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Preface

This report is the deliverable report made for Milestone 75 in Work Package 1 of EU EIP Evaluation, titled 'socio-economic assessment of ITS Directive priority actions'. This deliverable is a final evaluation report, carried out in EC-supported corridor projects, as well as other projects. The report assesses the deployment of services related to the priority actions defined in the ITS Directive 2010/40/EU within EU EIP Activity 5 WP1.

The report includes an evaluation and impact valuation in general as part of the deliverable. The report presents a description of the services related to the ITS Directive priority actions, as well as the operating environments, as defined within the EasyWay program. Furthermore, relevant impacts and the KPIs recommended for evaluation of each service related to the ITS Directive priority actions are also presented.

List of Abbreviation

Abbreviation	Full form
AD	Automated Driving
API	Application Programming Interface
AV	Autonomous Vehicle
CAV	Connected Automated Vehicle
DDT	Dynamic Driving Task
KPI	Key performance indicators
MaaS	Mobility-as-a-Service
NeTEX	Network Timetable Exchange
ODD	Operational Design Domain
RAI	Road Infrastructure Agency (RIA)
SAE	Society of Automotive Engineers
TII	Transport Infrastructure Ireland
V2I	Vehicle to Infrastructure
V2P	Vehicle to Pedestrian
V2V	Vehicle to Vehicle
V2X	Vehicle to X
VMS	Variable Message Sign

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1. Introduction

Building a sustainable transport system to meet the socio-economic needs of society is one of the objectives of the European transport policy by further development of integrated and harmonized transport systems in Europe. Adequate integration between the different modes of transportation is achieved through accelerated development and commissioning of innovative technological solutions that will improve the overall efficiency of the transport system. Intelligent transport systems significantly contribute to the optimization of integrated transport networks by improving the safety and security of transportation, increasing mobility of the population, reducing the negative impact on the environment, and enhancing energy efficiency.

The European Commission (EC) endorses Intelligent Transport Systems (ITS) deployment and proposed several targeted measures in 2008 as part of the ITS Action Plan, including the ITS Directive proposal. The ITS Directive (2010/40/EU) aimed to accelerate the deployment of innovative ITS technologies across Europe, focused on establishing interoperable and seamless ITS services. The ITS Action Plan2 set out 23 actions within six areas aimed to accelerate and coordinate the deployment of ITS on road transport, including interfaces with other transport modes. In the following chapter EU priority areas and action are explained.

1.1. EU Priority Area

The ITS Directive in 2010 identified four priority areas for the development and use of specifications and standards in ITS deployment: The four priority areas are listed below:

I. Optimal use of road, traffic, and travel data,

II. Continuity of traffic and freight management ITS services,

III. ITS road safety and security applications,

IV. Linking the vehicle with the transport infrastructure.

Six priority actions were identified within these four priority areas, which are defined in more detail in chapter 2. The six priority actions are listed below:

a) The provision of EU-wide multimodal travel information services

b) The provision of EU-wide real-time traffic information services

c) Data and procedures for the provision, where possible, of road safety-related minimum universal traffic information free of charge to users

d) The harmonized provision for an interoperable EU-wide eCall

e) The provision of information services for safe and secure parking places for tru (Ministry of Infrastructure and Water Management in cooperation 2020) (Directive 2010/40/EU Progress Report 2020 Norway 2020)cks and commercial vehicles

f) The provision of reservation services for safe and secure parking places for trucks and commercial vehicles

After the directive was published, priority action f (The provision of reservation services for safe and secure parking places for trucks and commercial vehicles) was withdrawn.

1.1.1. I. OPTIMAL USE OF ROAD, TRAFFIC AND TRAVEL DATA

The specifications and standards for an optimal use of road, traffic and travel data shall include the following:

1. Specifications for priority action (a)

The definition of the necessary requirements to make EU-wide multimodal travel information services accurate and available across borders to ITS users, based on:

- the availability and accessibility of existing and accurate road and real-time traffic data used for multimodal travel information to ITS service providers without prejudice to safety and transport management constraints,
- the facilitation of the electronic data exchange between the relevant public authorities and stakeholders and the relevant ITS service providers, across borders,
- the timely updating of available road and traffic data used for multimodal travel information by the relevant public authorities and stakeholders,
- the timely updating of multimodal travel information by the ITS service providers.

2. Specifications for priority action (b)

The definition of the necessary requirements to make EU-wide real-time traffic information services accurate and available across borders to ITS users, based on:

- the availability and accessibility of existing and accurate road and real-time traffic data used for real-time traffic information to ITS service providers without prejudice to safety and transport management constraints,
- the facilitation of the electronic data exchange between the relevant public authorities and stakeholders and the relevant ITS service providers, across borders,
- the timely updating of available road and traffic data used for real-time traffic information by the relevant public authorities and stakeholders,
- the timely updating of real-time traffic information by the ITS service providers.

3. Specifications for priority actions (a) and (b)

3.1. The definition of the necessary requirements for the collection by relevant public authorities and/or, where relevant, by the private sector of road and traffic data (i.e. traffic circulation plans, traffic regulations and recommended routes, notably for heavy goods vehicles) and for their provisioning to ITS service providers, based on:

- the availability, to ITS service providers, of existing road and traffic data (i.e. traffic circulation plans, traffic regulations and recommended routes) collected by the relevant public authorities and/or the private sector,
- the facilitation of the electronic data exchange between the relevant public authorities and the ITS service providers,
- the timely updating, by the relevant public authorities and/or, where relevant, the private sector, of road and traffic data (i.e. traffic circulation plans, traffic regulations and recommended routes),
- the timely updating, by the ITS service providers, of the ITS services and applications using these road and traffic data.

3.2. The definition of the necessary requirements to make road, traffic and transport services data used for digital maps accurate and available, where possible, to digital map producers and service providers, based on:

- the availability of existing road and traffic data used for digital maps to digital map producers and service providers,
- the facilitation of the electronic data exchange between the relevant public authorities and stakeholders and the private digital map producers and service providers,
- the timely updating of road and traffic data for digital maps by the relevant public authorities and stakeholders,
- the timely updating of the digital maps by the digital map producers and service providers.

4. Specifications for priority action (c)

The definition of minimum requirements, for road safety related 'universal traffic information' provided, where possible, free of charge to all users, as well as their minimum content, based on:

- the identification and use of a standardised list of safety related traffic events ('universal traffic messages') which should be communicated to ITS users free of charge.
- The compatibility and the integration of 'universal traffic messages' into ITS.

1.1.2. II. CONTINUITY OF TRAFFIC AND FREIGHT MANAGEMENT ITS SERVICES

The specifications and standards for the continuity and interoperability of traffic and freight management services, in particular on the TEN-T network, shall include the following:

1. Specifications for other actions

1.1. The definition of the necessary measures to develop an EU ITS Framework Architecture, addressing specifically ITS-related interoperability, continuity of services and multi-modality aspects, including for example multimodal interoperable ticketing, within which Member States and their competent authorities in cooperation with the private sector can develop their own ITS architecture for mobility at national, regional or local level.

1.2. The definition of the minimum necessary requirements for the continuity of ITS services, in particular for cross-border services, for the management of passenger transport across different modes of transport, based on:

- the facilitation of the electronic exchange for traffic data and information across borders, and where appropriate, regions, or between urban and inter-urban areas between the relevant traffic information/control centres and different stakeholders,
- the use of standardised information flows or traffic interfaces between the relevant traffic information/control centres and different stakeholders.

1.3. The definition of the minimum necessary requirements for the continuity of ITS services for the management of freight along transport corridors and across different modes of transport, based on:

- the facilitation of the electronic exchange for traffic data and information across borders, and where appropriate, regions, or between urban and inter-urban areas between the relevant traffic information/control centres and different stakeholders,
- the use of standardised information flows or traffic interfaces between the relevant traffic information/control centres and different stakeholders.

1.4. The definition of the necessary measures in the realisation of ITS applications (notably the tracking and tracing of freight along its journey and across modes of transport) for freight transport logistics (eFreight), based on:

- the availability of relevant ITS technologies to and their use by ITS application developers,
- the integration of positioning results in the traffic management tools and centres.

1.5. The definition of the necessary interfaces to ensure interoperability and compatibility between the urban ITS architecture and the European ITS architecture based on:

- the availability of public transport, travel planning transport demand, traffic data and parking data to urban control centres and service providers,
- the facilitation of the electronic data exchange between the different urban control centres and service providers for public or private transport and through all possible modes of transport,
- the integration of all relevant data and information in a single architecture.

1.1.3. III. ITS ROAD SAFETY AND SECURITY APPLICATIONS

The specifications and standards for ITS road safety and security applications shall include the following:

1. Specifications for priority action (d)

The definition of the necessary measures for the harmonised provision of an interoperable EU-wide eCall, including:

- the availability of the required in-vehicle ITS data to be exchanged,
- the availability of the necessary equipment in the emergency call response centres receiving the data emitted from the vehicles,
- the facilitation of the electronic data exchange between the vehicles and the emergency call response centres.

2. Specifications for priority action (e)

The definition of the necessary measures to provide ITS based information services for safe and secure parking places for trucks and commercial vehicles, in particular in service and rest areas on roads, based on:

- the availability of the road parking information to users,
- the facilitation of the electronic data exchange between road parking sites, centres and vehicles.

3. Specifications for priority action (f)

The definition of the necessary measures to provide ITS based reservation services for safe and secure parking places for trucks and commercial vehicles based on:

- the availability of the road parking information to users,
- the facilitation of the electronic data exchange between road parking sites, centres and vehicles,
- the integration of relevant ITS technologies in both vehicles and road parking facilities to update the information on available parking space for reservation purposes.

4. Specifications for other actions

4.1. The definition of the necessary measures to support the safety of road users with respect to their on-board Human-Machine-Interface and the use of nomadic devices to support the driving task and/or the transport operation, as well as the security of the in-vehicle communications.

4.2. The definition of the necessary measures to improve the safety and comfort of vulnerable road users for all relevant ITS applications.

4.3. The definition of necessary measures to integrate advanced driver support information systems into vehicles and road infrastructure which fall outside the scope of Directives 2007/46/EC, 2002/24/EC and 2003/37/EC.

