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Utilising ITS for NRAs

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Authors

This report was compiled by **CEDR task group N7 (ITS).**
Task group leader and main author: **Risto Kulmala (Finland)**
With contributions from the following countries and organisations:

Country	Contributor	Organisation
Austria	Manfred Harrer Dieter Hintenaus	ASFiNAG Autobahnen- und Schnellstrassen-Finanzierungs- Aktiengesellschaft
Belgium	Kristof Rombaut	Flemish Road Agency
Denmark	Claus Lund Andersen	Danish Road Directorate
Estonia	Tanel Jairus	Estonian Road Administration
Finland	Risto Kulmala (Chair) Pirkko Rämä	Finnish Transport Agency VTT Technical Research Centre of Finland Ltd
Germany	Torsten Geissler	BASt, the Federal Highway Research Institute
Greece	Kostas Papadimitriou	Ministry of Transport and Infrastructure
Netherlands	Frans op de Beek Hans van Saan Henk Schuurman Serge van Dam	Rijkswaterstaat
Norway	Jacob Trondsen Cathrine Ruud	Norwegian Public Roads Administration
Poland	Andrzej Kobuszewski	GDDKiA, Generalna Dyrekcja Dróg Krajowych i Autostrad
Sweden	Clas Roberg	Trafikverket
United Kingdom	Ian Thompson Joanna White David Cowell	Highways England
	Boris Ly	CEREMA (National Centre For Studies and Expertise on Risks, Environment, Mobility, and Urban and Country planning, France)
	Odile Arbeit de Chalendar	IFSTTAR (French institute of science and technology for transport, spatial planning, development and networks)
	Henk Jansma Marjolein Masclee	DATEX II

Executive Summary

This report outlines the main achievements and conclusions of CEDR task group N7 (ITS for NRAs, TG N7) during CEDR's Strategic Plan 3 (SP3) 2013–2017.

The group has reached all of its objectives, including that of acting as CEDR's strategic eyes and ears in the field of ITS, focusing on key European actions and initiatives that are relevant to national road authorities (NRAs). The group discussed important issues—sometimes in great detail—with relevant stakeholders and organisations, provided strategic assistance to CEDR and advice on recommended positions and actions. It liaised closely with the European Commission (EC) at the appropriate levels, monitored activities relating to the ITS Action Plan and Directive and identified NRA concerns about and elaborated common views on the implementation of the ITS Action Plan and Directive. It also provided high-quality input to the EC's ITS decision-making processes and discussed ITS with other CEDR task groups, supporting the utilisation of ITS.

In addition to its cooperation with the EC, the group cooperated with key European ITS projects with road operator emphasis: the iMobility Forum, the DATEX project and community, TISA, ERTICO taskforces and platforms, as well as the cooperative ITS (C-ITS)-related Amsterdam Group initiated by CEDR.

The work included participation in and support for the preparation and national implementation of EC delegated acts for EU-wide multimodal travel information and planning services, real-time traffic information services, road safety-related minimum universal traffic information, and intelligent truck parking information and reservation.

The importance of road vehicle connectivity and cooperative ITS grew even more strongly than expected during the life span of the group. This growth was heavily influenced by the C-ITS Platform set up by the EC. This meant that the group spent a lot of time monitoring, discussing, and influencing the connected and cooperative ITS landscape because developments and deployment have a major impact on the NRA core business of network operation, requiring new forms of cooperation with external stakeholders while providing new and more effective tools.

An even more substantial development that impacted strongly on the evolution of ITS was caused by rapid advances in the field of road vehicle automation. The group spent an increasing amount of time discussing the facilitation of automated driving in an attempt to understand the needs relating to higher levels of automation, the role of NRAs, and the implications for them.

The main conclusion of the group's work is that CEDR needs to be proactive in the rapid development of ITS, especially in the field of connected and automated transport. This is essential as ongoing fast developments have a profound effect on NRAs, and it is only by being active that CEDR and NRAs can promote their own interests and ensure that both road users and NRAs benefit from these developments. Some authorities will have a more active role than others, benefiting from learning by experience, but also sharing such benefits through cooperation within CEDR. There is a clear need for close cooperation and balanced partnerships among NRAs globally, with the industry and service providers in close liaison with the EC and with other activities within CEDR. It is also clear that emerging issues in activities in turbulent areas (such as ITS) should be tackled urgently by the best NRA experts available (not necessarily those appointed to a CEDR working group).

Contents

Abbreviations

Abbreviation	Definition
AP2017–2019	CEDR's Action Plan for the period 2017–2019, succeeds SP3
ASECAP	European Association of Operators of Toll Road Infrastructures
CACC	Cooperative Adaptive Cruise Control
CEF	Connecting Europe Facility
CEN	European Committee for Standardization
C-ITS	Cooperative Intelligent Transport System
DATEX	Standard for information exchange
DATEX II	CEN standard for the exchange of dynamic traffic information,
DG MOVE	Directorate General Mobility and Transport at the European Commission
EB	CEDR Executive Board
EC	European Commission
ECo-AT	European Corridor – Austrian Testbed for Cooperative Systems
EIP, EIP+, EU EIP	European ITS Platform projects
ERA-NET	European Research Area Network
ERTICO	ITS Europe, a European association for cooperation among relevant stakeholders for the development and deployment of ITS in Europe
ETSI ITS	European Telecommunications Standards Institute
EU	European Union
FEHRL	Forum of European national Highway Research Laboratories
GB	CEDR Governing Board
ICT	Information and Communication Technologies
INEA	Innovation & Networks Executive Agency
INSPIRE	Infrastructure for Spatial Information in Europe
ITS	Intelligent Transport System
KPI	key performance indicators
LKAS	Lane Keeping Assistance Systems
MaaS	Mobility as a Service
MS	EU Member State
NRA	National Road Authority
OJEU	Official Journal of the European Union
POLIS	European Cities and Regions Networking for Innovative Transport Solutions
RTTI	real time traffic information services
SAE	Society of Automotive Engineers
SLA	Service Level Agreement
SP	A CEDR strategic plan
SP2	CEDR's second strategic plan (2009–2013)
SP3	CEDR's third strategic plan (2013–2017)
SRTI	Road safety related minimum universal traffic information free of charge to users
TCC	Traffic Control Centre
TEN-T	Trans European Network – Transport
TG	CEDR task group

