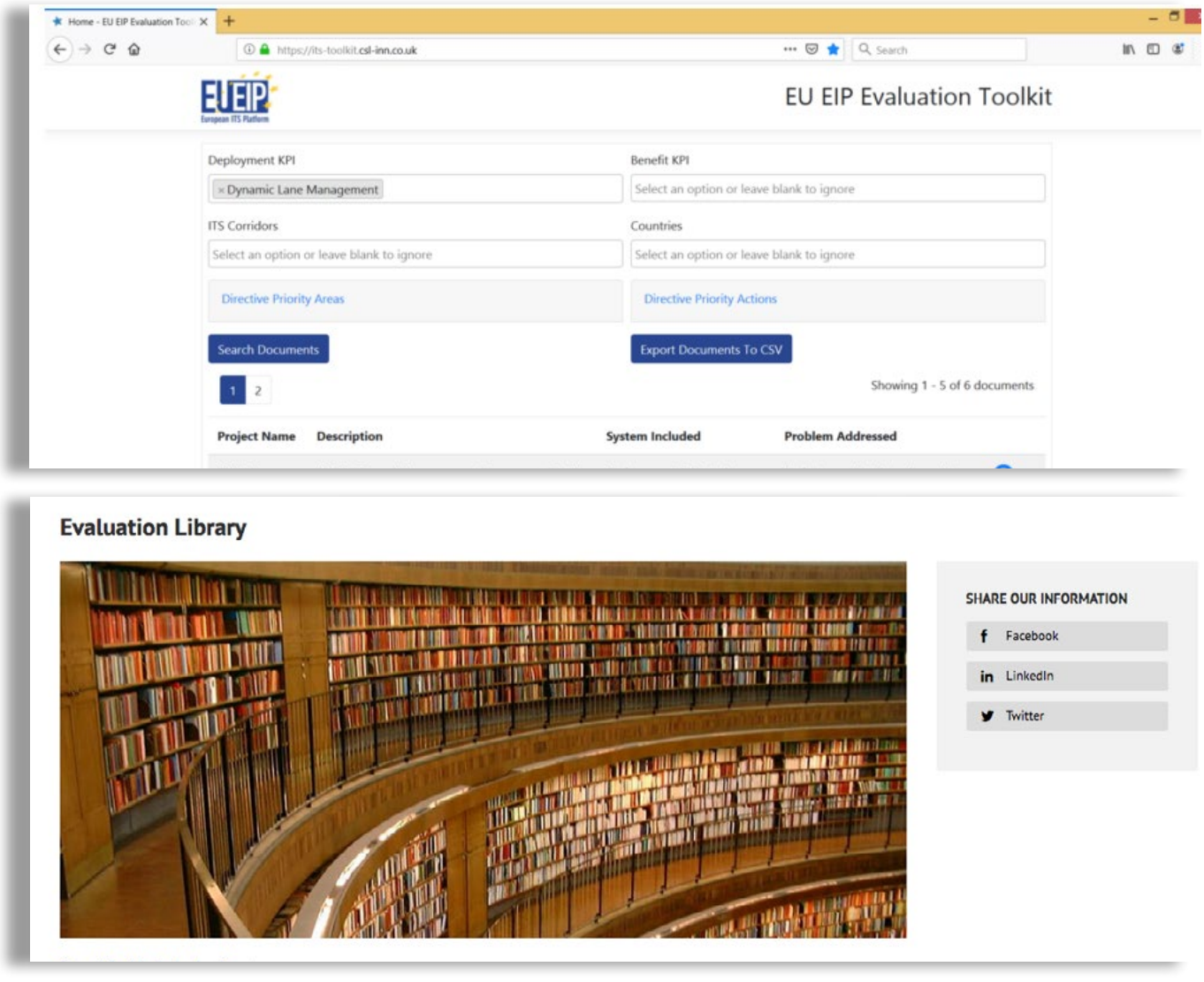
Evaluation: Results of the European ITS Platform - the Evaluation Group and its Objectives

The Evaluation group of the European ITS Platform (Activity 5) comprises experts from the majority of the EU EIP Member States and all CEF funded ITS Corridors and, to date, has benefitted from a strong active representation from its membership. The Evaluation Group has built on the work undertaken in its precursor EIP+ with a view to meeting its objectives of developing a suite of tools and support materials to enable a harmonised approach to ITS evaluation reporting which produces consistent and comparable results.

Summary of Key Deliverables

In 2017, some common KPI Definitions (including methodologies) were developed and agreed following extensive consultation with Member State experts, ITS Corridors and DG MOVE. This document was produced with the intent of providing a single convenient and practical reference point for evaluators and is comprised of agreed Deployment and Impact KPI definitions as well as suggested estimation methods for calculation. It draws significantly from various sources and work on the subject, including the ITS KPI definitions developed by DG MOVE and the body of work relating to the EasyWay and EIP+ studies.



Evaluation of ITS projects: the European ITS Platform produced web facilities and tools

Pan-European cooperation in the European ITS Platform

Following this, a common Evaluation Report Template (incorporating guidance) was developed in 2017. This was structured in line with and consistent with the European ITS Platform KPI Definitions for the purpose of ensuring that a common approach was adopted to Evaluation reporting. The KPI Definitions and Evaluation Report Template have been promoted on the Evaluation website and are publically available and downloadable from the Evaluation Library (https://evaluation.its-platform.eu/EvalLib).

These reports from the basis for the European ITS Platform ITS Toolkit, (https://its-toolkit.csl-inn.co.uk), which is an extensive database comprising key meta-data from all available Evaluation Reports. The Toolkit has been developed into a publicly accessible online tool for searching ITS Evaluation results by 6 key criteria (Deployment KPI, Benefit KPI, Location, Corridor, ITS Directive Priority Area and ITS Directive Priority Action) and enables users to directly locate Evaluation Reports. The Toolkit was launched in 2019 and will continue to be periodically updated as new results become available. For the duration of the Action the European ITS Platform Evaluation Website (https://evaluation.its-platform.eu/) has been maintained, featuring highlights relating to key deliverables and developments.

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The website incorporates an extensive Evaluation Library (https://evaluation.its-platform.eu/EvalLib), which serves as a repository for all European ITS Platform ITS Evaluation reference and guidance materials, as well as all compliant Evaluation Reports from the ITS Corridors and an archive of pre-CEF ITS Evaluation Reports and support materials.

Uptake of the Evaluation Deliverables and Added Value

The Evaluation group has benefitted from strong, regular, direct Corridor engagement. In return, all ITS Corridors have, for the duration of the Activity to date, informed the development of the common approach defined in the European ITS Platform developed support materials. Furthermore, the corridors have fully adopted the European ITS Platform KPI Definitions in their evaluation reporting and the harmonised European ITS Platform approach by using the report template and by transferring their results into the ITS Toolkit format.
Regarding the Added Value of the detailed European ITS Platform definitions, it should be noted that these were developed in parallel to (and are explicitly cross-referenced with) the more generic ITS KPI definitions developed by DG MOVE for the purpose of Member State reporting. Although the European ITS Platform KPIs are more detailed, they are nonetheless consistent with the DG MOVE KPIs and, for ease of reference, a shortlist of DG MOVE's KPIs has been included in the European ITS Platform KPI Definitions document along with a comparison of related (if not directly corresponding) European ITS Platform and DG MOVE KPIs.

Future Activity Plan

The European ITS Platform will continue to maintain the Evaluation Library and to periodically update the European ITS Platform Evaluation Toolkit as more reports become available from the phase 3 Corridors. The database will be comprehensively updated at regular intervals between now and the end of the current programme as more reports become available. Interim and Final Reporting will be completed between now and
the end of the programme which will provide an overview of evaluation (A5) deliverables, a review of corridor engagement and a summary of key Corridor results. A qualitative assessment of the socio-economic impact of implementation of the ITS Directive based on an assessment of the results of ITS Corridor and non-CEF funded ITS projects undertaken within Member States will be completed by the end of the programme.

evaluation toolkit

https://its-toolkit.csl-inn.co.uk

evaluation website

https://evaluation.its-platform.eu/

evaluation library

https://evaluation.its-platform.eu/EvalLib

The Dutch Minister opening the European ITS forum
https://itsforum2018.eu

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Corridor Results

Overall, the European ITS Platform has delivered as planned to date and will continue to gather, process and make available the corridor evaluation results between now and the end of the European ITS Platform programme. Full and up to date detailed corridor reporting can be found in the European ITS Platform Evaluation Library. Whilst corridor reporting is, in some cases, yet to be completed, some good examples of the impacts reported to date are included in the following sections.