1.1.4. IV. LINKING THE VEHICLE WITH THE TRANSPORT INFRASTRUCTURE

The specifications and standards for linking vehicles with the transport infrastructure shall include the following:

1. Specifications for other actions

1.1. The definition of necessary measures to integrate different ITS applications on an open in-vehicle platform, based on:

- the identification of functional requirements of existing or planned ITS applications,
- the definition of an open-system architecture which defines the functionalities and interfaces necessary for the interoperability/interconnection with infrastructure systems and facilities,
- the integration of future new or upgraded ITS applications in a 'plug and play' manner into an open in-vehicle platform,
- the use of a standardisation process for the adoption of the architecture, and the open in-vehicle specifications.

1.2. The definition of necessary measures to further progress the development and implementation of cooperative (vehicle-vehicle, vehicle-infrastructure, infrastructure-infrastructure) systems, based on:

- the facilitation of the exchange of data or information between vehicles, infrastructures and between vehicle and infrastructure,
- the availability of the relevant data or information to be exchanged to the respective vehicle or road infrastructure parties,
- the use of a standardised message format for the exchange of data or information between the vehicle and the infrastructure, the definition of a communication infrastructure for data or information exchange between vehicles, infrastructures and between vehicle and infrastructure

1.2. Easyway Operating Environments

Data will be analysed with state-of-the-art evaluation methods as recommended by earlier

work done in TEMPO, EasyWay, EIP+ and FOT-Net and the classification of the operating environments will follow the structure defined in EasyWay. According to EasyWay an operating environment is a category of the road section classified according to types and service levels of ITS services typically expected to be operated and often provided on it by road authorities and operators. Thereby, the operating environment is closely related to the expected ser-

vice levels of the travellers and transporters using the road section, the frequently occurring or threatening problems of the section, and the viability of possible ITS solutions to deal with these problems. The main properties of the road section affecting the operating environment are its physical characteristics, network typology, and the frequency and s verity of traffic flow and road safety concerns on the section. (EU EIP Activity 5 2017)

The scope of EasyWay was to provide core European services to the European road users. These services were harmonized in content and functionality, but also in their availability. The road users should be able to expect certain services offer in a specific road environment. In order to provide a basis for the harmonization process EasyWay needed a tool to define such environments in an agreed manner. This tool was the operating environments – a set of predefined road environments combining physical layout of the road and network typology with traffic characteristics. (EU EIP Activity 5 2017)

In EasyWay it was agreed on a set of 18 pre-defined operating environments, where each
operating environment was a combination of three criteria:
• Physical characteristics – Motorways, other 3/4 lane roads or 2-lane roads
• Network typology – Corridor, Network, Link or Critical spot
• Traffic characteristics – Traffic flow and road safety situations (with optional additions)

Furthermore, the operating environment was defined according to a letter code relating to
its different physical characteristics. C stands for critical spots (bridges, tunnels, reversible
lane sections, etc.), T for motorways, R for roads, S for motorway corridors or networks, N
for road corridors or networks and P stands for peri-urban road networks. The full table of
the different operating environments can be found in Table X.

Table 1: EasyWay Operating Environments for Core European ITS Services

C1 critical spots, local flow related traffic impact and/or potential safety concerns
T1 motorway, no flow related traffic impact and no major safety concerns

T2 motorway, no flow related traffic impact, potential safety concerns
T3 motorway, seasonal or daily flow related traffic impact, no major safety concerns
T4 motorway, seasonal or daily flow related traffic impact, potential safety concerns
R1 two lane road, no flow related traffic impact, no major safety concerns
R2 two lane road, no flow related traffic impact, potential safety concerns
R3 two lane road, seasonal or daily flow related traffic impact, no major safety concerns
R4 two lane road, seasonal or daily flow related traffic impact, potential safety concerns
R5 three/four lane road, no flow related traffic impact, no major safety concerns Concerns
R6 three/four lane road, no flow related traffic impact, potential safety concerns
R7 three/four lane road, seasonal or daily flow related traffic impact, no major safety
R8 three/four lane road, seasonal or daily flow related traffic impact, potential safety concerns
S1 motorway corridor or network, at most seasonal flow related impact, possibly safety concerns
S2 motorway corridor or network, daily flow related traffic impact, possibly safety concerns
N1 road corridor or network, at most seasonal flow related traffic impact, possibly safety concerns
N2 road corridor or network, daily flow related traffic impact, possibly safety concerns
P1 peri urban motorway or road interfacing urban environment, possibly safety concerns

Existence of weather and/or environmental concerns and/or truck relevance may be used as additional attributes for the Operating Environments.

The classification meant that EasyWay partners described their actual road network as operating environments. By classifying their network into operating environments, a partner got an immediate link between the actual road and the status of EasyWay Core European Services, since the EasyWay Deployment

Guidelines provided a recommended service composition and design for each operating environment. Furthermore, network classification provided EasyWay partners a powerful tool to assess the current situation and discuss national and European deployment needs and strategies ahead. Therefore, we also want to use this classification.

2. Methodology

According to the EasyWay evaluation expert group8 (EasyWay. Evaluation Expert Group Document – EEG/12/03, EasyWay Handbook on Evaluation Best Practice), evaluation is required in order to justify EU and national government expenditure of current projects; demonstrate the benefits (financial and socio-economic) of individual applications; demonstrate the benefits of the projects; and demonstrate the benefits of increased information sharing. Evaluation covers a number of feedback mechanisms. The EU EIP evaluation plan has covered all of them in a single coordinated framework. Some different feedback mechanisms are scientific studies; audits; monitoring; performance measurement; policy analysis; feasibility studies; and impact analysis.

This report identifies and reflects upon the ITS development that has occurred during the past few years in the EU member states based on their ITS National progress reports, in accordance with EU Priority areas, EU priority actions and various KPIs. The key methodology for this report can be said to be a thorough literature study, along with various developed tools (ITS Toolkit developed by EU EIP Evaluation group, templates etc.). The report mentions the data that has been collected from these various sources and present them in accordance with EU Priority actions and further discusses the relevance of ITS Directive KPIs in the chosen member states evaluation.

Due to various reasons (mostly the language the reports were written in), only the chosen member state ITS National progress reports could be evaluated. The detailed summary of input from the chosen member states can be seen in the Appendix of the report.

3. Data collection

3.1. Detailed analysis Based on National Progress Reports

The national progress reports from 2017 and 2020 provided a good overview of the Member States' recent implementation, development, and deployment of ITS as well the progress in recent years. The progress report was a good framework for assessing the socio-economic impact of the priority action. Below is discussed each priority action in the respective countries. These data were collected from the 2017 and 2020 progress study for each chosen member state.

3.1.1. A) THE PROVISION OF EU-WIDE MULTIMODAL TRAVEL INFORMATION SERVICE

Belgium: Belgium has taken significant steps in recent years regarding ITS services. By mid-September 2019, the first version of the Belgian National Access Point (NAP) was available in a test environment. In the second half of September and the first half of October 2019, Belgium's different administrations and public transport operators performed User Acceptance Tests on the NAP. The NAP has been operational since 14th February 2020: More information can be found at https://www.transportdata.be (Committee 2020).

Denmark: The progress shows that the NAP has been running, and updates have been made to make the platform more user-friendly. The Danish Road Directorate has been and still is, focusing on establishing a sound data governance setup around the NAP since it is one of the essential elements that need to be in place for a NAP to work as intended. To access data or subscribe to a data feed, the users need to sign in. More information on NAP is available at: https://nap.vd.dk (Directive 2010/40/EU Progress Report 2020 Denmark 2020).

Finland: Finland has set up a NAP for multimodal traffic and travel information in line with the requirements in the Commission Delegated Regulation 2017/1926. Transport authorities provided respective data from transport operators, transport on-demand service providers, and infrastructure managers. The Finnish Transport and Communication Agency is responsible for the multimodal access point. The NAP is available in Finnish, English, and Swedish and can be found at www.finap.fi (Agency 2020).

Ireland: Ireland has decided to use its existing NAP set up to comply with the other delegated acts adopted under Directive 2010/40/EU to fulfil the requirements of Delegated Regulation 2017/1926. The National Access Point has been continuously updated through Ireland's Open Data Portal. The Open Data Portal hosted by the Irish Department of Public Expenditure and Reform serves as the NAP. It can be found at https://data.gov.ie/ (Directive 2010/40/EU Progress Report 2020 Ireland 2020).

Italy: The Ministry of Infrastructure and Transport has appointed two of its internal structures for supplying NAP services (Directive 2010/40/EU Progress Report 2020 Italy 2020).

Specifically, the establishment of the NAP for multimodal travel information services will stem from the cooperation between the Road Safety General Directorate - Road Safety Information & Coordination Centre and the ICT General Directorate. Given the broad perimeter and the significant number of actors involved, the project is still in the development phase, and the action plan is in an updating process to achieve the design completion (Directive 2010/40/EU Progress Report 2020 Italy 2020).

The Netherlands: In December 2019, the NAP was extended to include multimodal information as well. A national profile for Network Timetable Exchange (NeTEx) has been developed. For road traffic, DATEX II is used. Further harmonization is an ongoing and necessary process with many (multimodal) data suppliers. It contributes to the amount of available multimodal data at the NAP (Ministry of Infrastructure and Water Management in cooperation 2020).

Norway: A new National Access Point, Transportportal.no, was launched in December 2019. Transportportal.no contains most of the requirements set out in level 1 of the regulation. The Norwegian Public Roads Administration works continuously to improve data quality (Directive 2010/40/EU Progress Report 2020 Norway 2020).

Sweden: The Swedish Transport Administration is appointed to provide and maintain a NAP for this delegated regulation. In 2017, a National Access Point was launched at www.trafficdata.se for the previously delegated acts B, C, and E. In November 2019, the NAP was modified to cover the delegated regulation EU 2017/1926 (Directive 2010/40/EU Progress Report 2020 Sweden 2020).

3.1.2. B) THE PROVISION OF EU-WIDE REAL-TIME TRAFFIC INFORMATION SERVICES

Belgium: In Brussels, real-time traffic information is available through the OTAP-node of the traffic center (Mobiris). In Flanders, a DATEX II information link is available for RTTI data by the Traffic Management Centre. An RDS-TMC service is also running. In Wallonia, real-time traffic information is currently available through the OTAP-node of the traffic centre (PEREX). The possibility of uploading data on the region's open data platform http://opendata.digitalwallonia.be/ is being investigated (Directive 2010/40/EU ITS Progress Report 2017 Belgium 2017).