TG N7	CEDR task group N7 (ITS for NRAs)
TISA	Traveller Information Services Association
TM2.0	Traffic Management 2.0 (ERTICO Platform)
TMC, TPEG	Traffic Message Channel, Transport Protocol Expert Group (ISO standard) for information provision to end users, Traffic information coding format
TN-ITS	Transport Network- ITS Spatial Data Deployment Platform
WG	working group
WIKI ITS	Online forum for MS experts to exchange experiences

1   Vision and communications plan

The vision of CEDR task group N7 (ITS for NRAs, TG N7) was to use members' knowledge and expertise to advise CEDR and national road authorities (NRAs), to engage and influence major stakeholders, and to aid strategic planning and decision-making for ITS now and in the future.

The task group sought to deliver this vision through:
- shared knowledge,
- collaboration,
- engagement, and
- influence.

By considering the ITS horizon, we aimed to deliver sustainable solutions to improve the mobility of people and goods, which will benefit society in the future and support long-term economic growth. The group sought to advise the EB/GB, other TGs, and NRAs on the strategic choice and implementation of ITS solutions, bringing into focus:
- ITS development,
- European and national ITS policy,
- opportunities and risks, and
- the deployment of ITS, such as the implementation of multi-modal solutions.

To help TG N7 manage and direct effective communications with internal and external stakeholders of the CEDR project, a communications plan was developed, setting out a framework for communication at all levels.

The purpose of this plan was to ensure:
- controlled communications (communication happens in the right way),
- consistent communications (provision of accurate, coherent messages),
- communication with the appropriate audience (sending the right message to the right organisation or set of individuals).

The goal of this communications plan was to:
- improve visibility and understanding of the purpose of TG N7;
- increase buy-in from internal and external stakeholders, leading to improved feedback and engagement;
- improve decision-making;
- increase the influence and involvement of CEDR in the ITS community;
- improve the take-up of CEDR deliverables/products.

The next steps were to review the communications of TG N7 to identify which methods of communication are being adopted and to revisit the communications plan to determine whether there are any gaps in communications that should be closed by the group. TG N7 also wanted to make sure that the outcomes identified above were being met by the group's improved communications.

The tasks of TG N7 were:

- to be CEDR's strategic eyes and ears in the ITS arena, focusing on key European actions and initiatives that are relevant for NRAs, discussing important issues—sometimes in great detail—with the relevant stakeholders and organisations (e.g. ITS standardisation bodies, industry fora …);
- to provide strategic assistance to the EB and GB on ITS-related matters, including advice on recommended position-taking and actions;
- to establish and maintain close links with the EC at the appropriate levels;
- to identify the concerns of NRAs relating to the EU ITS Action Plan and Directive;
- to monitor the progress of the implementation of the ITS Directive and elaborate common views,
- where relevant, to support and provide high-quality input to the EC decision-making process for ITS:
  a) how to optimise the flow of traffic, taking into account safety and environment concerns (role of ITS);
  b) monitor the progress of implementation of the ITS Directive;
  c) provide input and support for the CEDR representative in the ITS Advisory Group (timing partially dependent on the EC agenda)
- to discuss ITS with other task groups in CEDR SP3,
- to support the utilisation of ITS by these task groups.

2 Intelligent Transport Systems (ITS) position paper

ITS provides national road authorities (NRAs) with valuable tools for enhancing their core business of network operation, improving service to their customers, and reaching their policy objectives. In order to maximise the benefits of ITS by providing seamless continuity of ITS services across European borders and to set up European ITS markets, the European Commission (EC) initiated the EU ITS Action Plan and Directive. The ITS Action Plan and Directive have focused the interest of NRAs and other stakeholders on a number of priority services. CEDR and NRAs need to have a strategic view on and vision for these priority services in order to be able to act as a trusted partner for other stakeholders, including the EC. The same applies to the key European fora within the development and deployment of ITS.

The transversal task group N7 (ITS for NRAs) acted as the eyes and ears of CEDR in the field of ITS and provided advice and guidance to both CEDR's Governing and Executive Boards (GB and EB), other task groups, and NRAs on issues relating to ITS. For this reason, TG N7 produced a position paper highlighting CEDR's position on the six priority services of the ITS Directive, Cooperative ITS, and the key European ITS fora. TG N7 finalised the CEDR and NRA position paper on Intelligent Transport Systems (ITS) based on the successful EB workshop in Tallinn in March 2014.

The position paper is included as an annex to this final report.