Evaluation reports included in the library are performed according to European KPIs and templates harmonized by EU EIP

Cooperation of the European ITS Platform with other European programmes

Cooperation within Core Network Corridors

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Arc Atlantique
Atlantic - North Sea - Mediterranean

Belgium | France | Ireland | Portugal | Spain | Netherlands | United Kingdom (coordinator)

arcatlantique.its-platform.eu

ARC ATLANTIQUE

ITS CORRIDOR

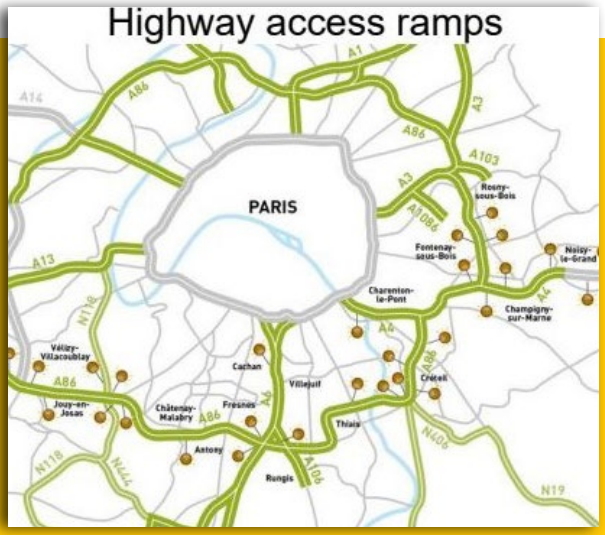
Co-financed by the Connecting Europe Facility of the European Union

Overview and Objectives of the Arc Atlantique ITS Corridor

The purpose of the Arc Atlantique ITS Corridor is to accelerate the deployment of traditional and innovative Intelligent Transport Systems (ITS) and services on the Core and Comprehensive networks. This is with the key objectives of:

- Increasing the efficiency of the trans-European road network
- Improving safety
- Improving environmental performance

These objectives are consistent with the policy objectives of the EU, which is committed to reducing the overall cost of transport to the economic benefit of the Union, reducing societal impacts through improving the safety record of the network, delivering improved air quality, and contributing to the delivery of the Paris Agreement on climate change. Furthermore, through having a positive impact on congestion, particularly at bottlenecks, the ability for the Union to deliver goods and services more effectively supports transport cohesiveness, economic vitality and wellbeing.
To this end, the Arc Atlantique ITS corridor network is largely aligned with the North-Sea Mediterranean and Atlantic Core Network Corridors. Together, the corridors work towards improved multimodal transport links across the western reaches of the Union and for which the Arc Atlantique ITS corridor deploys technology and digital services on the road network.
Partner Member States comprise, Ireland, United Kingdom, the Netherlands, Belgium, France, Spain and Portugal and are supported and funded by the Connecting Europe Facility. The partners are all public highway authorities or concessionaires operating on behalf of public authorities.



Traffic efficiency in urban area: ramp metering in motorways around Paris

Following page :
Integrating information for cargo - port of Ravenna

Targeting Known Problems, Adopting a Harmonised Approach

The Arc Atlantique works in conjunction with the European ITS Platform (EU EIP) and the other ITS Corridors to build a common approach to deployment and makes use of agreed common performance indicators to measure impacts and benefits on the network.

The Arc Atlantique Corridor technological focus is to deploy ITS enabled traffic management and safety solutions in known problem areas such as bottlenecks, and on routes with chronic and acute congestion which cause increased transport costs, pollution, and are often associated with an unsatisfactory safety record. Furthermore, it extends and builds digital communications and cross-border cooperation through the implementation of harmonised systems and services such as Real Time Traffic Information and Safety Related Traffic Information whilst contributing to multimodal information via National Access Points. These are implemented in accordance with applicable European Regulations and assist Member States in meeting their obligations under the ITS Directive.

Protecting human life: ghost vehicles detection Project - Lyon region and the French Alps

Achievements a snapshot

The Arc Atlantique is being implemented over 3 phases and is due to complete its work in 2021. The Corridor has delivered and will continue to deliver a number of achievements over its lifetime. The following highlights some of these achievements over the Arc Atlantique phases to date.

For the Arc Atlantique 1 period to end of 2017 the total number of Real Time Traffic Information schemes implemented on the corridor was 22. The length of corridor that benefited from this service was 19,000 km. The work included upgrades to traffic management centres and new digital communications. For the same period, 19 projects concerning Safety Related Traffic Information were implemented benefiting 7,600 km of the network. Furthermore, the network received new and improved services in co-modal information, truck- parking and the roll out of DATEX II.

The Arc Atlantique 2 implemented a further 36 ITS projects designed to deliver enhancements in traffic and congestion management, safety and environmental improvement, amongst others, at specific locations on the network.

Throughout the length of the ITS corridor, the

Variable speed limits and ramp metering in Lille and Bordeau – A25 - A62, A63, A10, N89

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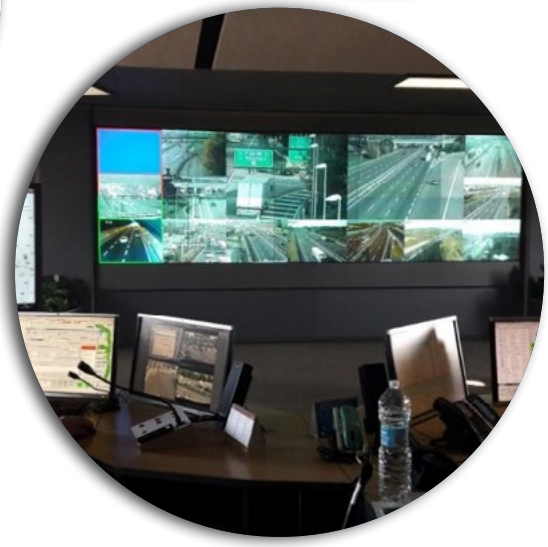

Building the digital layer: monitoring, traffic management and smart cameras in traffic control centres - A24/25 Roma - A4 Verona and Mestre

improvements delivered to users and operators during the current Arc Atlantique 3 can be measured by the increase to the Level of ITS Services resulting from the deployment of ITS on the network.

- 31 projects aimed at improving management of traffic is leading to an increase to the Level of Services in Traffic Management up to Levels 4 (Traffic Management including HSR, HGV overtaking ban and / or VSL) and 5 (Integrated Traffic Management Services).
- 30 projects aimed at improving traffic information will lead to an increase in the Level of Services in Traffic Information to Levels 4 (Additional service available including real-time event, traffic condition and travel time, speed limit, weather information) and 5 (Enhanced TIS level of service available: including continuity at cross border sections, service continuity inter-operators, combination of high-level TIS services).

This impacts 16,000 km of the network. An additional 21,000 km of the network will benefit

from improved DATEX connectivity.
Level of Service definitions can be found at https://www.its-platform.eu.

Selected Highlight Projects

A85, A10, A11 A63, A6 – Conceded Motorways - France Enhancement of the Traffic Management Systems.
Traffic monitoring projects, Ghost Vehicle (wrong way) Detection project, and the On-board Emergency Call Post project, have been helping to shorten the alert time allowing faster response times and reduction of incident risk with wrong way vehicles.
ITS systems that shorten response times for events or accident, indicate a reduction in the number

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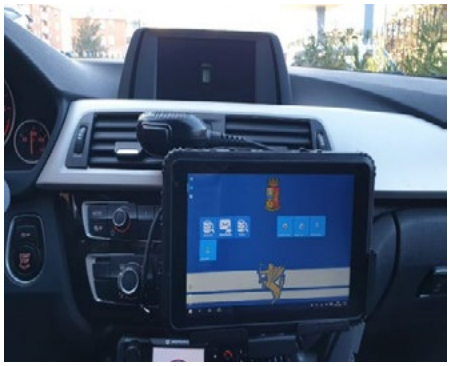
Early warning wireless: salvage companies warn road users for dangers

of accidents and congestion levels on the concerned motorway networks of 1.6%.
Over a 5-year period of the Arc Atlantique programme, after deployment of the ITS services, expected minimal potential savings on French conceded motorways are:

- 7 Fatalities, 17 seriously injured and 143 slightly injured for the safety figures
- 136 000 avoiding hours lost
- 565 000 fuel litres saved
- 1,524 CO2 tons for the congestion volumes

The socio-economic benefits corresponding to these savings, amount to 5,2 M€ per year, giving a return on the investment programme of French motorway companies of approximately 3 years.