Denmark: Content and metadata have to be updated, and the Danish Road Directorate wishes all data owners to feel obligated to inform the users of their information feed if changes are made or data is not available (Directive 2010/40/EU Progress Report 2020 Denmark 2020).

Finland: In compliance with Article 3 of the Delegated Regulation (EU) 2015/962, a national Single Point of Access through which data is accessible has been set up as follows: Static Road data is available for exchange and re-use in compliance with Article 4 of the Delegated regulation via the Digiroad service (www.digiroad.fi). Dynamic road status and traffic data is available for exchange and re-use in compliance with Articles 5 and 6 of the Delegated regulation via the Digitraffic service (www.digitraffic.fi) (Agency 2020).

Ireland: The open data portal is arranged thematically when it comes to Real-Time Traffic Information. The transport theme has 409 datasets, including Irish Rail, Luas tram/light rail Dublin city, Dublin Bus, Private Bus timetables for Ireland, Rural transport routes, Real-time Passenger Information (RTPI) for Dublin Bus, Bus Éireann, Luas and Irish Rail and more. The data can be accessed at www.data.gov.ie (Directive 2010/40/EU Progress Report 2020 Ireland 2020).

Italy: As for dynamic road data and real-time traffic information, CCISS accepts, besides the Italian profile, the entire European DATEX II - version 2.3 set and can share it through social media, Web Portal, App Mobile, Public number 1518, Radio, and News Bulletin. CCISS publishes information over the web, radio, and phone channels completely free of charge and puts no limitation on its services (Directive 2010/40/EU Progress Report 2020 Italy 2020).

The Netherlands: All the Dutch motorways are included, and in some cases, real-time traffic information for other types of roads is given as well. Data sources have been published that cover real-time information such as road characteristics, road works, parking data, and the location of electric charging stations. For each dataset, a description (metadata) is often available, including publication, application area, quality, data exchange, and contact. The basic situation has not changed substantially in the last years, except that the content is being updated all the time and new sources are being added (Ministry of Infrastructure and Water Management in cooperation 2020).

Norway: Existing real-time information services, both static and dynamic, do not exclude any part of the national road network. Currently, dynamic data such as real-time road weather data, travel times, web camera images, incidents, road works, driving conditions, road closures, and diversions are available free of charge. Dynamic road and traffic data are available from the national DATEX II node (Directive 2010/40/EU Progress Report 2020 Norway 2020).

Sweden: The Swedish National Access Point has been operational since 8 May 2017 and is adapted for all delegated acts under the ITS directive. It includes services such as discovery services for users, support services, and the possibility to publish and search datasets for the entire transport network in Sweden. The Swedish NAP provides static road data such as geometry, road width, number of lanes, junctions, and road classification, as well as dynamic road status data such as road closures, lane closures, bridge closures, road works, accidents and incidents, poor road conditions, availability of charging points for electric vehicles weather conditions affecting road surface and visibility in addition to traffic data such as traffic volume, speed, locations of queues, travel times, traffic data at border crossings to third countries, expected delays and estimated travel times (Directive 2010/40/EU Progress Report 2020 Sweden 2020).

3.1.3. c) Data and procedures for the provision, where possible, of road safety related mini-mum universal traffic information free of charge to users

Belgium: Progress has been made in implementing the information service, including the criteria used to define its level of quality and the means used to monitor its quality. In Brussels, an RDS-TMC service is also used to cover main regional roads. In Flanders, a DATEX II information link is available for SRTI data by the Traffic Management Centre (Agency 2020) .

Denmark: The Danish Road Directorate has for more than 15 years operated a National Traffic Management Centre, which collects, processes, and distributes traffic information regarding highways and motorways (the state road network) in Denmark, including the TEN-T road network. The distributed traffic information includes safety-related traffic information and real-time traffic information. Information on roadworks and special events is also distributed. The Danish Road Directorate distributes data on the NAP (https://nap.vd.dk/) and sends out information on the traffic website: Trafikinfo.dk.

Finland: Intelligent Traffic Management Finland operates the traffic management centers which provide traffic reports on safety-related traffic events as specified in the Delegated Regulation. Safety-related traffic reports are distributed through the Traffic Management Finland Group's web pages (http://liikennetilanne.liikennevirasto.fi/), Liikennetilanne application via application stores, and via social media such as Facebook and Twitter. The Traffic Management Centres also deliver information directly to existing distribution channels, including variable message signs and RDS-TA, public and private media broadcasters, and external service providers. The information is provided free of charge.

Ireland: Progress made in implementing the information service, including the criteria used to define its level of quality. Universal traffic information gathered by TII is made available to the NAP hosted at data.gov.ie. Quality is automatically monitored by the system which generates the information. No formal structured user-level monitoring exists other than journalistic feedback from TII staff and consultants.

Italy: In compliance with the ITS Directive (2010/40/EU), CCISS is the National Access Point for road safety information and, since 2009, from the same platform, provides information on the categories of events or conditions. In the cooperative model used by the NAP, three kinds of actors are involved: network operators or dealers, service providers, and content providers, all communicating through computerized connections (to achieve interoperability and application cooperation.

The Netherlands: The information (data) that Rijkswaterstaat shares with service providers cover current traffic information, such as the nature, cause and residual duration of disruptions, as well as data resulting from the work processes of the measures mentioned, such as the status of traffic measures implemented (local speed limits, lane closures, diversions and green periods of traffic lights) and safety-related messages (detected slipperiness, ghost drivers, traffic tailbacks, obstacles on the road). The service providers ensure that the information reaches the road user via radio, web pages, navigation systems, apps, or social media.

Norway: The Norwegian Public Roads Administration's five traffic management centres (TMCs) are the NPRA's Incident and Traffic Management hubs. The TMCs have access to video surveillance from selected road sections, mainly tunnels, and real-time traffic data. In many tunnels, video surveillance is supplemented with automatic incident detection that responds to vehicle stops and objects on the road.

Sweden: A description of datasets from the Swedish Transport administration and Media mobile is available at the Swedish NAP at www.trafficdata.se. The following safety-related traffic information data is available at the NAP: Exceptional weather conditions, unmanaged blockage of a road, wrong-way driver, temporary slippery road, obstacles on the road, unprotected accident area, short-term road works, and reduced visibility (Directive 2010/40/EU Progress Report 2020 Sweden 2020).

3.1.4. D) THE HARMONIZED PROVISION FOR AN INTEROPERABLE EU-WIDE ECALL

Belgium Concerning eCall, the Federal Government has undertaken several actions to-wards the implementation of eCall. In accordance with the delegated act, the Belgian State has laid down the legal framework for the implementation of eCall (final approval: March 2017) in the public version (public eCall) and in the version provided by the private sector (private eCall). In future, the eCall service will allow any motorist to reach emergency services by car if necessary (Committee 2020).

Denmark: There have been no changes or actions in the infrastructure for eCall (Committee 2020).

Finland: Finland implemented eCall in 2017 in six PSAPs operated by Emergency Response Centre Administration (ERCA). In 2017, Emergency Response Centre Administration asked VTT Technical Research Centre of Finland Ltd to perform a conformance assessment for the PSAP information system (ELS). The conformance assessment was carried out in December 2017 - March 2018 and received by the Finnish Transport and Communications Agency which had been appointed in Finland as a public authority with competence to receive the conformance assessment of the PSAP and assess the conformity of the PSAP (Agency 2020).

Ireland The Department of Communications, Climate Action and Environment confirms that the conformity assessment of Ireland's eCall infrastructure was executed successfully by an accredited laboratory and that the eCall infrastructure conforms to the specification laid down in Delegated Regulation (EU) No 305/2013 (Directive 2010/40/EU Progress Report 2020 Ireland 2020).

Norway: The Norwegian government has decided that the fire services are to process automatic and manually triggered eCall for a two-year trial period (in Norway there are three separate emergency numbers – police, health and fire – with their own separate emergency centres). The Ministry of Justice and Public Security has therefore asked the Directorate for Civil Protection (DSB) to prepare and establish a technical solution to be implemented in one or more of the 12 fire services emergency centres that will work for two years from April 2018 (Directive 2010/40/EU Progress Report 2020 Norway 2020).

The Netherlands: The Ministry of Justice and Security, specifically the National Police, is responsible for implementing the 112-facility. As of April 1, 2018, eCalls can be received directly by the national 112-control centre (Ministry of Infrastructure and Water Management in cooperation 2020).

Sweden: There have been no changes in the infrastructure for eCall. There are possible upcoming activities due to frequency changes (Directive 2010/40/EU Progress Report 2020 Sweden 2020).

3.1.5. e) The provision of information services for safe and secure parking places for trucks and commercial vehicles

Belgium: Belgium have started activities concerning safe and secure parking. There is a pilot project ongoing in Flanders to deliver real-time information of truck parking spaces, especially for occupancy. Additional information: In addition, the national access point should be a website redirecting to platforms managed by the Regions. Implementation will be supervised by the Belgian ITS Steering Committee. In Wallonia, information is provided by the Road Administration (Service Public de Wallonie) and available on the website trafiroutes.wallonie.be. Currently no dynamic data. Information has been uploaded on DG MOVE European Access Point. For Flanders, static data is published on the European Access Point for Truck Parking hosted by DG MOVE (Agency 2020).

Denmark: There are 91 parking places alongside the Danish part of the TEN-T road network. On these parking places there are in total 1332 parking spaces for lorries. Static information about all of the above-mentioned rest areas are available in the EU database. On 4 (4,4 % of total amount of parking places on TERN rod network) parking places dynamic information on the availability of parking spaces is provided. Static data is published on the European Access Point for Truck Parking hosted by DG MOVE, and dynamic data is published at the NAP. All data is gathered from public sources (The Danish Road Directorate). As the benefits of the services cannot be directly measured, they will have to be estimated. The benefit calculations for road transport regarding change of travel time, fatalities, injury accidents and emissions are based on estimates by the NEXT-ITS Evaluation group made within the CEF supported projects NEXT-ITS and NEXT-ITS21 (Committee 2020).