3 EU ITS Action Plan and Directive

3.1 Priority actions

CEDR has been working actively on issues relating to the EU ITS Action Plan and Directive, compiling and providing the common views of NRAs, so that they can, for example, be used by the CEDR representative in the European ITS Advisory Group. In most cases, this work was done by gathering comments by e-mail. A draft CEDR view was then prepared by the coordinator assigned to each of the priority actions. In the most important cases, telephone conferences were arranged to discuss the issues.

3.1.1 Multimodal travel information and planning services

Within ITS Action Plan priority area 1 (Optimal use of road, traffic and travel data), the priority action (a), 'Provision of EU-wide multimodal travel information services', was selected by the EC.

The work was to define necessary requirements to make EU-wide multimodal travel information accurate and available across borders to users, based on:
- the availability and accessibility of existing and accurate road and real-time traffic and travel data used for multimodal travel information for ITS services, without prejudice to the restrictions relating to road safety and traffic management;
- the facilitation of the data exchanges between the relevant public authorities, stakeholders, and the relevant ITS services across borders;
- the timely updating of available road and traffic data used for multimodal travel information by the relevant public authorities and operators;
- the fast updating of multimodal travel information by the suppliers of ITS services.

Following a first study 'Towards a European multimodal journey planner'[1] in 2011 and the first-of-a-kind 'Smart Mobility Challenge' in 2011–2012[2], the EC has since 2013 invited stakeholders to a number of workshops/hearings to discuss the scope of a broad initiative on access and availability of multimodal travel and traffic data in the EU, completed by two online public consultations on 'Enablers for European multimodal travel planning and information services'[3] and 'Access to multimodal traffic and travel data in the European Union'[4] to which CEDR responded. CEDR has been active and participated in the various events organised by the EC. It has, therefore, been able to influence forthcoming EC proposals. This initiative is quite comprehensive and also includes the development of specifications for EU-wide multimodal travel information services (as priority action (a) of the ITS Directive), the funding of R&I projects, and possible standardisation activities.

The EC produced a working document 'Towards a roadmap for delivering EU-wide multimodal travel information, planning and ticketing services' in June 2014[5], describing the major challenges, possible solutions, and its own instruments for accelerating the deployment of such

[1] http://ec.europa.eu/transport/themes/its/studies/doc/2011_09-multimodal-journey-planner.pdf
[2] http://ec.europa.eu/transport/its/multimodal-planners/index_en.htm
[3] http://ec.europa.eu/transport/media/consultations/2013-03-12-mtpis_en.htm
[4] http://ec.europa.eu/transport/media/consultations/2013-accesstraveldata_en.htm
[5] http://ec.europa.eu/transport/themes/its/doc/swd(2014)194.pdf

services. The first expert meetings for the preparation of specifications for a delegated act were held in late 2014. The delegated act is expected to be ready by early 2017.

Eleven expert meetings took place between 18 November 2014 and 18 March 2016. CEDR was represented at all these expert meetings. Experts from the European Parliament also participated in these meetings. The meetings focused on discussing the findings of the key deliverables of the supporting study and stakeholder consultation. In this context, the experts played a key role by helping the consultant develop the baseline narrative and providing input for the key deliverables and participating in the various stakeholder consultation activities. A number of topics were discussed in the expert meetings, including: appropriate measures to access and exchange travel and traffic data, the scope of travel and traffic data, the roles of public and private actors along the travel information value chain, the geographical scope of the specifications, the conditions for data re-use and the role and suitability of distributed journey planning by linking travel information services and relevant terms and conditions between those service providers. CEDR provided a position paper for the public consultation and attended the stakeholder workshop that took place on 4 November 2015.

An inter-service consultation and translation was ongoing in the autumn of 2016. After that the consultation of the ITS Advisory Group took place. The last thing that happens before the final decision on the specification is the consultation period (2 to 4 months).

3.1.2   EU-wide real-time traffic information services (RTTI)

According to the ITS Directive, the specifications for priority action (b) should cover 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.

In order to reach this goal within the EC schedule, several meetings were held between the EC and MS experts. The content of these and the meetings below are given in Annex 3.

In parallel, the EC informed MS representatives in the regular European ITS Committee meetings. These discussions dealt with a number of topics, including the geographical scope of the services (interoperability across the EU only on the TEN-T or on the whole interurban network or also in urban areas), the promotion of the cooperation between the public sector (which generally collects data) and the private sector (which generally processes data and provides services), finding the right balance between achieving public policy goals, societal benefits, and the need to promote innovation and preserve competition in the sector, and ownership and re-use conditions of probe data generated by vehicles.

The main objective of the delegated act has been identified as establishing appropriate enabling framework conditions to promote the provision of accurate, reliable, and content-rich real time traffic information services. The specifications should be seen as part of a toolbox of measures available at EU level including R&D activities under Horizon 2020 and financial support for deployment under the Connecting Europe Facility. The specifications are clearly not meant to mandate deployment.

The delegated regulation was first adopted on 18 December 2014 under the ITS Directive. The European Data Protection Supervisor submitted its formal approval on 21 January 2015. Afterwards, DG Translation drew attention to a problem of misinterpretation in various linguistic versions due to the inappropriate use of the term 'namely' in the original English version of the Annex on data categories accompanying the delegated Regulation. This entailed a new inter-service consultation, the re-launch of the written procedure and a new 2-month period of examination for the Council & the European Parliament. In the meantime, the publication of the delegated Regulation in the OJEU (as adopted on 18 December 2014) was put on ice. Ultimately, the revised versions in all EU languages were submitted to the Council and the European Parliament on 17 April 2015. The examination period should end on 17 June 2015.