AG-64 Spain - Traffic Control and Traffic Management ITS deployment.
Deployment of Variable Message Signs, digital communications, detection and monitoring systems and weather stations. Deployment KPI - 64km of network improved, Benefit KPI - reduction in accidents by 15% over two years, 450 k€ saving.
M25 United Kingdom - Traffic Control / ITS Enabled Hard-shoulder Running.
Deployment of Lane control, detection and monitoring systems to enable hard shoulder running. Benefit KPI – Vehicle Lost Hours reduction of 4,400 hours a day, reduction in Killed and Seriously Injured – 15%, reduction in collision rate of 20%.
M70/M50 Ireland - Lane Control Systems.
Installation of lane control signing with VMS to moderate speeds and increase compliance. Benefit KPI - reduction in speed to national limits with expected increase in safety, reduction in pollution and more consistent flow to reduce congestion.



Electronics on Patrolling Italian Traffic Police cars to reduce the duration of congestions at accident scenes, mitigating impact on traffic and reducing the risk of secondary accidents

Optimizing the capacity of existing roads: speed management in Manchester ring road

Co-financed by the Connecting Europe Facility of the European Union

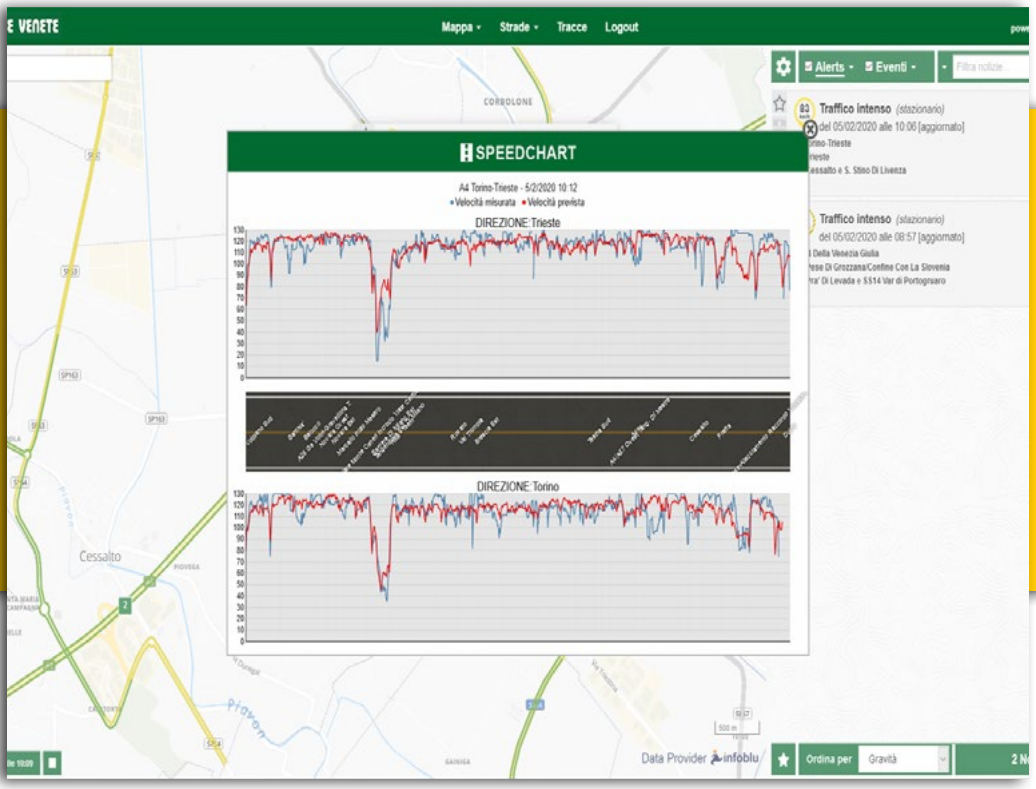
Real Life Pilot on Truck Platooning in The Netherlands

Estimated Benefit over the 5 Year Programme.

Using modelling it is possible to estimate the impact of the new and improved ITS systems and services on the Arc Atlantique 2 network over a period of 5 years, after deployment. Expected savings are as follows:

- 236 slight injuries saved per year (1180 slight injuries over 5 years)
- 28 seriously injured saved per year (140 seriously injured over 5 years)
- 11 fatalities saved per year (55 fatalities over 5 years)

Applying these different realistic hypotheses and taking into account the level of investment, the Arc Atlantique 2 programme as a whole will deliver minimum safety socio-economic savings of **36 M€ per year and a projected ROI of about 3 years.**



Speedchart on A4 - Palmanova

Co-financed by the Connecting Europe Facility of the European Union

Italy

Portugal

Spain

France
(coordinator)

medtis.its-platform.eu

MedTIS

Mediterranean Corridor Deploying traveller information services

Co-financed by the Connecting Europe Facility of the European Union

Objectives

The MedTIS main objective is to foster the implementation of ITS (Intelligent Transport Systems) for better Traffic Management Service and better Traffic information Service on the Core and Comprehensive networks of the Mediterranean Corridor. By contributing to the evolution of local traffic management modes towards coordinated and cross-border management modes, MedTIS has a key role in improving corridor efficiency in terms of road safety and capacity of the trans-European road network.

By developing its actions over nearly 9,000 km and relying on a budget of more than 50 million euros, MedTIS project directly addresses the objectives of the ITS directive to reduce congestion on major networks whilst improving user safety and environmental performance. MedTIS is therefore perfectly in line with the EU's objectives of decreasing societal costs by reducing the number of road victims and improving air quality. These objectives have been stressed in the new EU mobility package and its action plan.

Gathering almost thirty public and private road operators from the Members States of Italy, France and the Iberian Peninsula, MedTIS contributes to a better management of a strategic axis serving several major ports such as Venice, Genoa, Marseille, Barcelona and Valencia. As such it addresses areas where the traffic conditions are often difficult with high levels of traffic, especially during summer holiday periods, heavy truck traffic, large international flows, but also, in some sectors, significant commuter traffic.

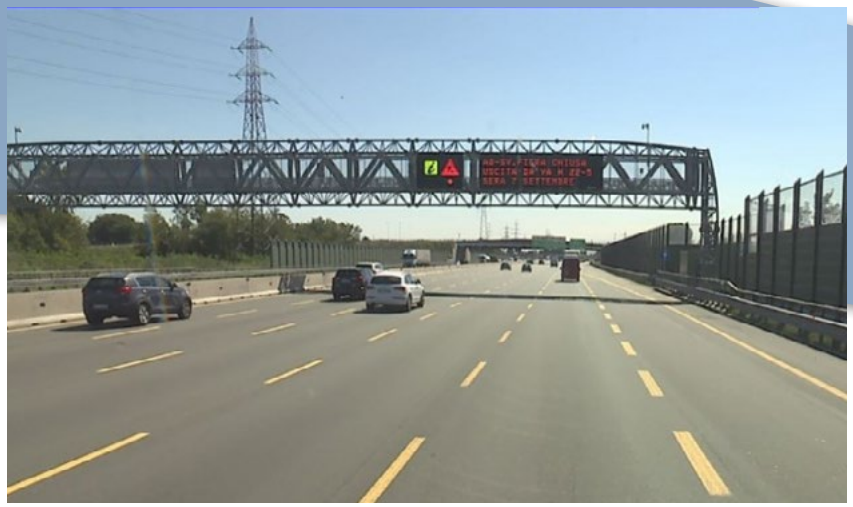
Priority and main actions to improve control, information and traffic management are the following:

- **the deployment of automatic event detection equipment**
- **the deployment of the first on-board information systems**
- **the deployment of speed control systems**
- **the displaying of truck parking occupancy information**

Moreover, one of the key actions of MedTIS was to develop a flagship project: «cross-border travel time project» that has significantly improved the operations efficiency and the level of service on France-Spain and France-Italy borders.
From a close collaboration between the 3 cross-border operators, who developed their exchanges of traffic information and traffic data and thanks to Datex II new border traffic management plans and generalized travel time services have been deployed between Spain, France and Italy.