Finland: Implemented eCall in 2017 in six PSAPs operated by Emergency Response Centre Administration (ERCA). In 2017, Emergency Response Centre Administration asked VTT Technical Research Centre of Finland Ltd to perform a conformance assessment for the PSAP information system (ELS). The conformance assessment was carried out in December 2017 - March 2018 and received by the Finnish Transport and Communications Agency which had been appointed in Finland as a public authority with competence to receive the conformance assessment of the PSAP and assess the conformity of the PSAP (Agency 2020).

Ireland: When it comes to Number of different parking places and parking spaces on their territory: No developments in this area have been made yet, but a Pilot is being considered by TII for 2021. Ireland has not designated any areas on the trans-European road network which require safe and secure parking for trucks and commercial vehicles, as in accordance with the Regulation

no traffic and security conditions warranting such designation currently exist in Ireland. Therefore, information services on safe and secure parking for trucks and commercial vehicles will not be implemented at this time. As a result of this, no priority zones are defined (Directive 2010/40/EU Progress Report 2020 Ireland 2020).

Italy As national access point (NAP) for road safety information, the Road Safety Information Coordination Centre (Centro di Coordinamento Informazioni sulla Sicurezza Stradale – CCISS) collects the following data on parking and rest areas for trucks and commercial vehicles:

- number of parking and rest areas for heavy goods vehicles and commercial vehicles.
- location of parking and rest areas for heavy goods vehicles and commercial vehicles.
- capacity of parking and rest areas (whose unit of measure is the number of places available for trucks).
- name of the company responsible to manage the rest area or parking and the related contacts.
- services and security systems available at each parking and rest area; types of cargo allowed at each parking and rest area (Directive 2010/40/EU Progress Report 2020 Italy 2020).

Norway: Norway has an automatic real time registration of road travel time. This service covers the main road network in the four largest urban areas and also a motorway corridor between Oslo and Kristiansand. This system uses toll tag equipped vehicles as probes and measures individual travel time anonymously. The data is then aggregated and made available at the NAP and used in several information services including VMS. The data is stored in a historic database which will be the source for this KPI. The KPI is currently under development and is planned to be available during 2018 (Directive 2010/40/EU Progress Report 2020 Norway 2020).

Sweden: A study has been conducted on state owned rest areas suitable to be included in the information service. However, on several of those locations truck parking is provided as parking lanes with no fixed parking spaces. Hence, there are not a fixed number of parking spaces. A study on which commercial installations that could be included have been carried out in a first step. Further analyses are foreseen. State owned rest areas and commercial installations found suitable would be included in the service. An implementation of Priority zones is not foreseen hence only static data will be handled within the framework of the delegated act. Subsequently there will be no dynamic information on the availability of parking spaces. The Swedish National Access Point (NAP) www.trafficdata.se also include data for priority action e (truck parking information) and the Swedish state-owned rest areas for the delegated act e is published on the European Access Point for Truck Parking hosted by DG MOVE (Directive 2010/40/EU Progress Report 2020 Sweden 2020).

4. Results

According to the Its National progress reports evaluated, deployment KPIs were provided by most of the countries in their national reports. Some countries broke down the KPIs into different categories. For example, the KPI for information gathering infrastructure/equipment was broken down into weather monitoring (Denmark, Finland, Sweden), traffic volume (Finland, Sweden), permanently fixed traffic monitoring (Denmark), temporarily fixed traffic monitoring (Denmark), and mobile/probe traffic monitoring (Denmark) and travel time (Finland). In some cases, KPIs (such as incident detection) were disaggregated into tunnels and the rest of the road network.

The level of disaggregation by road type also varied. Some countries provided KPIs for the whole TEN-T road network, while other countries provided individual KPIs for varying degrees of disaggregation (for example, combinations of TEN-T network, TEN-T core, TEN- T comprehensive, other motorways, urban roads).

This section provides a short summary (by KPI) for the twelve countries that reported deployment KPIs.

Information gathering infrastructure/equipment (road KPI)
Reporting of this KPI varied significantly across the Member States, with some providing more detailed information than others. For example, some countries (Denmark, Finland, Sweden) decided to break the KPI down into several subcategories (such as cameras, weather monitoring, permanent fixed traffic monitoring, temporary fixed traffic monitoring, mobile/probe traffic monitoring, and traffic volume services), while other countries (Belgium, The Netherlands) did not provide a breakdown by ITS service. However, the available information indicates that the TEN-T network in the reporting countries generally has a high level of coverage of information gathering infrastructure.

Incident detection (road KPI)
Coverage of the TEN-T network with ITS used to detect traffic incidents varied significantly among Member States that reported on this KPI. The values reported ranged from 0.4% (Denmark) to 100% (The Netherlands on a 24/7 basis) for the TEN-T network, with the remaining countries somewhere between these values. Norway and Sweden specified manual and automated incident detection values, with Norway at 12 manual detection and 3 automatic detection and Sweden at 100 manual detection and 3 automatic detections. Finland has 60% of its' tunnels covered with automated incident detection, and outside of tunnels, 1 km of road is covered.

Traffic management and traffic control measures (road KPI)
The national reports indicated that the deployment of ITS to enable traffic management and control measures varies considerably among countries. All countries reported this KPI for the TEN-T network, high-level road network, or motorways. The values reported ranged from 0% (Ireland motorways and TEN-T comprehensive) to 100% (The Netherlands), with a range of values in between

these. Sweden reported a KPI of 3% covered by traffic management and traffic control measures and 100% with mobile equipment for traffic management and traffic control measures. In addition, Denmark provided values for tunnels (100% of 6.1 km) and 8% coverage of the TEN-T road network.

Cooperative-ITS services and applications (road KPI)
C-ITS KPI was not provided by most of the countries, considering that technology was only at the pilot stage even if sometimes numerous pilot projects were in progress. For some countries, the values reported were low, except for Finland. In Finland in the year 2020, the three pilot deployments of NordicWay 2 cover all of the TEN-T road networks with a C-Roads hybrid service utilizing the cellular network and specific NordicWay interchange nodes. However, the number of users was still relatively modest, 3600 active users/month. Denmark also noted that the KPI is intended to be for road-based ITS infrastructure, while the main project in the country (NordicWay) is based on cellular communication technology, so it has no road-based infrastructure.

Real-time traffic information (road KPI)
Real-time traffic Coverage was generally very high, with most countries reporting 100% for the TEN-T road network.

Dynamic travel information (multimodal KPI)
The method of reporting varied, with some countries providing values for transport nodes and/or the TEN-T network. The values reported for transport nodes are relatively high for most countries.

Freight information (multimodal if possible, or road KPI)
Some of countries have reported values for this KPI. The countries that reported this KPI have values close to 100% for the TEN-T network.

112 eCalls (road KPI)
Member States were not asked to report on this KPI, as the related information will be provided regularly through another channel, i.e. the yearly COCOM (Communications Committee) questionnaire on the implementation of the 112 number.

While few ITS National progress reports provided a detailed progress of their ITS deployments in accordance with EU Priority areas and actions, some reports failed to provide such descriptive progress in their country. This created a varying input for this evaluation report, making it quite difficult to assess the KPIs mentioned in the ITS Directive/40/EU.

5. Discussion

Intelligent transport systems promise an enormous potential to reduce the negative societal impacts concerning road safety, traffic flow, energy consumption, and emissions. However, ITS services are not yet widely deployed due to the novelty of the technologies used. On a brighter note, most member states have made significant measures regarding the priority actions according to the ITS directives and reported key benefits gained from the deployment of ITS services. For instance, Finland reported a 1.1% improvement in travel time as a result of ITS for-road transport and 15.3% for public transport with the assumption that all public transport users use the services. The Netherlands also provided an analysis of the impact of various measures on congestion from 2005-2015: a 9% improvement in travel time was attributed to ITS, specifically thanks to ramp metering and dynamic route information, in addition to benefits from existing traffic management measures implemented before 2000 which is a significant result.

Another significant change is that road accidents resulting in death or injury has decreased due to the implementation of ITS services. Finland estimated a 14% decrease based on recent project experience, and Germany reported a 30% decrease in accidents.

Regarding the change in traffic-CO_2 emissions, Finland reported around a 1.2% decrease, based on recent project experience. Belgium has reported an estimated benefit of 7000 vehicle hours/year.

Due to the limitation of reported data from the Member states Progress reports there is not a lot of quantitative data when it comes to major socio-economic impacts. The change in travel time before and after the implementation of ITS has not been fully measured in some countries like Ireland. And where ITS services has been implemented, it has generally been implemented in places with rising traffic volumes so that the impact of ITS has been difficult to measure against this increase in traffic (Ainsalu, et al. 2018) (Drive Sweden 2016).

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7. Appendix

7.1. Project inventory

The project inventory is partly based on searching the literature but also on the knowledge and contacts of the participants within sub-activity 4.2. There is the ambition to get in contact with relevant, ongoing projects to extract information but also to get the chance to influence what they are observing to accommodate our needs.

The first step of the project inventory is to list finished and ongoing projects and their relevance for this sub-activity. For this means an Excel-template available online is used where participants in sub-activity 4.2 can enter information (see *Figure 1*). This inventory will then be used to select projects to collect information on and, in a second iteration, decide for which projects to continue with the cost elaboration.