The EC held a follow-up expert meeting on 7 May 2015. The purpose of this meeting was to share information/best practice and discuss how to facilitate the implementation of RTTI specifications across Europe. Such sharing of best practice and facilitation could, for example, take the form of a guidance document shared via WIKI ITS, the setting up of MS meetings/working groups on common specific issues, EU funding, studies, standardisation activities. The afternoon was dedicated to the implementation of RTTI in urban areas. Urban ITS experts selected within the framework of the European project Capital Civitas and some POLIS members joined the group of MS experts. Several topics had been identified for discussion with a view to sharing experience and paving the way forward (i.e. finding solutions that would enable/ease the implementation of RTTI in practice). These topics included:
- metadata (scope and harmonisation),
- concession contracts, and
- geographical scope (road networks).

The delegated Regulation (EU) 962/2015 of 18 December 2014 was published in the OJEU on 23 June 2015. It entered into force on 13 July 2016. There is a 2-year transitional period for implementation. The delegated regulation is available here:
http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32015R0962

The EC held a follow-up expert meeting on 30 June 2015:
The workshop was organised at the request of Member States experts during the follow up meeting of 7 May 2015. As agreed, TEN-T ITS corridor coordinators and EIP/EIP+ partners were invited too. The purpose of the meeting was to share information/best practice and to discuss how to achieve metadata harmonisation for RTTI. This should contribute to the interoperability of national access points across Member States. Against this background, some Member State experts were invited to share their experience/initial thoughts regarding metadata for RTTI, while the EIP/EIP+ sub-activity on single point of access (SPA) presented preliminary results on metadata harmonisation. Colleagues from the Commission's Joint Research Centre also came to explain the INSPIRE approach to metadata/data catalogues. Austria, Germany, and the Netherlands agreed to continue working on a metadata prototype (incl. clear definitions) and agreed to have a finalised proposal by the end of September 2015, which was then shared with

more Member States notably through EIP+. DG MOVE encouraged Member States to participate in the EIP+ survey (the questionnaire was circulated to Member States experts) and expected EIP+ to build upon the outcomes of the work done by Austria, Germany, and the Netherlands. The conclusions of this collective work were presented to the ITS Committee towards the end of 2015. Following endorsement of the ITS Committee, these conclusions on a harmonised concept for national points of access for RTTI incl. associated metadata served as guidelines supporting the implementation of delegated Regulation (EU) 962/2015.

3.1.3   Road safety-related minimum universal traffic information free of charge to users (SRTI)

According to the ITS Directive, the specifications for priority action (c) should cover 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 integration of 'universal traffic messages' into ITS services for real-time traffic and multimodal travel information.

After several expert meetings and European ITS Committee meetings organised by the EC, the specifications (c) on SRTI were adopted on 15 May 2013 under Directive 2010/40/EU ('ITS Directive') and published in the OJEU on 18 September 2013. The delegated regulation is available here:
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32013R0886:EN:NOT

On 11 October 2013, the EC organised a follow-up meeting with MS experts with the aim of sharing experience, exchanging best practice, identifying opportunities for MS collaboration, discussing remaining issues, and clarifying interpretation. The following issues in particular were discussed: the role of broadcasters, coding formats (e.g. TMC, TPEG, and DATEX), and monitoring technologies. The EC concluded that:
- Several parallel initiatives could contribute to the implementation of the delegated Regulation, e.g. the iMobility forum (various WGs), the TISA WG on the ITS Directive (e.g. coding standards, harmonisation of presentation), the European ITS Platform (e.g. methodological activities on access points, data and information quality, VMS harmonisation, DATEX II development).
- The EC should support deployment through the upcoming TEN-T Call 2013 and the Connecting Europe Facility from 2014 onwards, complemented by R&D through Horizon 2020.
- There is a need for clarification on two things: firstly, the independence of national bodies assessing compliance and, secondly, national access points.
- There is a need for a solution with respect to the role of broadcasters.
- Elaboration of frequently asked questions on road safety related traffic information
- Investigation if/how to set up a 'wiki'/online forum enabling the sharing of experiences among MS experts and easy dissemination of documents.

On 15 October 2014, the EC held a follow-up MS expert meeting for priority action (c) of the ITS Directive to look into the operational implementation of these specifications.
The meeting provided an overview of the (preparation of the) implementation of these specifications in the MS as well as national contributions, presenting national cost-benefit

analyses and experiences so far with the assessment of compliance, stakeholders forum, and data sharing.

On 30 June 2016, DG MOVE organised a follow-up expert meeting on the following topics:
- the approach and progress of setting up the single access point;
- designation of an impartial and independent national body;
- procedures for assessment of compliance;
- validation of self-declarations;
- areas in which further cooperation with EC/DG MOVE is needed, (definitions, e.g. data quality, metadata, operational implementation);
- how to engage third parties and the role of data/service providers.

DG MOVE reached the following conclusions:
- DG MOVE stressed the Member States' reporting obligations regarding the Directive and Specifications and referred to the fact that the Commission can only fulfil its obligation to report to the European Parliament and Council if it has national reports.
- DG MOVE promoted further harmonisation of self-declarations while ensuring coordination at EU level.
- DG MOVE, together with the front-running Member States, drafted the general terms for a harmonised declaration, while conducting a cross reference on the currently used self-declarations across Member States.
- The DATEX profiling exercise, according to action (c), was expected to finish by November 2016 in the Crocodile Project. Member States will discuss its adoption at the next expert meeting to be held in March 2017.
- Member States using the Metadata Catalogue should provide further feedback on the progress made, while Member States not using it would conduct a cross reference with the other metadata being used.
- INEA and EIP will follow up on the prioritisation of a quality framework for action (c), in order to provide input for the workshop in September.