Ergonomic studies for A10 traffic control centre – BIM 3D design and overview – Autostrada dei Fiori

Co-financed by the Connecting Europe Facility of the European Union



Removing bottlenecks – A8/A9

Overall, from the beginning of 2014 to end of 2018, MedTIS programme actions have deployed 85 projects. Ten of them were assessed, using ex-post or ex-ante evaluations, based on EU EIP indicators (Change in accident numbers and severity, Change in bottleneck congestion, Change in CO2 emissions)

These evaluations relate to individual emblematic deployments of MedTIS 2 "Action" These projects, of local impact, have been deployed to better respond to the specific issues encountered on MedTIS 2 network:

- improving traffic management and reducing congestion on critical spots, such as the approach of big cities, and cross-border areas
- improving safety on tunnels and their surroundings
- improving quality of traffic and event information to users, including travel times information

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. So, the impact on benefit KPIs is different from one deployment to another.
Regarding impact on congestion and on environment, the benefits of those local

Best use of existing infrastructure: dynamic use of lanes in peak hours – Sevilla bridge

projects can go from a reduction of 2 to 10% of lost hours and CO2 emissions volumes.
Concerning safety, the benefits of those local projects can go from a reduction of 2 to 5% of accidents numbers.
When comparing an individual deployment's costs and benefits, the results can be equally diverse, but all satisfactory: ROI are between 2 and 9 years, but most of them (8/10) are between 2 and 5 years.

New or enhanced traffic management services now covers more than 6,600 km of that corridor. New or enhanced traffic information services now covers 2,300 km of that corridor.

This extension of proven traditional systems will bring significant benefits in the management and level of service of this ITS corridor and, through use of the most innovative telecommunication solutions, will facilitate the introduction of connected and automated vehicles.

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More precisely, on the 9,000 km of the MedTIS network:

- nearly 100% of the network classified Level of Service 0 (no ITS service) switch to classification 1 (Basic travel information)
- nearly 20% of the network classified Level of service 1 switch to classification 2 (Traffic information and traffic management per section)
- nearly 10% of the network classified Level of service 2 switch to classification 3 (High level and sophisticated traffic management/information)

The general improvement in the level of congestion and road safety therefore is significant and can be highlighted with concrete figures.
For this purpose, and since a full evaluation of this type of programme requires at least five years, it has become necessary to develop a methodology that can immediately and realistically extrapolate the full impact of this corridor programme. Overall, the operational and practical impact of most of the projects deployed in the programme of motorway operators is to shorten response times in the case of an event or accident. These projects therefore make it possible to reduce the occurrence of secondary accidents. Founded on that basis, the methodology developed for this evaluation demonstrates that this ITS deployment programme potentially reduces the number of accidents and congestion levels on the concerned motorway networks by 1.6%. This figure, well in line with those 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 programme.

Benefits in 5 years period

On the whole MedTIS 2 network, after deployment of the programme, one can calculate the following **savings**:

- **8 fatalities**
- **53 seriously injured and 277 slightly injured for the safety figures**
- **642,000 hours lost**
- **2,700,000 fuel litres**
- **7,200 CO2 tonnes for the congestion volumes**

Boosting the efficiency of the transport:
high-occupancy vehicles lane (carpool lane) - Madrid

Previous page:
roadside device in Spain

The socio-economic benefits

The socio-economic benefits corresponding to these savings, calculated from the figures presented in the "handbook on external costs of transport on road safety", amount to 9,42 M€ per year. For the investment programme deployed in MedTIS, that leads to a ROI of roughly 5 years.

As these overall results come from projects that do not cover all the actions deployed in the programme, they must be considered as minimum results. In practice, the result will therefore be even better.

In conclusion, these various projects and actions are fulfilling the objectives and goals for which they were targeted. They have thus contributed significantly to improving traffic safety and fluidity as well as the environmental performance and continuity of service on the MedTIS 2 networks.

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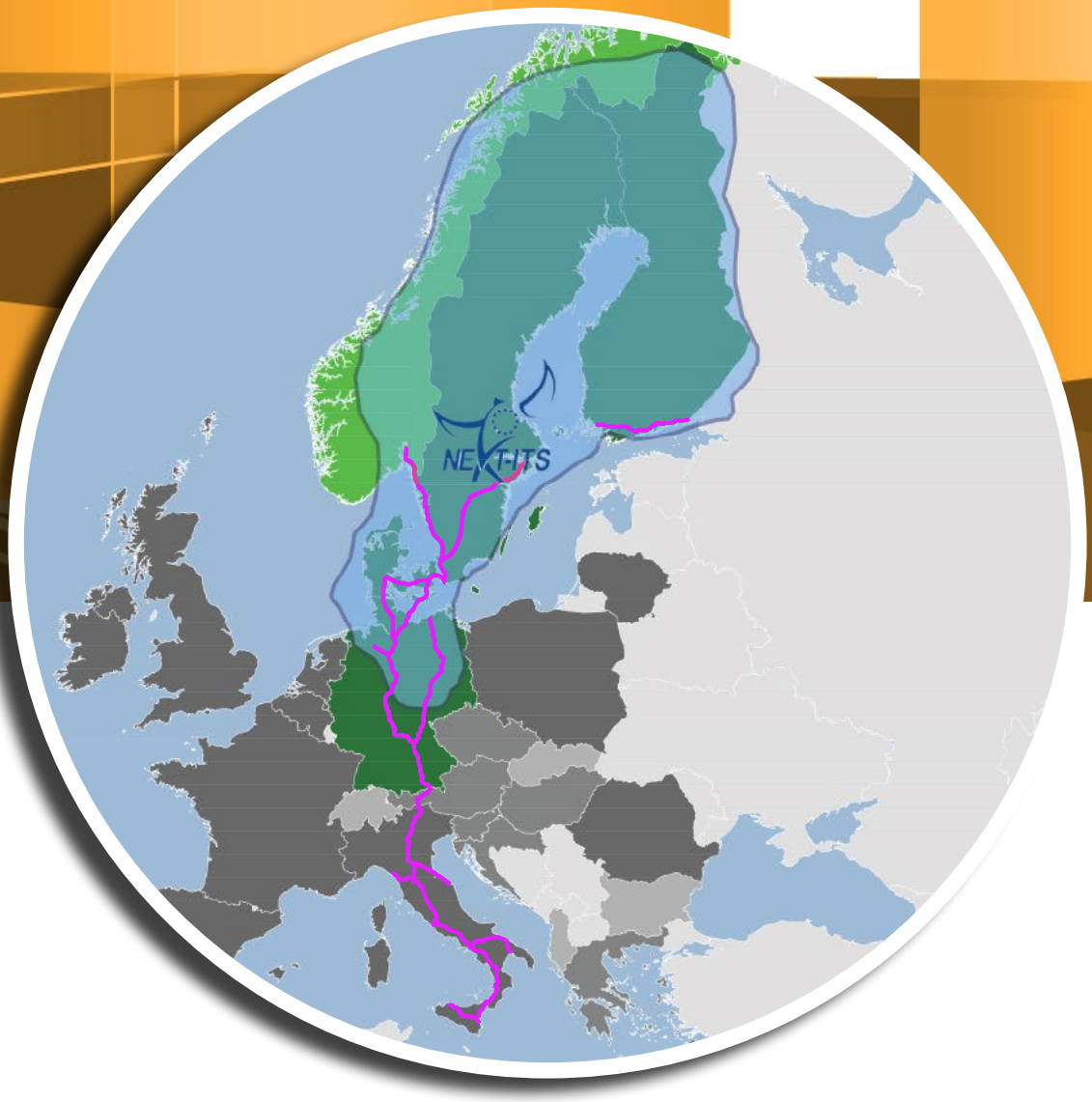
Denmark Finland Germany Norway Sweden (coordinator)

next-its.its-platform.eu



NEXT-ITS

Co-financed by the Connecting Europe Facility of the European Union

Overview

The NEXT-ITS 2 corridor forms the Northern part of the Scandinavian-Mediterranean Corridor. The corridor connects Northern Europe with Western and Southern European transport networks. It offers the primary road transport connections between Western/Central Europe and Norway and the St. Petersburg region of Russia.
During the last decade increased traffic load and extensive presence of HGVs has made the NEXT-ITS corridor and core network vulnerable to disturbances. The road network of the sparsely populated areas of Northern Europe offers limited possibilities for alternative routes and large parts of the network is subject to recurring harsh weather conditions, particularly in wintertime.

Traffic management centre in Finland (© Risto Kulmala).

Objective

The main objective of the NEXT-ITS 2 has been to improve the network performance - in terms of efficiency, reliability, safety, and environmental impact - of the Northern part of the Scandinavian- Mediterranean CEF corridor from Oslo and the Finnish-Russian border in the north via Copenhagen, Hamburg, and Bremen to Hanover in Germany. Cross-border continuity of traffic management services have been targeted through coordinated deployment of Traffic Management services and major upgrades of Traffic Management centres (see figure).