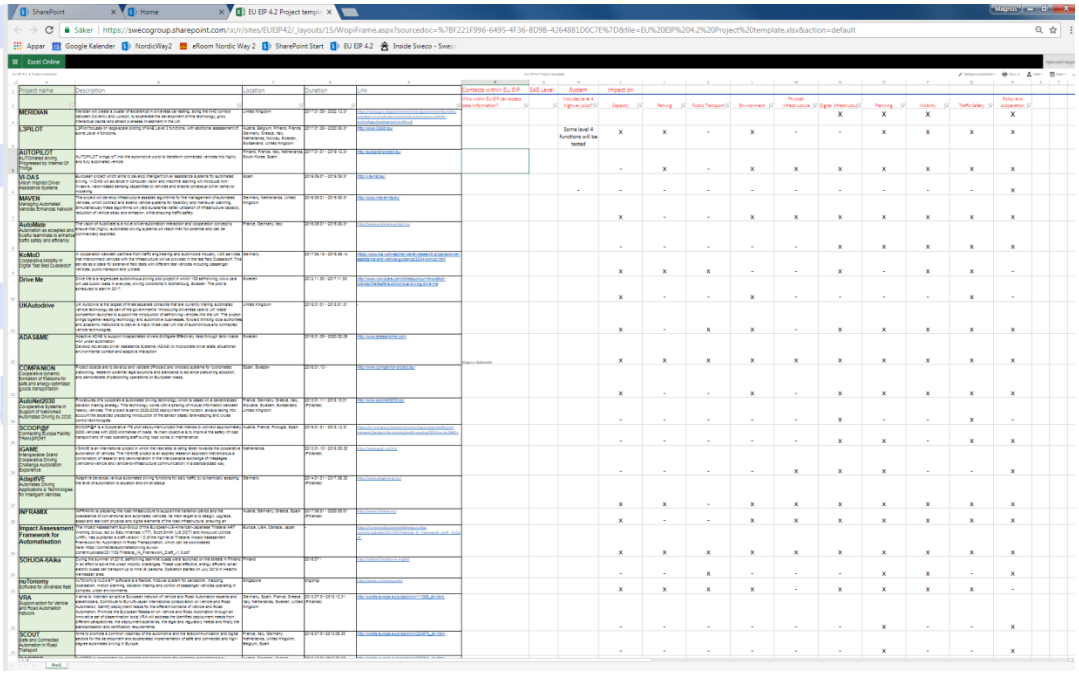

Figure 1: The on-line template used for project inventory.

7.2. Selected project description from partners

7.2.1. SWEDEN

Author: Clas Roberg, Vishal Baid
Contact detail: Clas.roberg@trafikverket.se

Project 1 title: NordicWay 1 and 2

Report available: https://uploads-ssl.webflow.com/5c487d8f7febe4125879c2d8/5fdb176c20c0a29823b40c68_NordicWay%202%20Evaluation%20Report_FINAL.pdf (note that this is the full corridor evaluation report)

Project duration (year)	**2016 - 2020**
Budget and funding	0.6M€/year (CEF)
ITS Priority Actions covered	b) The provision of EU-wide real-time traffic information services, c) Data and procedures for the provision, where possible, of road safety related minimum universal traffic information free of charge to users
ITS Directive Priority Areas covered	I. Optimal use of road, traffic and travel data, II. Continuity of traffic and freight management ITS services, III. ITS road safety and security applications IV. Linking the vehicle with transport infrastructure
EasyWay Operating Environments covered	

Summary

Way successfully tested and demonstrated the interoperability of C-ITS (cooperative ITS) services both for passenger and freight traffic and piloted continuous services offering an equivalent user experience in the whole network. NordicWay 1 and 2 are a real-life deployment pilot projects, which facilitated a wider deployment in the Nordic countries and in Europe in near future.
In NordicWay the first phase has focused on hybrid technology and information exchange between clouds to facilitate implementation of day 1 services.

Through the NordicWay 1 and 2 projects, collaboration between the authorities, the automotive industry and the telecom industry, have developed an information exchange solution for different enterprise-specific clouds. Through this cloud it is possible to address specific vehicles, and creating cost-effective opportunities for different security applications. In the ongoing phase, NordicWay 3 is exploring new opportunities for organizing traffic.

Key impacts/ benefits:
Change in Accident Numbers and Severity; Change in Traffic Flow; Change in CO2 Emissions

Project 2 title: NEXT-ITS 1 and 2

report available: https://www.its-platform.eu/filedepot_download/2101/6288
(note that this is the full corridor evaluation report including all country parts, too)

Project duration (year)	**2013 - 2015**
Budget and funding	5,2M€ (CEF)
ITS Priority Actions covered	b) The provision of EU-wide real-time traffic information services, c) Data and procedures for the provision, where possible, of road safety related minimum universal traffic information free of charge to users
ITS Directive Priority Areas covered	I. Optimal use of road, traffic and travel data, II. Continuity of traffic and freight management ITS services,
EasyWay Operating Environments covered	the most advanced network is motorways but the main road network is mainly two-lane/one-carriageway road (so in all - FI NEXT-ITS1 services cover various operating environments)

Summary

Finnish measure in NEXT-ITS1 aimed to eliminate the current problems in traffic information services as well as traffic management services. It focused on improving the quality of traffic information services by developing a common user interface and an integration layer named T-LOIK.
The common interface will support Traffic Centre operators in their daily tasks at informing road users on relevant developments in traffic and managing traffic. The emphases was on developing a usable, all-inclusive interface highlighting ease of use and good tools for fast delivery of traffic management actions and information to road users via VMS and other channels of information such as the internet, social media and radio stations. The user interface comprised a

map interface, VMS information tool (also for other information channels), alarm tool and road weather display integration.

Key impacts/ benefits:
Change in Accident Numbers and Severity; Change in Traffic Flow; Change in CO2 Emissions

Link to project evaluation:
ex-ante evaluation - but utilizing found ex-post evaluations as background; note that services implemented/integrated cover wider network than just the actual NEXT-ITS corridor.
Benefits are calculated for the whole covered network

7.2.2. FINLAND

Author: Merja Penttinen, Petri Antola, Anna Schirokoff
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Project 1 title: Renewal of central traffic management systems - NEXT-ITS1 (FI)

report available: https://www.its-platform.eu/filedepot_download/2101/6288
(note that this is the full corridor evaluation report including all country parts, too)

Project duration (year)	**2013 - 2015**
Budget and funding	5,2M€ (CEF)
ITS Priority Actions covered	b) The provision of EU-wide real-time traffic information services, c) Data and procedures for the provision, where possible, of road safety related minimum universal traffic information free of charge to users
ITS Directive Priority Areas covered	I. Optimal use of road, traffic and travel data, II. Continuity of traffic and freight management ITS services,
EasyWay Operating Environments covered	the most advanced network is motorways but the main road network is mainly two-lane/one-carriageway road (so in all - FI NEXT-ITS1 services cover various operating environments)

Summary

Inventory

F

innish measure in NEXT-ITS1 aimed to eliminate the current problems in traffic information services as well as traffic management services. It focused on improving the quality of traffic information services by developing a common user interface and an integration layer named T-LOIK.
The common interface will support Traffic Centre operators in their daily tasks at informing road users on relevant developments in traffic and managing traffic. The emphases were on developing a usable, all-inclusive interface highlighting ease of use and good tools for fast delivery of traffic management actions and information to road users via VMS and other channels of information such as the internet, social media and radio stations. The user interface comprised a map interface, VMS information tool (also for other information channels), alarm tool and road weather display integration.

Key impacts/ benefits:
Change in Accident Numbers and Severity; Change in Traffic Flow; Change in CO2 Emissions

Link to project evaluation:
ex-ante evaluation - but utilizing found ex-post evaluations as background; note that services implemented/integrated cover wider network than just the actual NEXT-ITS corridor.
Benefits are calculated for the whole covered network

Project 2 title: Traffic Management Centre renewal and adaptation to corridor management and control systems, Finland (NEXT-ITS2, FI)

Project duration (year)	2016 - 2018
Budget and funding	6,2 M€ (CEF)
ITS Priority Actions covered	b)The provision of EU-wide real-time traffic information services c)Data and procedures for the provision, where possible, of road safety related minimum universal traffic information free of charge to users
ITS Directive Priority Areas covered	I. Optimal use of road, traffic and travel data, II. Continuity of traffic and freight management ITS services, III. ITS road safety and security applications,
EasyWay Operating Environments covered	the most advanced network is motorways but the main road network is mainly two-lane/one-carriageway road (so in all - FI NEXT-ITS2 ser-

	vices cover various operating environments)

S
ummary:
Continuation of the TMC central system upgrade and integration of services under the new T-LOIK: To ensure corridor-oriented strategic traffic management, all existing traffic management and control systems will be adapted to the Traffic Management Centre (TMC) operator support and control systems, and integrated with the control room facilities at the TMC. In practice, this means the renewal of control room software, control logic software, and control equipment. In addition, TMC equipment is purchased to facilitate use of the T-LOIK operator support system, and the CCTV control system is renewed. The adaptation covers traffic management and control systems in the tunnels along the corridor as well as the dynamic traffic management systems (dynamic speed limits accompanied with incident, congestion and/or weather warnings) on 20 km of the corridor.

Key impacts/ benefits:
Change in Accident Numbers and Severity; Change in Traffic Flow; Change in CO2 Emissions

Link to project evaluation:
ex-ante evaluation - but utilizing found ex-post evaluations as background; note that services implemented/integrated cover wider network than just the actual NEXT-ITS (2) corridor.
Benefits are calculated for the whole covered network

Project 3 title: Nordic Way1 (FI) = Nordic Way Coop
https://www.nordicway.net/previousprojects

Project duration (year)	Evaluation completed 2017
Budget and funding	part of Nordic Way (1), CEF
ITS Priority Actions covered	road safety-related minimum universal traffic information services
ITS Directive Priority Areas covered	III. ITS road safety and security applications,
EasyWay Operating Environments covered	T2 motorway (link), no flow-related traffic impact, potential safety concerns

Summary:

The 'NordicWay Coop' pilot in Finland included the provision of road safety-related minimum universal traffic information services. It was evaluated during a one-year field test with the HERE DTI application in mobile devices used by ordinary road users. The purpose of the Coop project was to assess the technical feasibility of the system and the information it provides as part of a cooperative traffic information system and readiness for wide-scale implementation, as well as its commercial potential and ecosystem model. Another purpose was to gain knowledge on cooperative services as a channel for safety-related information, and their impacts on driver behaviour and traffic management. A socio-economic assessment completed the evaluation.

The expected impact mechanism for the service was that when the driver receives a cooperative warning of a hazardous situation or condition ahead, (s)he is aware of it earlier than without the warning (before seeing or detecting the actual situation or condition) and is thus better prepared. This is manifested in increased alertness, less multitasking and a smoother approach. Additionally, the traffic management centre not only receives information on hazardous situations or conditions that would not otherwise be detected by their traditional incident detection systems/mechanisms or road weather models, they also get it sooner. This is believed to result in better informed road users (improved travel quality), fewer primary and secondary accidents, less time spent in congestion, a slight drop in emissions, and increased road network performance/efficiency.