3.1.4   Intelligent truck parking information and reservation

According to the ITS Directive, the specifications for priority action (e) 'the provision of information services for safe and secure parking places for trucks and commercial vehicles' should cover 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 to users of road parking information,
- the facilitation of the exchange of electronic data between road parking sites, centres, and vehicles.

After several expert meetings and European ITS Committee meetings organised by the EC, the specifications (e) were adopted on 15 May 2013 under Directive 2010/40/EU ('ITS Directive') and published in the OJEU on 18 September 2013. The delegated regulation is available here:
http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0885&from=EN

On 17 January 2014, the EC organised a workshop as a follow-up meeting to facilitate the preparation of the implementation of the specifications for priority action (e). The following items were discussed at the meeting:

- best practice exchanges on the provision of information services;
- available complementary surveys on parking information or analysis results;
- a round table on common concerns and steps taken so far;
- European point of access and harmonised description of static data on parking areas (a proposal for a description for security and services equipment was circulated before the meeting);
- the clarification of questions arising during the meeting (e.g. assessment of compliance). A list of frequently asked questions is available on a dedicated wiki for actions (c) and (e).

Since then, the Commission has finalised the development and establishment of an EU access point for truck parking (static data). The European access point offers the possibility to register and manage static information data on safe and secure parking places. The information can also be re-used by service providers to develop apps for guiding truck drivers. The EC has also set-up an online forum (the 'WIK-ITS') that will allow MS experts to exchange experience and raise issues among themselves.

3.2   Connected vehicles

3.2.1   Introduction

Cloud-based ITS solutions connect vehicles and mobile devices with computing resources via the Internet. Cloud services can be driven by automobile manufacturers as a basis for a 'connected vehicle' concept. Telematics services providers offer cloud services to road operators, ranging from data delivery to complete traffic management applications. NRAs provide traffic-related data to their National Access Points, which in most cases are a public cloud environment. It is currently unclear how the universe of ITS cloud services will develop. In any case, there will be more than one cloud, and cooperation between cloud services is vital in order to make the most out of the data provided by different stakeholders.

Cloud-based Intelligent Transportation Systems are systems in which road users and road operators (or service providers in general) are connected via Internet to shared computing and storage resources that provide services relating to traffic information and traffic management, which allow transport networks to be used in a safer, more efficient, and more convenient way. Cloud services are the backbone of many smartphone applications in ITS and for connected vehicles. Many automobile manufacturers drive their own cloud services for connected vehicles. While they strive for product differentiation and CRM applications, which are an aspect for a private cloud environment, road operators try to distribute traffic information to as many road users as possible, which means openness to information-sharing, especially for safety-related messages.

3.2.2   Needs for information exchange

In traffic management, the expected benefit of cloud services (especially for connected vehicles) is the facilitation of the exchange of information between the road user and road operator. Road

operators typically have the mandate to inform road users about traffic events, roadworks, and incidents; their main need is to reach out to road users. The ability to bring this information directly into vehicles is a big advantage and paves the way for automated driving if in-vehicle information can be processed by the vehicle's on-board systems in an automatic way. When it comes to traffic-related information, traditional data silos, as shown in Figure 1, could be turned into hubs. Cloud services can help connect the different data sources due to their ability to pool computing and communication resources independent of location.
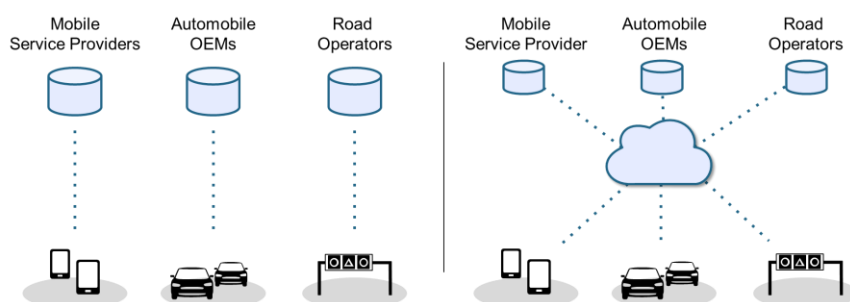

Figure 1: Data silos vs. central data hub

3.2.3 Connecting clouds

An important question, not only for road operators, is how cloud services will be interconnected. Does a road operator have to connect to all vehicle manufacturer clouds in order to reach all road users equally? Do vehicle manufacturer clouds have to connect to the systems of all road operators in order to obtain traffic information? A central ITS cloud could act as a data hub, connecting private clouds and databases and their specific interfaces (see Figure 2). This offers advantages when translating between interfaces and reduces complexity compared with bilateral connections. However, it is still unclear who would operate such a central cloud. The central data hub can also be implemented as an interchange node, as done in the NordicWay project. In NordicWay, the national road operators are connected via their national clouds to an interchange node sharing traffic safety-related data and messages with the vehicle manufacturer and service provider clouds, which are also connected to the same interchange node. Financial aspects, SLAs, and preferences for strategic partnerships will determine which cloud topology (bilateral connections vs. central data hub) will emerge in the future.
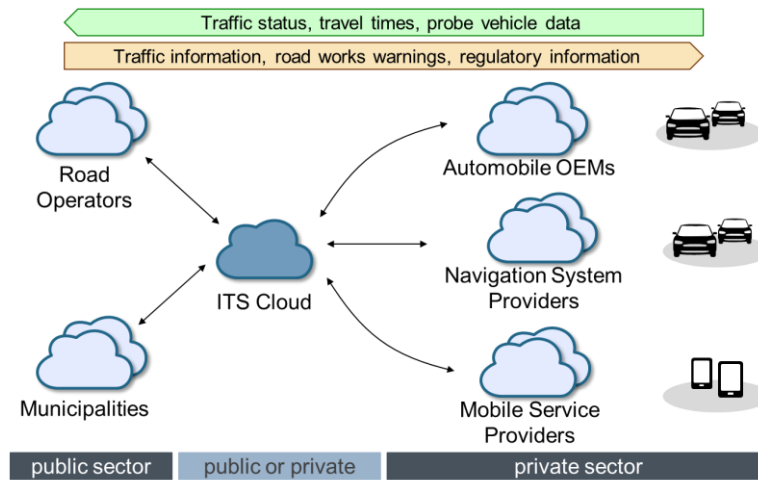
Figure 2: A central ITS cloud acting as a data hub for connected clouds