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The measures included in NEXT-ITS 2 have been chosen in order to fill the gaps concerning coverage, accessibility, dissemination, quality and content of the core traffic management services as well as to improve the cost-efficiency in the operation of traffic management. The following deployment projects were completed during NEXT-ITS 2:

- Implementation and upgrade of Traffic Management Centres
- Development and implementation of Traffic Management Plans
- Update of roadside control software to enable service integration
- Implementation and update of roadside information panels for driver information and control
- Data fusion and data quality control at Traffic Management Centres

As basic network for the assessment of the deployment KPIs of NEXT-ITS 2 measures, the comprehensive TEN-T Network has been used. The measures of NEXT-ITS 2 address mainly the Northern part of the Scandinavian-Mediterranean Corridor, but also influence the adjacent road network to the corridor and – in particular where general improvements and enhancements of traffic centres are carried out – larger parts of the main road network. Therefore NEXT-ITS 2 has estimated the impacts on the network which is influenced by the services deployed. The impacts are not limited to the NEXT-ITS Corridor but are the total estimated impacts on the affected network. The reason is that NEXT-ITS 2 contained a number of deployments in relation to central systems in traffic management centres and these system upgrades in reality affect a larger network than just the corridor itself. Thus, when including all the costs in relation to the deployments, one should also include all the benefits.

Cost-benefit analysis of NEXT-ITS 2

Costs

When calculating the costs, all the costs related to those measures, which were fully deployed during NEXT-ITS 2 are included. Overall, the costs are included into CBA calculations if and only if the respective benefits are included, too. This explains the inclusion of Norwegian costs into the total costs, even if they did not receive any EC funding for their deployment; Norwegian figures are also included into the benefit calculations.

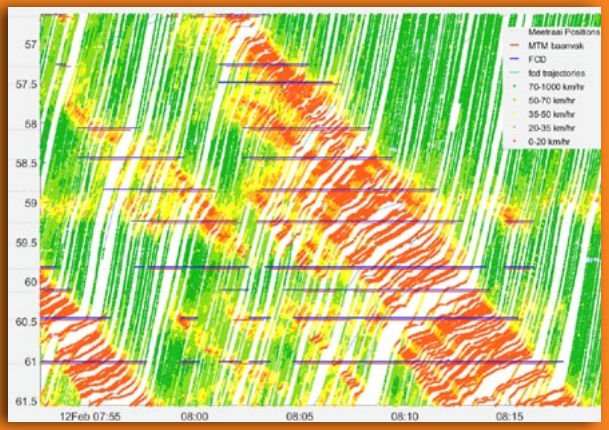
For 5-year period, the estimated implementation costs of all NEXT-ITS 2 deployment measures are circa 33 million € (including VAT), and the annual operation and maintenance costs circa of 3 Million €, resulting 15 M€ for five years.
The five-year costs:

- implementation 33M€
- maintenance and operation 15 M€
- total costs 48 M€

Benefits

The NEXT-ITS 2 evaluation has not determined a minimum benefit but was focused on estimating the "average" annual total benefits. The evaluation work did not include trying to estimate the level of minimum benefits, nor an interval of impacts. Instead the work was concentrated on performing a socio-economic assessment based on "average impact per year" and subsequent sensitivity analyses. The following impact KPIs were included into CBA for NEXT-ITS 2:

- Vehicle hours driven (h/year)
- Vehicle hours spent in congestion (h/year)
- Fatal accidents/Fatalities (number/year)
- Non-fatal injury accidents (number/year)
- CO2 emissions (tonnes/year



Impact on traffic - New integrated services: A9 test site (Amsterdam-Alkmaar)

Co-financed by the Connecting Europe Facility of the European Union

Overall, the estimated main impacts of NEXT-ITS 2 measures are seen especially in improved traffic flow, indicated with the KPIs vehicle hours driven (reduced by 400,000 vehicle hours per year), and vehicle hours spent in congestion (reduced by 114,000 vehicle hours per year). This is a result of the deployed measures, which aims mostly at improving traffic and incident management, and supporting it with the improved traffic information. In addition, nine thousand tons of CO2 emissions are avoided annually due to NEXT-ITS 2 deployments. Moreover, the very conservative safety benefit estimate was an annual reduction of two severe accidents.

Even with these conservative estimates, the total value of the annual benefits in 2017 is calculated to be circa 12 Million €, which can be compared to the implementation costs of circa 33 million € (including VAT), and annual operation and maintenance costs 3 M€ (or 15 M€ for 5-year period), which leads to ROI roughly 4 years.

Pilots: tyre pressure measuring system - Dutch A16

Following page: pilot installation in operation: Compact Parking (Jura-West on A3 Nuremberg-Regensburg)

The five-year benefits of NEXT-ITS 2 deployments are the following:

- **vehicle hours driven - 2 035 000 h**
- **vehicle hours spent in congestion - 571 000 h**
- **fatalities - 1 fatality prevented**
- **non-fatal injuries - 11 non-fatal injuries prevented**
- **CO2 emissions - 45 600 tonnes**

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NEXT-ITS 2 deployment in Germany with real-time information and re-routing via new VMS.

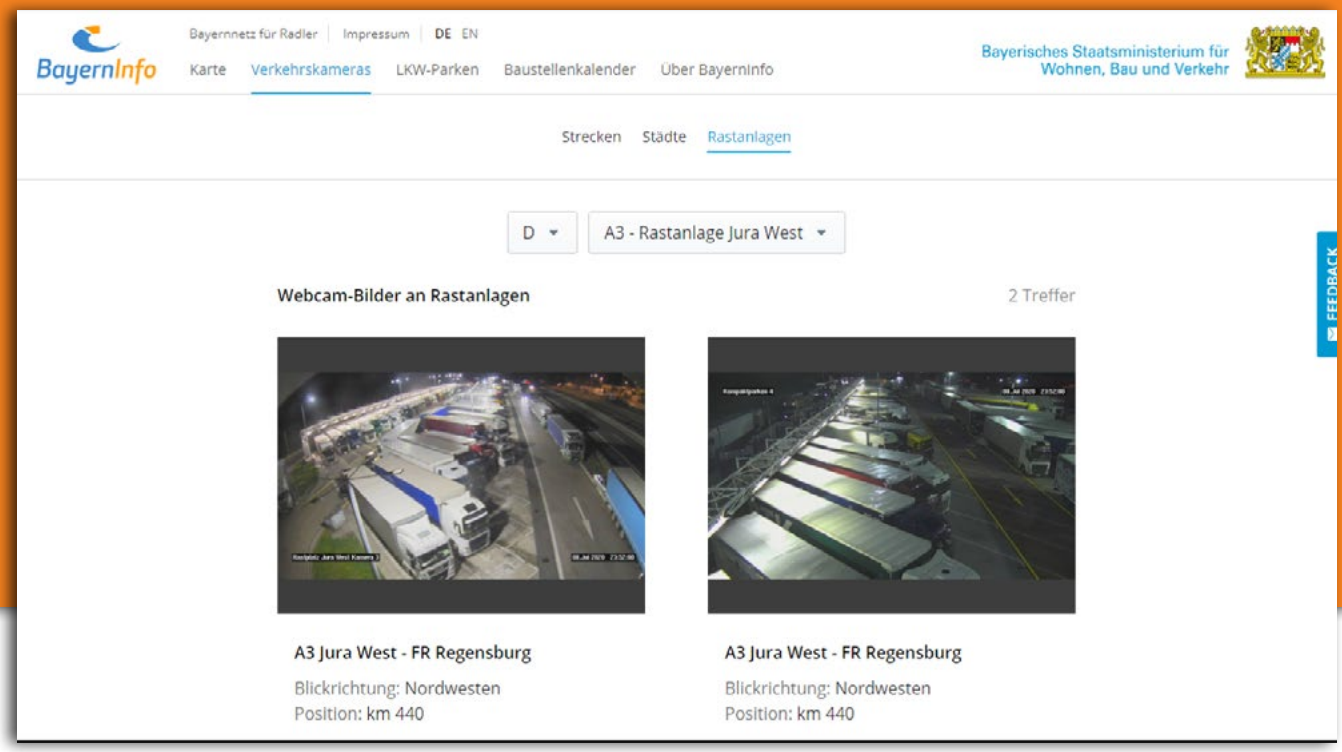
Transferability of results (European Dimension)

NEXT-ITS 2 corridor and the road networks affected by NEXT-ITS 2 measures differ from the core and comprehensive networks in central Europe in the following ways:

- Much less congestion due to lack of capacity, and typically shorter duration of congestion
- Weather, especially winter weather, is a much more important source of transport problems in the Northern parts of Europe than elsewhere in Europe
- Road safety is at a somewhat higher level
- The share of incidents as a cause for congestion is higher and the share of over-demand respectively lower
- For these reasons, the impacts of traffic management and information in NEXT-ITS 2 tend to be lower than they would be in central Europe on travel times, especially outside congestions whereas the impacts of weather information tend to be higher.