The results showed that the cooperative system for providing safety-related traffic information through a cellular network is a technically feasible concept. The latencies of the system were short enough (median latency 0.3 seconds for mobile-server-mobile communication) for a driver information system, and the system architecture ensured cross-border interoperability. The HERE DTI application used in the field test followed the requirements by Car Connectivity Consortium and ESoP (European Statement of Principles) guidelines for applications used while driving.

The service of receiving warnings and being able to warn others about hazardous situations on the road was well accepted by road users. They felt that it provided information that other services did not, and that the information was more detailed or better targeted. The drivers also reported that information on hazardous locations ahead affected their driving behaviour; concomitant changes in speed were observed in GPS data analysis.
The direct safety impact on target roads was greatest for warnings of slipperiness and animals & people on the road, followed by warnings of roadworks and exceptional weather. Warnings of obstacles on the road, accidents or poor visi-

bility were assessed to be least effective due to the small number of 'target accidents'. In addition, over-reliance on the system being able to warn of hazards was considered to cause a slight increase in speed, also affecting safety. The overall assessment of the safety impact of the service for 2019 was a 0.00–0.09% reduction in injury accidents and a 0.00–0.08% drop in fatal accidents on motorways in Southern Finland. For 2030 the estimated impact was a 0.8–4.6% reduction in injury and non-injury accidents and a 0.6–4.0% drop in fatal accidents on all main roads. The service was also considered to have travel time benefits if the number of accidents and the ensuing delays were reduced.

In conclusion, widespread penetration of the system is expected to generate societal benefits, especially from a smaller number of accidents leading to fewer traffic delays. The benefit-cost ratio was assessed to be at least 2.3 for the period 2019–2030, assuming linear growth up to widespread acceptance and use among road users in Finland.

Key impacts/ benefits:
Safety and travel time:
The overall assessment of the safety impact of the service for 2019 was a 0.00–0.09% reduction in injury accidents and a 0.00–0.08% drop in fatal accidents on motorways in Southern Finland. For 2030 the estimated impact was a 0.8–4.6% reduction in injury and non-injury accidents and a 0.6–4.0% drop in fatal accidents on all main roads. The service was also considered to have travel time benefits if the number of accidents and the ensuing delays were reduced.

Link to project evaluation:
evaluation of C-ITS services, safety and travel time impacts reported. CBA calculated

Project 4 title: Impact evaluation of the Porokello (Reindeer) alert service (part of Nordic Way 2)

report available in Finnish:
https://static1.squarespace.com/static/5c4703b5d274cba2e71f7489/t/5cb812bf6e9a7f2692fc0d3b/1555567351492/Porokello_Traficom_tutkimuksia_9_2019.pdf

Project duration (year)	Evaluation completed 2019, Porokello R&D-project 2016 - 2018
Budget and funding	Part of Nordic Way 2 - budget for Porokello n/a
ITS Priority Actions covered	Action C: Safety related traffic information/ Warning of Animals on the road
ITS Directive Priority Areas covered	III. ITS road safety and security applications,
EasyWay Operating Environments covered	R2 two-lane road (link), no flow-related traffic impact, potential safety concerns

Over the last decade there have been from 3,300 to 4,500 collisions with reindeer each year. The variation in the annual number of reindeer collisions depends on the movement of reindeer, which in turn is affected by weather conditions and the availability of food for reindeer. The variation in the location and timing of collisions is large. Most collisions occur at the end of the summer and the end of the autumn. The objective of this study was to investigate whether the Porokello (reindeer bell) alert system has had an impact on traffic safety and the number of reindeer collisions, and to make recommendations to improve the usability and quality of the service and thus increase its impact on traffic safety. The data examined in this study consisted of data on reindeer collisions in reindeer husbandry areas from 2011 to 2018, exact time and location data of alerts given by Porokello since the adoption of the system in October 2016, as well as route data of the professional drivers who gave warnings. In addition, the study included interviews with experts, workshops for those active in giving warnings, and an online survey for those giving warnings and for users of the Porokello application. On the basis of examination of statistics and maps, it can be seen that the number of reindeer accidents and the reindeer accident rate have decreased since the introduction of Porokello. The alerts are likely to be one factor in the positive development of safety. In online surveys, approximately 9 out of 10 drivers said that they had taken precautions and changed their driving behaviour after receiving a reindeer alert. The biggest reported impact on driving behaviour was the increase in alertness and reduction of driving speed. The responses received support the notion that the alerts have an impact on reindeer collisions and general traffic safety.

Key impacts/ benefits:
Reduction in accidents/collisions with a reindeer. Other safety impacts reported by the drivers, too: being more alert and reduced speed when receiving the alert.

Link to project evaluation:
This evaluation study is part of the NordicWay2 project, supported by the EU. In the project, the Finnish, Swedish, Norwegian and Danish road authorities are collaborating with companies, research institutes, vehicle manufacturers and service providers to develop Cooperative Intelligent Transport Systems (C-ITS) for Nordic conditions.

7.2.3. DENMARK

Author: Lone Dörge, Genua Consult
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Project 1 title: NEXT-ITS (Full corridor report from DK and the other NEXT-ITS countries

Project duration (year)	2013-2015
Budget and funding	30 MEURO (excl. VAT) co-funded by CEF
ITS Priority Actions covered	Priority Actions b and c
ITS Directive Priority Areas covered	I, II and III
EasyWay Operating Environments covered	C1, T2, T3, T4, R3, R4, R5, R6, R7, R8, S1, S2, N1, N2, P1

Summary:
The main objective of the project is to improve the performance of the NEXT-ITS corridor i.e. to improve the efficiency, reliability and safety of the corridor as well as to reduce the environmental impacts – this is to be done primarily through a Coordinated deployment of core European traffic information services in response to the Priority Actions b) and c) of the ITS Directive.
The NEXT-ITS corridor covers 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. The total length of the corridor is 2834 km.

Key impacts/ benefits: (copy from the final evaluation report)
The key results in the project are the deployments and the benefits achieved:

The coverage/deployment KPIs for the NEXT-ITS corridor show the change in *coverage of ITS services with the minimum level of service and quality as defined by NEXT-ITS* (table below).

Table 8:
Coverage of ITS services with the minimum level of service and quality, end of 2012 and 2015

NEXT-ITS Corridor length 2833,5	End of 2012 Length km	End of 2012 %	End of 2015 Length km	End of 2015 %
RT 2.1 Traffic condition	596,7	21,1	2618,5	92,4
RT 2.2 Travel Time	100,0	3,5	993,4	35,1
RT 2.3 Weather information	2341,1	82,6	2624,4	92,6
SR 1.1 Temporary slippery road	492,4	17,4	1394,6	49,2
SR 1.2 Obstacles on the road	501,9	17,7	1090,1	38,5
SR 1.3 Unprotected accident area	501,9	17,7	1090,1	38,5
SR 1.4 Short term road works	492,4	17,4	2164,6	76,4
SR 1.5 Reduced visibility	492,4	17,4	1277,6	45,1
SR 1.6 Unmanaged blockage of road	501,9	17,7	1090,1	38,5
SR 1.7 Exceptional weather conditions	492,4	17,4	1394,6	49,2

The End of 2015 figures show the deployment situation after the NEXT-ITS project has ended. The End of 2012 figures show the situation at the start of the project. As can be seen the project has *substantially improved the coverage of real-time as well as safety related traffic information on the corridor.*

The next tables sum up the impacts of the NEXT-ITS services in each country, and their national networks affected by the services.

Table 10: The total impacts of NEXT-ITS services in the national networks ("-" means reduction)

Total annual impacts	Impacts in absolute numbers					
	DE	DK	FI	NO	SE	Total
Vehicle hours driven (million/year)	-0,67	-0,30	-0,44	-0,018	-0,33	**-1,8**
Vehicle hours spent in congestion (1000/year)	-97	-26	-13	-1,5	-28	**-166**
Fatalities (number/year)	-0,27	-0,17	-0,24	0,000	-0,18	**-0,87**
Injury accidents (number/year)	-13,7	-1,6	-4,4	-0,21	-11,3	**-31**
CO2 emissions (kilotonnes/year)	-35	-6,0	-10	-0,46	-14	**-65**

In Table 11, the monetary value of the impacts has been transformed to benefits expressed in million Euros utilising the national unit values for the different impacts.

Table 11: The benefits i.e. the monetary value of the NEXT-ITS impacts on the national networks in million €.

Total annual benefits	Monetary value in M€ (using national unit values)					
	DE	DK	FI	NO	SE	Total
Vehicle hours driven	8,6	7,3	5,7	0,4	6,9	**28,9**
Vehicle hours spent in congestion	1,2	0,9	0,2	0,0	0,9	**3,2**
Fatalities	0,3	0,4	0,7	0,0	0,5	**2,0**
Injury accidents	2,0	1,2	1,9	0,1	5,5	**10,6**
CO2 emissions	4,7	0,1	0,4	0,0	1,6	**6,9**
Total benefits in M€	**16,9**	**9,9**	**8,9**	**0,6**	**15,3**	**51,6**

The total estimated effects of the services are considerable, about 1.8 million vehicle hours driven less and circa 166 000 vehicle hours less spent in congestion annually. More than thirty severe accidents and 65 thousand tonnes of CO2 emissions are avoided annually due to NEXT-ITS. The total value of the annual benefits in 2016 will be circa 51 Million €, which can be compared to the implementation costs of circa 36 million € including VAT and thereby comparable to the benefits (the costs without VAT amount to almost 30 Million €). As the annual operation and maintenance costs will be in the order of 3-4 Million €, the NEXT-ITS can be assessed to be socio-economically feasible to a large extent.

The result is indeed very positive, however, the effect estimates are based on a desk-top analysis, which needs to be compared to the actual statistics from the NEXT-ITS corridor and the national networks affected. Such an ex-post evaluation could be carried out in 2017 or 2018.

The sensitivity analysis shows that the benefits calculated vary a lot dependant on the most important input parameters. However, it can be concluded that even with conservative estimates, NEXT-ITS has a positive net impact.

It should be pointed out that one of the most important user benefits of making the road-users better informed is today totally neglected in the traditional benefit calculations i.e. the value of being informed in itself. For this reason, the direct economic value of the benefits will be even higher than the traditional estimate which has be made in accordance with well-established socio-economic meth-

odologies. It should be mentioned that in Denmark, however, the value of increased information has been determined in a comprehensive study in 2013. The NEXT-ITS evaluation team finds that the overall results are very positive, even more than anticipated. Explanations for the very positive results are among others that the services influence and thereby benefit a larger network than just the corridor itself. Further it could be added that the measures and services included in NEXT-ITS have also been through national justification procedures at an earlier stage.