External cloud services for connected vehicles are information channels to road users and data sources. Figure 3 shows how single vehicles and road operators' detectors can jointly provide incident information. On the basis of this information, traffic management can decide to warn all drivers and set a speed limit. These cloud services need to be assessed in terms of their cost-benefit ratio for the road operator, ideally in pilot projects, where systems and interfaces are specified and tested. In this regard, seeking cooperation with relevant stakeholders and setting standards early is an investment in the future, since the importance of cloud services cannot be neglected.
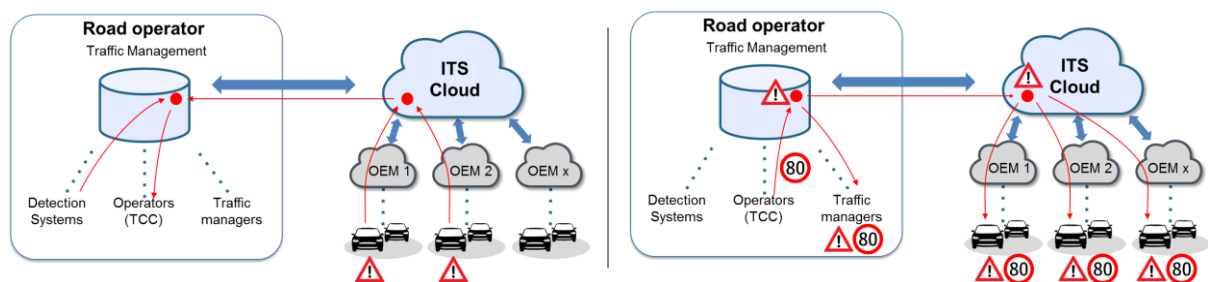
Figure 3: Example of message propagation in connected clouds

3.2.4   Requirements and recommendations

Certain requirements are important when introducing and connecting cloud services; the road operator's data management system should be set up with the following requirements in mind:

Organisational requirements
- Agreements on service levels, data quality, and accountability are needed.
- Agreements on data usage (conditions of use): a common framework could help avoid complex legal implications when combining data from different sources. It is also likely that the agreements will depend on data type—safety-related information is a likely candidate for

open sharing, whereas data providing navigation guidance or driver comfort are less likely ones.

- Openness to different cooperation models is desirable.

Interface requirements
- The use of standardised interfaces is vital for interoperability. Key criteria for interfaces are flexibility, extensibility, and expressiveness. For example, a data exchange infrastructure between public authorities, road administrations, and traffic information service providers based on DATEX II [1] has been specified in the Crocodile project [2]. In the NordicWay project, an interchange node was established between public and private clouds utilising the DATEX II and AMQP standards.
- If data translation is necessary, translation rules (mapping tables) must be thoroughly defined. For example, a comprehensive mapping of data elements from a DATEX II interface of the traffic management centre to an ETSI ITS [4] interface of the vehicles is given in the ECo-AT specification [3].
- Data semantics must be understood by all stakeholders. This should not be underestimated.
- Once the connection to cloud services becomes essential for reaching road users, internal processes and data representations should be aligned with external interfaces.
- Processing and communication delays have to be considered when selecting protocols.

Data quality and performance requirements
- Original data sources should have specified quality criteria (e.g. accuracy of sensors). This can often be attached to the actual value as meta-data (e.g. location information and location accuracy).
- Data collection methods and aggregation algorithms should ideally be specified and known to all data consumers, although this seems to be doubtful as far as private service providers are concerned. Aggregated data should be annotated with statistical properties (e.g. quantity of included measurements, deviations).
- Data aggregation and merging from multiple data sources should be carefully defined. In those cases where road operators have high-quality data about their road network (e.g. if they provide regulatory information such as speed limits), it is important that this data is not altered in a merging process. If multiple sources provide redundant data, an alternative to data-merging and fusion is to select a primary source and use secondary sources for consistency checks.
- Data quality needs to be monitored. This is essential in a multi-source environment, where the degradation of a single data source can cause a degradation of data quality in the overall system. Data quality is a key differentiation criterion.

3.2.5   Conclusion

Cloud services are important for reaching out to connected vehicles. In this context, road operators are not only data consumers, they also provide significant information (e.g. VMS status, road and lane closures, lane information in road works, parking information). Cooperation with other stakeholders from the automobile industry, map and navigation service providers, etc. are vital, especially for specification and testing. When connecting cloud services, road operators should support standardised interfaces and prepare their internal processes and data models to support data exchange, in order to be ready for the era of connected and automated vehicles.