NEXT-ITS 2 "showcase" project: Network Control System/ Traffic Management Plans Hannover-Braunschweig-Salzgitter (A2/A7/A39/A391)

The system is located in Niedersachsen on the motorways A2, A7, A39, A37, A391 and Federal Road B6 between the cities of Hannover, Braunschweig and Wolfsburg. The length of the network addressed is about 245 km. In the area where the system is



Extension of the traffic information platform BayernInfo towards parking information for trucks

implemented the important East-West connections (A2) between Western and Eastern Europe crosses the important North-South connection A7. In the vicinity of the cities of Hannover, Braunschweig and Wolfsburg several motorways around the cities are existing so that re-routing in case of congestion of incidents is possible to improve the traffic situation.

In total 10 large VMS have been installed at the motorway junctions. The system provides real-time on-trip information on congestion, traffic disruptions (problems, incidents) and re-routing recommendations via the VMS. It is being operated from the traffic centre and depending from the real-time traffic situation (see figure).

Re-routing recommendations are integrated so that the road users are informed about the possibly best routes in the case of congestion, incidents, accidents or other traffic problems on parts of the network.

By the information on congestion and possible alternative routes, the drivers can assess whether it is advantageous to choose another route. This may depend on the location of the congestion or incident and from the drivers' final destination. As a result, parts of the traffic will choose the alternative route which leads to time saving for these drivers. Decreased congestion is expected on the original route, too. Safety (i.e. accidents with fatalities or injuries) might also be improved because end of queues are always critical points for accidents.

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URSA MAJOR neo

Italy Switzerland Netherlands Germany (coordinator)

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URSA MAJOR

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Efficiency of the transport: dynamic rerouting - support for truck navigation services - A5, A8, A6, A81 Karlsruhe

Dynamic Rerouting A1, A3, A46 Leverkusen - Hilden - Wuppertal

General Information

URSA MAJOR targeted the deployment of ITS services to improve freight traffic on the TEN-T road network mainly along the Rhine-Alpine and the Scandinavian-Mediterranean Core network corridor, linking North-Sea ports, the Rhine and Ruhr area, metropolitan areas in southern Germany and in Italy. Parts of the Rhine-Danube core network corridor are also addressed due to important freight traffic routes linking these corridors in the middle of Europe.

International freight transport between EU Member States is one of the three main

pillars for a Single Europe Economic Area. Improving services for international freight traffic along the mentioned corridors is the main European Added Value of URSA MAJOR 2.

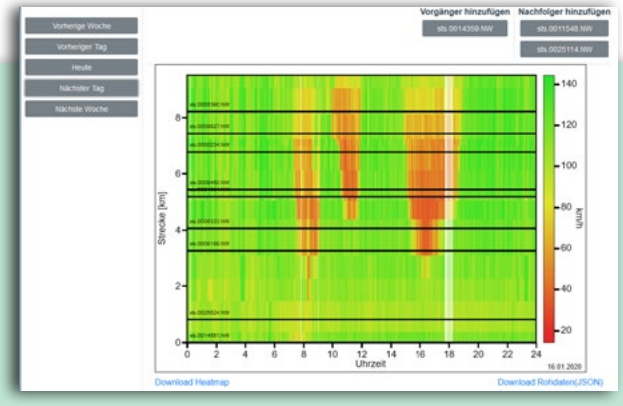
Countries involved in the project are Germany, Italy and The Netherlands. Switzerland is an active partner without EU co-funding; Austria is included in its role of transit country, based on operational agreements for cross-border Traffic Management Plans.

Evaluation, including GIS data tool support

The main objective of the Evaluation activity is the assessment of the overall impact of URSA MAJOR Project on traffic efficiency, safety and environment, based on the results emerging from ex-post evaluation studies carried out by URSA MAJOR Partners. This means that the evaluation studies will be based on measured real impacts on mobility. Moreover, the comprehensive usage of Floating Car Data will complement the project-wise evaluation.

The study is performed within "SA 1.7 – Evaluation, including GIS data/tool support" lead by Italy with contributions from European implementing bodies of URSA MAJOR 2.

Developing the digital layer: usage of floating car data for traffic information and traffic management (NRW)



A4 – Access to the Traffic Control Centre

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Most significant results emerging from the evaluated projects

Below are the most significant results that emerged from the evaluation studies of the individual projects implemented in URSA MAJOR 2 (18 studies), divided by impact area.

- **Impact on Traffic Efficiency**.

With regard to evaluated URSA MAJOR projects, the more remarkable impacts are the increase of traffic flow, intended as throughput, with Dynamic Lane Management (DLM, +17%/+23%)[1], the reduction of travel time with Dynamic Rerouting (DR) and DLM (770,000 hours per year and 8%/50%), a good percentage of rerouted users with DR (10%/43%), the reduction of Vehicle Hour Lost thanks to Traffic Monitoring and Management (TMM, 48%/86%) and a good result in congestion cost savings with DR and TMM (26 M€ per year and 6,000 €/55,000 € for 4 events).

- **Impact on Safety**.

The analysis on safety reported in evaluated URSA MAJOR projects shows few results related to this area, where the most relevant indicator is the change in ratio between the number of accident and the change in traffic flow, which results as -7% in a TMM implementation. Moreover, a safety campaign on VMS obtained 91% user satisfaction.

- **Impact on Environment.**

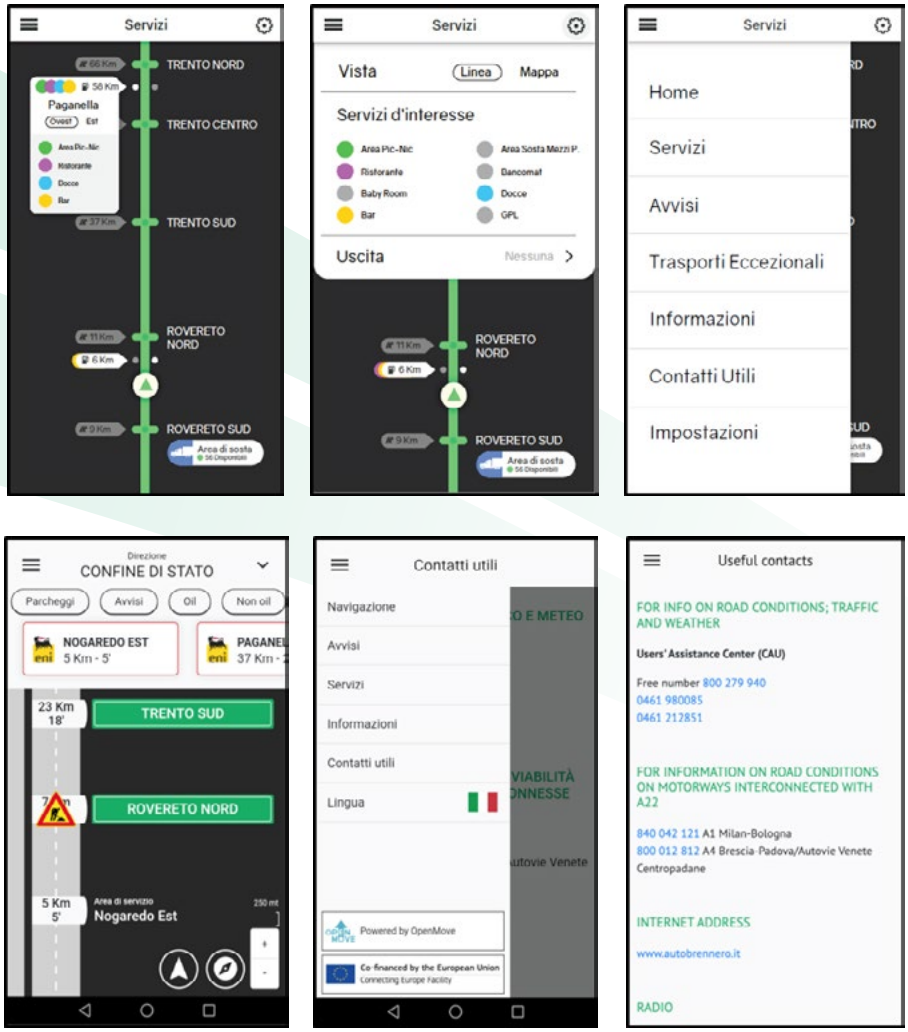
The ITS service that presents more results within evaluated URSA MAJOR projects is the DLM, with a reduction in fuel consumption of 28%/55% and a change in fine particle emissions equal to -75%. In a DR application, a reduction of 3,650 tons of CO2 per year was calculated.