Link to project evaluation: https://evaluation.its-platform.eu/EvalLib
https://www.its-platform.eu/filedepot_download/2101/6288

Project 2 title: Improved safety related and real-time traffic information services (i.e. Danish part of NEXT-ITS)

Project duration (year)	2013-2015
Budget and funding	4.0 MEURO (excl. VAT) co-funded by CEF
ITS Priority Actions covered	Priority Actions b and c
ITS Directive Priority Areas covered	I and III
EasyWay Operating Environments covered	C1, T2, T3, T4, R3, R4, R6, R7, R8, S1, S2, N2, P1

Summary:
The Danish measures
New solutions for data acquisition of real-time data and wider coverage of real-time data.
New Traffic Centre Data Management System and operator interface, including data quality enhancement and improved data dissemination through DATEX-II.
Improved data quality and service provision enhancement through new information channels, e.g. apps, mobile services.
Integration of map-based traffic information services.
Upgrade of road weather monitoring and information on winter road management.

The partners of NEXT-ITS have carried out an analysis in order to identify which actions that together provide the best value in terms of **filling the gaps between today´s situation and the identified needs** in relation to the Priority Actions b) and c) of the ITS Directive. The services concerned are referred to within NEXT-ITS as follows:

Safety related traffic information	Real-time traffic information
Temporary slippery road Animal/people/obstacles/debris on the road Unprotected accident area Short term road works Reduced visibility Unmanaged blockage of a road Exceptional weather conditions	Traffic condition information Travel time information Weather information

As seen from users´ perspective, the measures contribute to the services by:

Providing continuity in service provision (e.g. through corridor extension and coverage)
Improving the quality of the service (e.g. through improved data collection and management)
Improving/extending the content of the service
Facilitating the development and provision of services (and also extending the usage) through providing access to the data for service providers
Improving the accessibility to the service by harmonizing the interface with which the service is provided and adding additional interfaces towards the users.

Key impacts/ benefits:

Deployment in Denmark – expressed with the deployment KPIs

NEXT-ITS Corridor length, DK **452,7**	**End of 2012** Length km	**End of 2012** %	**End of 2015** Length km	**End of 2015** %
RT Info 2.1 Traffic condition	100	**22**	452,7	**100**
RT Info 2.2 Travel Time	100	**22**	452,7	**100**
RT Info 2.3 Weather information	317	**70**	452,7	**100**
SR Info 1.1 Temporary slippery road	0	**0**	452,7	**100**
SR Info 1.2 Obstacles on the road	0	**0**	452,7	**100**
SR Info 1.3 Unprotected accident area	0	**0**	452,7	**100**
SR Info 1.4 Short term road works	0	**0**	452,7	**100**
SR Info 1.5 Reduced visibility	0	**0**	452,7	**100**
SR Info 1.6 Unmanaged blockage of road	0	**0**	452,7	**100**
SR Info 1.7 Exceptional weather conditions	0	**0**	452,7	**100**

Coverage of ITS services with the minimum level of service and quality. Pre-situation is end of 2012, after deployment situation is end of 2015.

Costs of measures

The total costs of all Danish measures are 4.0 MEUR (excl. VAT) and 5.0 MEUR (incl. VAT).

Benefits of measures

The total benefits of the first year are estimated to 9.9 MEUR, excluding the value of being informed.

Note: Ex-ante evaluation - but utilizing ex-post evaluations as background to estimate effects; note that the services implemented cover a wider network than just the actual NEXT-ITS corridor. Benefits are calculated for the entire network covered.

Link to project evaluation: https://evaluation.its-platform.eu/EvalLib

https://www.its-platform.eu/filedepot_download/2101/6288 (note that this is the full corridor evaluation report including all country parts)

7.2.4. FRANCE

Author: Cerema, Ministry of Transport (DGITM)

Project 1 title: SCOOP

Project duration (year)	**6 years, 2014-2019**
Budget and funding	11M€, European Funding: 50%
ITS Priority Actions covered	Actions a, b and c
ITS Directive Priority Areas covered	Priorities I + III
EasyWay Operating Environments covered	All road networks , C1 critical spots

Summary:

SCOOP is a pilot deployment of cooperative intelligent transport systems (ITS), based on the exchange of information between connected vehicles and between vehicle and road. The vehicles are equipped with sensors that detect events (slippery road, shock, sudden braking, etc.) and on-board units that transmit information to upstream vehicles as well as to the road manager via roadside units. They also receive information from the road manager on construction sites, winter viability, etc.
SCOOP aims to deploy 3000 vehicles on 2000 km of roads divided into five sites: Ile-de-France, A4, Isère, Bordeaux ring road and Brittany. These sites are characterized by a great diversity of types of road (motorways, major urban axes, interurban and local bidirectional roads).
The project brings together many public and private partners around the Ministry of Ecological Transition, which coordinates it: local communities, road managers, car manufacturers, universities and research centers, telecoms operators, suppliers of security services, and Austrian, Spanish and Portuguese partners.

Key impacts/benefits:

The objectives of SCOOP are to improve road safety, but also the safety of the operators who work on the roads for works and other operations, make traffic management more efficient and help reduce emissions, optimizing infrastructure management costs, preparing the vehicle of the future and developing new services.

Link to project evaluation:

Project 2 title: InterCor

Project duration (year)	**3 years, 2016-2019**
Budget and funding	30M€, European Funding 50%
ITS Priority Actions covered	Actions a, b, c, e and f
ITS Directive Priority Areas covered	Priority II
EasyWay Operating Environments covered	Corridors, S2, N2

Summary:

InterCor (Interoperable Corridors) is a European project which aims to connect the C-ITS corridor initiatives of the The Netherlandss C-ITS Corridor (The Netherlandss-Germany-Austria), the French corridor defined in the SCOOP project, and the United Kingdom and Belgian C-ITS initiatives.
In France InterCor follows the project Scoop which allowed to deploy since 2016 cooperative systems based on the exchange of information between connected vehicles and the road infrastructure. The InterCor pilot aims to extend the existing spatial coverage on the North Sea-Mediterranean Corridor and to develop new use cases related to safety and freight, while ensuring the continuity of services via multimodal platforms.
The project brings together many public and private partners (road managers, providers, research centers) under the coordination of the French Ministry of Transport, with the challenges subtended to promote cooperative systems for sustainable mobility and to ensure the homogenization of services in the context of C-ITS projects in Europe via standardized interoperable systems.

Key impacts/benefits:

The general objectives of InterCor project is to achieve a sustainable network of C-ITS corridors providing continuity and serving as a TestBed for Day-One C-ITS service development and beyond.
The main impacts are improving traffic and road safety and reducing management costs and nuisances (pollution, traffic jams, noise).

Project 3 title: C-Roads

Project duration (year)	**5 years, 2016-on going**
Budget and funding	14M€, European Funding 50%
ITS Priority Actions covered	Actions a, b, and c
ITS Directive Priority Areas covered	Priorities I, III and IV

EasyWay Operating Environments covered	P1 peri urban, C1 critical spots

Summary:

Through the C-Roads Platform, authorities and road operators join together to harmonise the deployment of cooperative intelligent transport systems (C-ITS) across Europe in order to develop interoperable cross-border C-ITS services for road users.
Eight Member States (Germany, Austria, Belgium, The Netherlandss, Czech Republic, Slovenia, United Kingdom and France) are contributing to C-Roads platform, in partnership with other States which are gradually joining the project (Spain, Finland, Hungary, Italy , Portugal and Sweden).
In France the C-Roads project is part of the continuation of cooperative vehicle deployment projects as Scoop or InterCor, by introducing new use cases especially in urban areas and by focusing more on V to V exchanges (development of a smartphone application).
At the French level, the project brings together road and / or mobility infrastructure managers, car manufacturers, universities and research institutes, and IT security experts.
Four pilot sites have been selected at national level for this experiment: the East (SANEF, DIRE and Strasbourg), the Center-East (DIRCE, APRR and Vinci), the Southwest (DIRA and Bordeaux) and the West (DIRO and Vinci).

Key impacts/benefits:

This project develops a set of technical specifications based on those developed in Scoop projects and results pooled by the commission within the framework of the C-Roads platform. In a second phase, deployments are carried out in areas defined in partnership with car manufacturers and infrastructure managers. These are referred to as “Day-1-services”, encompassing messages about traffic jams, hazardous locations, road-works and slow or stationary vehicles, as well as weather information and speed advice to harmonise traffic. Using probe vehicle and infrastructure-related data, all C-ITS services shall be transmitted directly into the vehicles in a way that allows users to get informed, but not distracted.
The results of the project will make it possible to move Europe forward towards the massive deployment of connected vehicles, to assess their interests in various fields and to identify residual technological or organizational difficulties.

Project 4 title: InDiD

Project duration (year)	**3 years, 2019-on going**
Budget and funding	21M€, European Funding 50%

ITS Priority Actions covered	Actions a, b, and c
ITS Directive Priority Areas covered	Priorities I, III and IV
EasyWay Operating Environments covered	P1 peri urban, C1 critical spots, Corridors, S2, N2

Summary:

The InDiD project aims to develop and test a complete digital infrastructure in the field of cooperative intelligent transport services, by continuing the deployment of Cooperative Intelligent Transport Systems (C-ITS) on new road test sites in order to extend the coverage of the services offered by the infrastructure. As part of the logical continuation of the European projects SCOOP, C-ROADS and InterCor, InDiD consider new use cases, some of which deal with urban environments or autonomous vehicles, deploy new technologies to best meet user needs and make transport systems more resilient.

By deploying intelligence on the infrastructure, InDiD will improve the conditions of use. Coordinated by the Ministry of Ecological and Solidarity Transition, it brings together 25 partners including communities (Grenoble, Paris, Aix-Marseille and departments of Isère and Bouches-du-Rhône), road managers and their representatives (APRR, Vinci, SANEF and ASFA) and user companies (Valeo, Renault, PSA, TomTom).

The pilot sites are located in 4 French geographical basins, on the Mediterranean side, in the south-west, in the center and in the north of France.