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3.3   Cooperative ITS

Cooperative ITS involves many stakeholders, including NRAs and road operators (incl. their suppliers), the automotive and telecom industries, and service providers. Priority C-ITS services are safety oriented and make traffic management more efficient and more reliable. Fixed and mobile roadside infrastructure for C-ITS services will be deployed mostly on roads related to TEN-T roads, where critical sections are involved or traffic is dense. Additional road network coverage will rely on utilising cellular networks for vehicle–infrastructure communications. While in the infant days of C-ITS deployment, vehicle fleet penetration is not yet high enough (critical mass), in subsequent phases, NRAs and road operators can harvest the benefits in order to improve traffic management and network operation.

At European level, Cooperative ITS (C-ITS) is related to the EC's ITS Action Plan Action Area 4 (Integration of the vehicle into the transport infrastructure). It represents an important forthcoming deployment initiative. DG MOVE uses a three-level-approach to prepare the framework for the deployment of C-ITS services:
- At policy level: the preparation of a Delegated Act for important elements of the common European policy framework began in May 2016. The Delegated Act aims to provide not only legal certainty on the common security and certificate policy, but also guidance on compliance assessment, the privacy framework, etc. Several actions identified by the C-ITS Masterplan (est. Q4/2016) will point towards the Delegated Act.
- The support level comprises the platform for the deployment of Cooperative ITS in Europe (C-ITS Platform).
- The success of the policy will be demonstrated by a flourishing implementation level. Pilots and deployment initiatives in more than ten Member States are co-financed by means of the Connecting Europe Facility (CEF).

The field of Cooperative ITS (C-ITS) has developed dynamically in the reporting period:
- First NRA-driven initiatives to deploy initial C-ITS services have been set up since 2013. Examples include the Cooperative ITS Corridor between the Netherlands, Germany, and Austria (MoU of Transport Ministers was signed on 10 June 2013) as well as SCOOP@F in France. Nordic Way involves pilot C-ITS deployment in Finland, Sweden, Norway, and Denmark. First initiatives have also been launched in the UK (UK CITE, A2/M2 Connected Vehicle Corridor), the Czech Republic (BaSIC, D5) and Hungary (M1 pilot). The results of the CEF Transport Call 2015 on ITS has boosted the number of Member States involved to nearly 15, now also including Belgium, Spain, and Slovenia. It was expected that the CEF Call 2016 (opening Q4/2016) would support further initiatives under formation.

- The National Highway Traffic Safety Administration (NHTSA) in the United States published an Advance Notice of Proposed Rulemaking (ANPRM) on 18 August 2014. Vehicle-to-vehicle communication capability (forming the technological basis for applications) would then be required for new passenger cars and light trucks. The Notice of Proposed Rulemaking is scheduled for 2016, but has not yet been published. It is expected that the underlying Federal Motor Carrier Safety Standard would lead to first mandated deployment between 2019 and 2021, reaching full penetration (supported by aftermarket) between 2022 and 2024.
- After finishing the Safety Pilot Model Deployment (Ann Arbor, MI, 2012–2014) the implementation level in the United States consists of the Connected Vehicle Pilot Deployment. In its first wave, three large-scale pilot deployment sites in different operating environments were supported: Wyoming, New York City, and Tampa.

TG N7 has provided strong support to the accelerated preparation of C-ITS deployment:
- CEDR has continued to chair the Amsterdam Group. On 16 May 2013, the CEDR GB mandated two CEDR representatives to act in the Amsterdam Group, one as chair of the initiative and one to mediate and coordinate the views and interests of CEDR members in the Amsterdam Group. Status reports from the Amsterdam Group were regularly provided for meetings of the CEDR Executive Board. For more information on the progress of the Amsterdam Group, see Chapter 5.4.
- The persons appointed by CEDR to the Amsterdam Group are also experts for the European C-ITS Platform. CEDR colleagues also act as Member State experts or deputies. In this way, it is possible to provide substantial advice and guidance within the working groups. CEDR looks at C-ITS deployment in a holistic way, including a smart mix of hybrid communication technologies (short range: ITS G5, long range: cellular communication), allowing for the provision of coherent traffic information to drivers (strategic routing information in the road network, tactical information on the spot). CEDR has followed and analysed recent developments, among other things within the ERTICO Task Force on communication technologies (Chapter 5.7) and in cooperation with TISA (Chapter 5.6). CEDR also joined the ERTICO TM2.0 platform initiative converging mobile traffic services with traffic management into an integrated mobility services and road network management paving the way for traffic management-aware vehicle interaction.
- As more and more NRA-driven initiatives prepare for deployment, the status update on deployment initiatives has formed a regular agenda item at TG N7 meetings, whereas more time was devoted in Amsterdam Group plenary meetings and workshops on C-ITS Deployment to covering the progress of the initiatives.

The next steps (including addressing recent challenges) are outlined below.
- C-ITS deployment involves several organisational and business-related issues such as privacy, security framework, ownership of data, parallel intellectual property rights, and quality of content. As deployment preparation advances, the challenges have to be addressed at the most suitable geographical level (European, national, or regional level).
- The discussion on the connected vehicle ecosystem has revealed that it is important for NRAs to monitor latest developments and to assess the implications for road authorities and road operators. This is an essential step in stakeholder alignment before exchanging views with the automotive industry and other deployment partners. Maintaining strong links to CEDR, the EU EIP study (chapter 5.2) contains an activity on Cooperative ITS which is suitably designed to take up this role.