- **Other results.**

Other results presented in the analysed projects are different for each type of ITS; this makes it complex to compare data and to provide a final judgment on overall results. There is one result that must be mentioned, and is the improvement of the event detection time, which is reduced by 93%/97% in one URSA MAJOR implementation.

1 Double percentage represent the extreme values estimated from ex-post evaluation of different local implementations.

Congestion warning and traffic management system A96 Munich



Freight transport - app to deliver info to truck drivers on free parking slots A22

Monitoring and traffic management on cross-border Alpine motorways A22 – Italy

Showcase project

Project Regiodesk:	Improve accessibility with traffic management scenarios
Project reference (sub-activity)	4.1
Site	The Netherlands, in the South-Holland area around Rotterdam and The Hague
Short description	The system is composed of elements such as VMS, ramp metering and traffic signal control that are already operating on the road network. By using them in a better way, these ITS allow for the optimised management of traffic and emergencies thanks to the combination of regional and municipal coordination centres
BKPI	Change in traffic flow (EU EIP-BKPI-N1) Change in bottleneck congestion (EU EIP-BKPI-N3)
Impact on traffic efficiency	Considering 4 incidents investigated: Vehicle Hours Lost (VHL): between -468 and -4,207 (reduction between 42% and 86%), in average -838 VHL During a rush hour estimated reduction of 6 - 11 VHL Cost savings: between 6.000 € and 55.000 €, on average 11.000 €
Impact on safety	The reduction of traffic and emergency management time increases safety
Impact on environment	Limiting delays and congestion leads to emissions that are more similar to those of regular traffic
Other results	No other results
Costs	1,5 M€ per year for the 2012-2015 period
Benefits	43,82 M€ in 4 years
Benefit-cost ratio	7,3
Transferability of the results	The procedures and techniques used for optimisation are very useful and easily transferable to regions of other countries

Italy, port overview - Venice Port Authority

Venice Port Gate equipped with ITS

Venice Port Authority

Co-financed by the Connecting Europe Facility of the European Union

Overall impact of the project through EC Key Performance Indicators

The overall impact of URSA MAJOR is based on a combination of the results of URSA MAJOR evaluated ITS implementations and impact data available in literature (and similar to ITS realized in URSA MAJOR), in order to have more solid statistical basis. The results are expressed through the Key Performance Indicators defined by DG MOVE, using only those applicable and pertinent to URSA MAJOR implementations.
The first step is the calculation of KPIs for each type of ITS service, using combined data from the URSA MAJOR evaluation studies and from literature.
After that, the impact results are extended to the whole URSA MAJOR corridor using a weighted average of the indicators over the number of implemented projects for each ITS service type. The following table represents the assessed average impact along routes where the ITS systems included in the URSA MAJOR Project have been implemented.

Impact area	Benefit KPI along routes where UM - ITS has been implemented	Value
Traffic efficiency	Change in journey time	-13%
	Change in traffic flow	+9%
Safety	Change in number of accidents	-34%
Environment	Change in annual CO2 emissions	-22%

Smart cameras for traffic management A2 The Netherlands

Weather detection and information services - A22

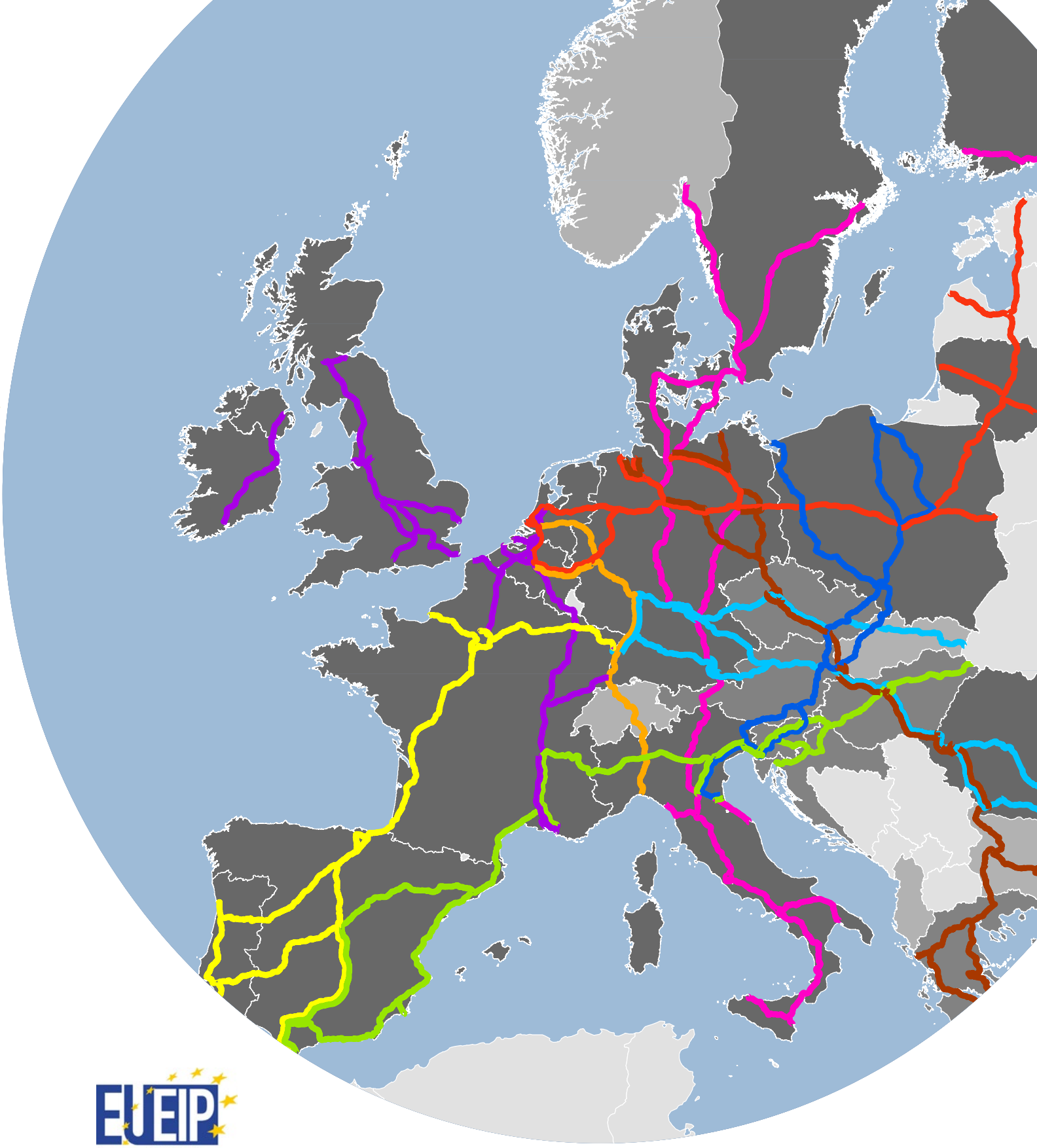
Pilot on Information system for rail and road traffic at Verona interport

5 year estimated minimum benefit

The estimation model applied only to the Italian and German Projects allows to estimate the following annual savings:

- less 71 accidents with victims
- less 79 slightly injured people
- less 22 seriously injured people
- less 2 fatalities

By transforming these benefits into economic value, a gain can be estimated of 11,5 M€. For the estimation of the ROI the following basic calculation can be applied: Project Investment (€) / Annual savings (€) = Number of Years ROI = 45,878 M€ / 11,5 = 4 years.



EUEIP
European ITS Platform

Blending results of corridors in a pan-European perspective

Co-financed by the Connecting Europe Facility of the European Union

General Benefits

Based on available results from the ITS corridors, pan-corridor estimated global minimum 5-year safety benefits and return on investment (ROI) have been calculated.