7.2.5. GERMANY

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Project 1 title: Road works warning in the C-ITS Corridor (part of the project "Conception and testing of cooperative systems" from the Excel list)

Project duration (year)	2016-
Budget and funding	Info not available
ITS Priority Actions covered	Priority action C: Data and procedures for the provision, where possible, of road safety related minimum universal traffic

	information free of charge to users
ITS Directive Priority Areas covered	III. ITS road safety and security application IV. Linking the vehicle with the transport infrastructure
EasyWay Operating Environments covered	

Summary:

The transport ministries of Germany, the The Netherlandss and Austria have joined forces to form the initiative "Cooperative ITS Corridor" (C-ITS Corridor), whose goal is to establish V2X services (cooperative vehicle-to-vehicle/infrastructure services) on a cross-border route. The project aims to gradually introduce cooperative, intelligent infrastructure applications on motorways in the three participating countries in order to make individual mobility more efficient, safer and more environmentally friendly.

The first application deployed and tested in this context is the road works warning, whose purpose is to warn road users of road works of short duration. New vehicles from various vehicle series, which are also equipped with this technology, are thus for the first time able to receive safety-relevant traffic information directly from the road infrastructure. The information on road works of shorter duration will be made available to traffic participants via two channels:

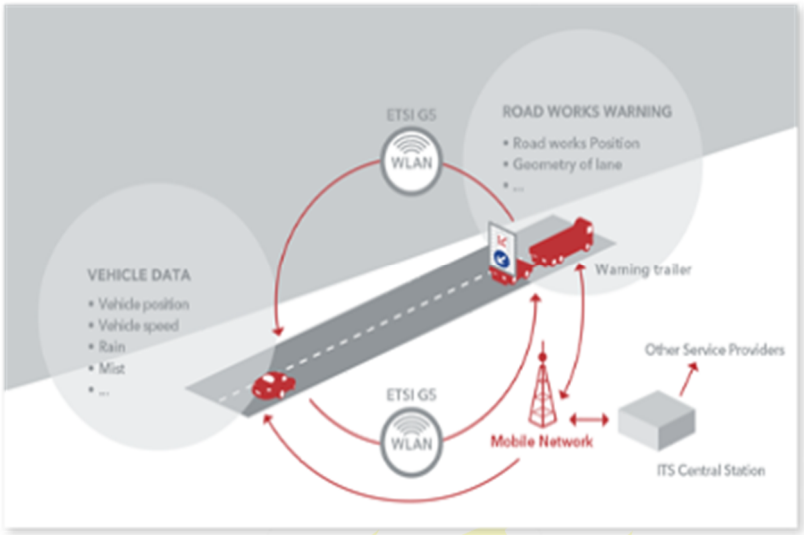
- The mobile barrier panel transmits corresponding warnings (Decentralised Environmental Notification Message, DENM) via ETSI ITS G5 (Automotive WLAN, IEEE 802.11.p) directly to the approaching vehicles.

- The warnings about road works of short duration are also made available to other information services by the ITS Central Station (ICS) via the Mobility Data Marketplace (MDM).

This application is predestined to make the background and the idea of cooperative infrastructure known and popular, as its benefits are obvious and comprehensible for road users.

The pilot test for the infrastructure-side facilities takes place in Hesse, Germany.

A description of the service is provided in the figure below:



Key impacts/ benefits:

A cost-benefit analysis has been carried out for this first implementation in the C-ITS Corridor. In order to assess whether the introduction of cooperative road works warning for road works of short duration makes economic sense and what benefits it may generate compared to the costs to be incurred, research was carried out on accidents occurring in connection with road works of short duration, accident costs and the effect of infrastructure measures on the safety and efficiency of the traffic flow. The knowledge gained was then used to determine a benefit-cost ratio (BCR). A forecast horizon up to 2032 was chosen (2018-2032). The key conclusions of the analysis are the following:

- BCR > 1 before 2020 (ROI approximately 2.5 years).
- Pay off two-three years later when considering lower values for appraisal.
- Safety impact alone pays off the investment & operating costs
- Additional factors point to even higher BCRs:
- Additional Day 1 services to be introduced (center costs degress.)
- Appraisal of additional impacts (at higher penetration)
- Network externalities, e.g. towards National Access Points

Link to project evaluation: (in German)

https://c-its-korridor.de/data/download/FE%2003.0541_2015-Bericht-Wirtschaftlichkeitsanalyse_koopFAT.pdf

Project 2 title: Project plan telematics for road transport

Project duration (year)	2010-2015
Budget and funding	240 M€
ITS Priority Actions covered	b) The provision of EU-wide real-time traffic information services c) Data and procedures for the provision, where possible, of road safety related minimum universal traffic information free of charge to users
ITS Directive Priority Areas covered	I. Optimal use of road, traffic and travel data II. Continuity of traffic and freight management ITS services III. ITS road safety and security application
EasyWay Operating Environments covered	

EU EIP European ITS Platform

Summary:

Traffic control systems on federal motorways make optimum use of the existing traffic infrastructure, avoid traffic jams and significantly shorten travel times. The number of traffic accidents is significantly reduced. The project plan telematics for road transport contains over 140 telematics measures deployed throughout Germany with a total budget of 240 M€ over approx. 6 years.

To answer the question which costs and benefits such systems carry in the course of their life cycle, a study has been carried out with the aim to find out how cost-benefit ratios can be assessed more precisely, compared to the conventional method of a 10-year depreciation period, when taking into account the whole life cycle of a traffic control system. The study calculated average life cycles for each different type of traffic control systems and proceeded

with estimation of the costs for the individual deployment phases and the benefits of the system, adding further aspects compared to the conventional method. The end result was a set of tools, which can be used to carry out a cost-benefit assessment over the entire life cycle of the respective type of system within a few minutes.

In the study, the concept was applied to three traffic control systems as an example. Some overall outcomes are provided below. Tables for each of the examples with the sums calculated for each cost and benefit category are also provided in the report. More details on the aspects taken into account and their values can be found in the annexes (separate document, links for both the report and the annexes are provided below).

Key impacts/ benefits:

When considering the more accurate lifecycle evaluation of each traffic control system type instead of the conventional method, the cost-benefit ratios improve, as the average lifecycle assessed for all traffic control systems exceeded 10 years (lifecycles assessed ranged from 12 to 18 years), increasing the benefits accumulated in the lifecycle of the project. Remaining expenses, such as costs for planning, supervision of the construction, as well as deconstruction at the end of the life cycle of the project, which in the conventional assessment method are not taken into account, also have a more negligible effect because of the longer life cycle.

Link to project evaluation: (in German)

Report: https://bast.opus.hbz-nrw.de/files/791/V243b.pdf

Annexes: https://bast.opus.hbz-nrw.de/files/791/V243_Anlagen.pdf

7.2.6. ITALY

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Project 1 title: Installation of VMSs, TVCC with AID systems, traversable cameras and strengthening of transmission network in tunnels

Project location: Italy, A6 motorway (Turin - Savona)

Project duration (year)	**2014 - 2018**
Budget and funding	€ 1.000.000 (co-funding 20%)
ITS Priority Actions covered	Predisposition of real-time traffic information services throughout the European Union Data and procedures for free communication to users, if possible, of minimum universal traffic information linked to road safety
ITS Directive Priority Areas covered	III ITS road safety and security applications
EasyWay Operating Environments covered	T4: motorway (link), seasonal or daily flow related traffic impact, potential safety concerns

Summary:

In a winding road with a huge traffic level, high travel speed and more or less 45 tunnels, the AID system and the control of VMSs can be very effective to improve reaction time of the TCC crew. A strong and well-designed monitoring system allows to give the TCC operators, constantly and in real-time, the complete view and control of the motorway situation and consequently to inform the road users.

Key impacts/ benefits:

Through the implementation of new TVCC stations in the most of A6 tunnels, it is possible to monitor and cover the whole tunnel length, in terms of incident detection and hazardous situations. With the aid of traffic sensors and the Traffic Control Center it is possible to prevent or activate procedures in case of alert in order to improve safety for the users and for the workers. Therefore, the benefits for the project:

- Improving road Safety
- Network efficiency and congestion.

Project 2 title: Equipment for traffic management and control

Project location: Italy, A12 motorway Sestri Levante-Livorno, including A11/A12 branch Viareggio-Lucca

Project duration (year)	**2014 – 2015**
Budget and funding	€ 2.700.000 (co-funding 20%)
ITS Priority Actions covered	c) Data and procedures for the provision, where possible, of road safety related minimum universal traffic information free of charge to users
ITS Directive Priority Areas covered	II) Continuity of traffic and freight management ITS services III) ITS road safety and security applications
EasyWay Operating Environments covered	T4: motorway (link), seasonal or daily flow related traffic impact, potential safety concerns

Summary:

As traffic volumes are growing, it is getting more complicated for the TCC to manage particular events, as slowdowns and traffic jams. They can be planned events, such as road works or unforeseen events, such as incidents or extreme weather phenomena, or slowdowns due to recurrent traffic peaks (holiday time or daily rush hours). Often these situations are also caused by poor or not updated reporting to the users, who therefore do not have the correct information to decide to leave the motorway on alternative routes; furthermore, the lack of timely information to road users increases the probability of incidents, both secondary and main incidents.

Key impacts/ benefits:

The new equipment, installed along the whole motorway, make possible a relevant upgrade of the traffic flow monitoring; sending data directly to the Traffic Control Center, it can identify, analyze and process these data for a better management of flow, dispatching user information through all possible channels and information devices. Therefore, the benefits for the project:

- Optimal use of road traffic and travel data
- Improve road Safety

7.2.7. BULGARIA

Project	ITS priority Action covered	ITS Directive Priority Area covered	Easyway Operating environments covered	Key benefits
'Regional Development, 2007 - 2013'.	I	B and C	C1	modernize the manual traffic count
'Transport, 2007 - 2013'	I and II	B and C	C1	to expand the scope of public road network, where monitoring and automated collection of traffic data takes place and to integrate it in the operating Automat-ed traffic data collection system
'Preparing the Road Infrastructure Agency for the implementation of road projects in the programming period 2014-2020	I and II	B and C		Improving the efficiency of the collection and processing of traffic data on the national road network'

EU EIP European ITS Platform