In terms of minimum safety-related socio-economic savings as a result of combined programme investments over a 5-year period, it can be concluded that:

- A minimum of 75 lives will be saved
- A minimum of 2,166 injuries will be prevented

Out of the tunnel: the need for greener and safer infrastructure - A10 - Italy

In conclusion, as a result of these safety benefits alone, it is apparent that the combined ITS Corridor investments also result in a high financial benefit.

Based on the combined investment of 232 Million € across the 4 ITS corridors, the following minimum savings based on safety impacts alone can be established:

- A minimum annual safety benefit saving of 55 Million €
- A minimum overall Return on Investment (ROI) of about 4 years on average
- A benefit-cost ratio of around 3 and higher (based on an average lifetime of 10 years for the related infrastructure components).

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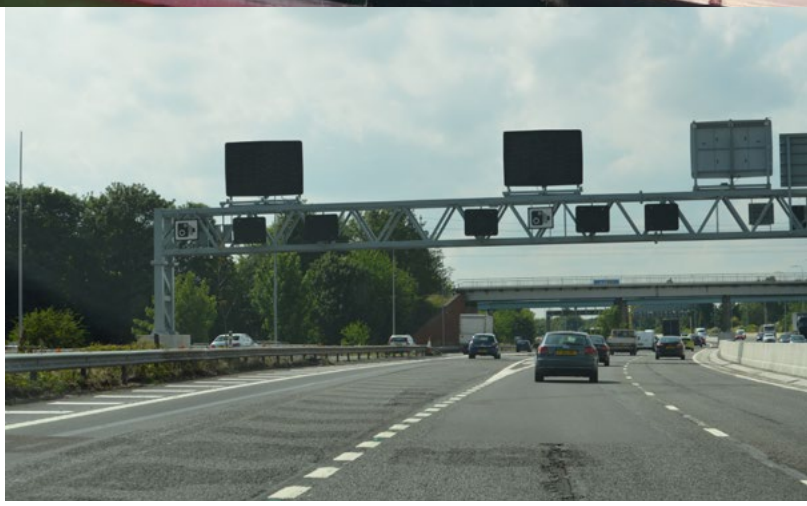
Road Safety is a major societal issue. Each year, the equivalent of a medium-sized town die on the roads of the European Union. Consequently safety related benefits are top priority for the European community among other societal benefits. Digitalisation programs concretely (and cost-efficiently) contribute to the European goals for safety. On the other hand, these benefits are just a part of results showcased in this report: Europe is currently preparingz for a new **European Green Deal**. This report has shown the impact of CEF ITS corridors in terms of greening of the transport. Important impacts are registered on the congestion with reduction of emissions, CO2, millions of saved litres of fuel. In addition to all of these benefits, European citizens would have lost millions of hours that are recovered thanks to European roads that are now more digital: this is a continuous contribution to the efficiency of the European economy.

Lesson learnt and Vision

On top of the hard infrastructures of the Core Network Corridors, CNC's, and the comprehensive TEN-T network, measures and services for their optimal use are essential. Those services will provide better performance of those hard infrastructures, higher throughput, fewer queues, better safety, and lower environmental impact and carbon footprint. Further, when harmonized, they'll cater for cross-border seamlessness of the corridor and enhance its multimodal use. Those services, both public and private, are always based on data, communication and information. For roads and the interfaces to other modes we call them Intelligent Transport Systems, ITS. One more important feature of ITS is that it is easier and quicker to implement than expanding the basic hard infrastructures, raising their performance at considerably lower cost.

With new policies for the coming decade, viz. the Green Deal and Digital Europe, the digitalisation of the Core Network Corridors, and also transport as a whole, including the urban environment, will be prioritised. The so-called ITS corridors already cover most of the CNC's and with the experience built in EU EIP will be a solid base for helping to realise the digitalisation of CNCs, wider networks and hubs. Collaboration with and coverage of the CNC's will be intensified to create the digital backbone and services which will make them perform in an optimal and integral way. With higher interests and investments in the coming years, the efforts on evaluation need to be sustained and extended to provide the evidence that investments on digitalisation are sound. More projects need be evaluated to build that body of evidence, and further methodology on extrapolating project performance into corridor or network performance will be required. That way the merging of digitalisation and infrastructure, "making better use of existing infrastructures", and the realisation of the Single European Transport Area by facilitating multimodal use, can best be warranted.


MOBY



Cross border motorways - advanced monitoring and traffic management (Susa)

Italy - cargo - Venice port Authority

Italy - overview - port of La Spezia

Traffic control in UK: rerouting section, speed cameras and warning signs

ADDITIONAL INFORMATION

can be found through the following web links:

European Commission - DG MOVE
https://ec.europa.eu/transport/home_en
European Commission - INEA
https://ec.europa.eu/inea/en

Core Network Corridors
Atlantic https://ec.europa.eu/transport/themes/infrastructure/atlantic_en
Orient Est-Med https://ec.europa.eu/transport/themes/infrastructure/orient-east-med_en
Baltic Adriatic https://ec.europa.eu/transport/themes/infrastructure/baltic-adriatic_en
Rhine-Alpine https://ec.europa.eu/transport/themes/infrastructure/rhine-alpine_en
Mediterranean https://ec.europa.eu/transport/themes/infrastructure/mediterranean_en
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North Sea-Baltic https://ec.europa.eu/transport/themes/infrastructure/north-sea-baltic_en
Scandinavian Mediterranean https://ec.europa.eu/transport/themes/infrastructure/scandinavian-mediterranean_en
North Sea-Mediterranean https://ec.europa.eu/transport/themes/infrastructure/north-sea-mediterranean_en
Motorways of the Sea https://ec.europa.eu/transport/themes/infrastructure/motorways-sea_en
European Rail Traffic Management System https://ec.europa.eu/transport/themes/infrastructure/european-rail-traffic-management-system_en

European ITS Platform and CEF ITS Corridors
Arc Atlantique https://arcatlantique.its-platform.eu/
Crocodile https://crocodile.its-platform.eu/
European ITS Platform https://www.its-platform.eu/
MedTIS https://medtis.its-platform.eu/
NEXT-ITS https://next-its.its-platform.eu/
URSA MAJOR neo https://ursamajor.its-platform.eu/
European ITS Platform Newsletter https://www.its-platform.eu/highlights/newsletter-european-its-platform-available-online

Other Useful pages
European Commission – priorities https://ec.europa.eu/info/strategy/priorities-2019-2024
DG MOVE – Intelligent Transport Systems https://ec.europa.eu/transport/themes/its_en
DG MOVE - Safety-Related Traffic Information (SRTI) & Real-Time Traffic Information (RTTI) https://ec.europa.eu/transport/themes/its/road/action_plan/traffic-information_en
DG MOVE – roads https://ec.europa.eu/transport/modes/road_en
DG MOVE Knowledge for policy https://ec.europa.eu/knowledge4policy/organisation/dg-move-dg-mobility-transport_en
INEA - Connecting Europe Facility https://ec.europa.eu/inea/en/connecting-europe-facility
INEA – CEF Transport https://ec.europa.eu/inea/connecting-europe-facility/cef-transport
INEA - Useful documents and forms https://ec.europa.eu/inea/en/connecting-europe-facility/useful-documents-and-forms
Cooperative, connected and automated mobility (CCAM) https://ec.europa.eu/transport/themes/its/c-its_en
EUR-LEX transport https://eur-lex.europa.eu/summary/chapter/transport.html?root_default=SUM_1_CODED=32

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ISBN 9788897212126

COLOPHON AND CONTACTS

This book was drafted by the Communication Team of the European ITS Platform, under the supervision of European Commission services and the Joint Technical Secretariat. The results of Corridors here summarized were provided by corridor leaders within the frame of corridor evaluations. The European ITS Platform team is thankful to corridor coordinators, members of JTS and consulted stakeholders for the scientific contribution.

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NEXT-ITS (Arne Lindeberg Swedish Transport Administration - Sweden)
URSA MAJOR (Stephanie Kleine DieAutobahn GmbH des Bundes – Germany)

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Arc Atlantique, Crocodile, European ITS Platform, MedTIS, NEXT-ITS and URSA MAJOR
contents coordination: Highways England - Capita UK
edited by: Roberto Arditi SINA (ASTM Group) – Italy on behalf of European ITS Platform and CEF ITS corridors
graphical design by: Valeria Pontremoli - Italy
published by Casa Editrice La Fiaccola S.r.l April 2021

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Following page:
Motorway A10 Italy ; National Spanish Traffic Control Centre (DGT)

Co-financed by the Connecting Europe Facility of the European Union

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European ITS Platform

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ISBN 9788897212126