4 Road vehicle automation

4.1 Connected and automated driving

4.1.1 Benefits of automated driving

Several benefits can be expected, especially from fully automated driving. The World Economic Forum, OECD International Transport Forum, and Fraunhofer have identified the main impacts, ranging from the decrease in individual mobility costs to the reduced need for parking spaces. Two factors relate to the main goals of road operators:

- Road safety: it is estimated that automated driving will reduce accidents by 70–95%. This tremendous gain in safety can be attributed to the elimination of human errors when the autopilot takes over.
- Traffic efficiency: the coordination of automated vehicles and platoons leads to better use of road capacity.
- The automation level for the introduction phase is expected to cover SAE Level 2–4 (partly to highly automated driving). Consequently, the benefits of the introduction phase will, to a great extent, be lower.
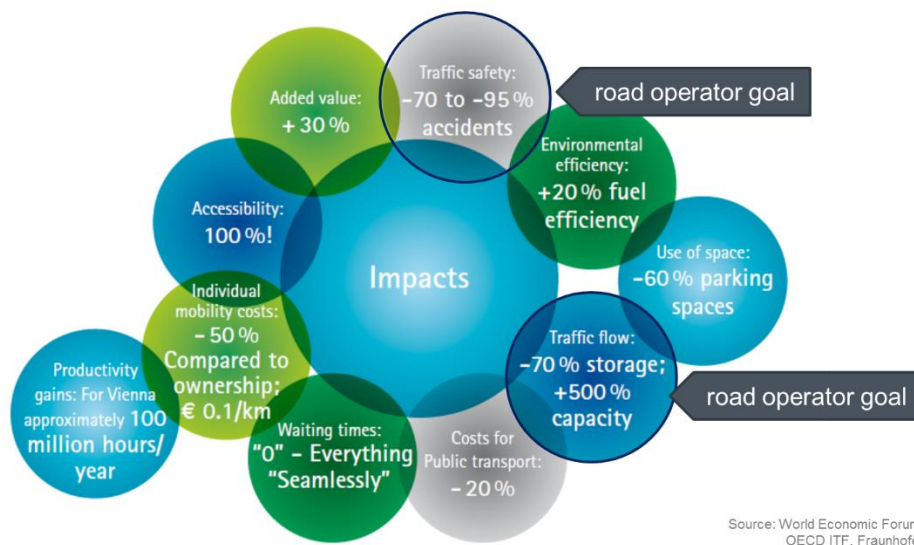
Figure 4: The benefits of automated driving for overall traffic

Individual drivers immediately see the changes when switching from a conventional to an automated vehicle. Road operators observe traffic as a whole, so changes in traffic flow will become apparent after a certain penetration of automated vehicles is reached. In the introduction phase, where conventional and automated vehicles share the road network, the overall traffic flow is not likely to benefit from automated driving. There is still some uncertainty as to how automated driving behaviour and human driving behaviour will co-exist and how mixed traffic can be managed from a road operator's point of view. Nevertheless, once a high degree of automation is reached, it is expected to be highly beneficial for traffic flow and safety.
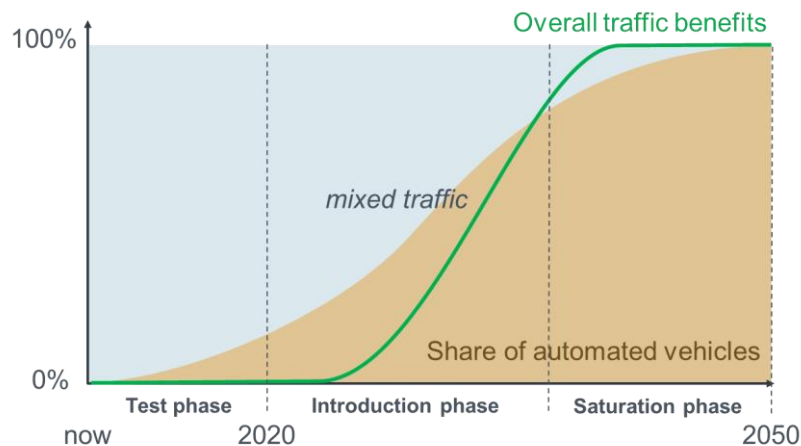
Figure 5: Relation between automation penetration and expected benefits

4.1.3 Automated driving: challenges

The greatest challenges for road operators and road authorities will be when there are different degrees of automation on their road networks:
- Are new traffic management strategies needed to manage mixed traffic with a rising share of automated vehicles?
- Are upgrades to the road infrastructure needed to connect traffic management processes to vehicles on the road (digitalisation, connectivity)?
- Are adaptations of legal frameworks (traffic regulations, vehicle regulations) needed?

Road operators can prepare their processes and systems for the change to automated vehicles in a number of areas. As processes and systems change, there is a clear need for a test phase before automated vehicles are broadly introduced on the market. This test phase ideally takes place within a framework that allows for collaborative testing in real traffic scenarios involving road operators and car manufacturers.

4.1.4 Benefits of the digital infrastructure

The digital infrastructure can provide certain information that is hard or expensive to obtain from an automated vehicle's on-board sensors alone. This way, the infrastructure can help reach higher degrees of automation without the need for expensive on-board sensing capabilities. The digital infrastructure supports the testing of automated vehicles by providing and collecting data on traffic and environment conditions, which is useful when planning, conducting, and documenting tests.

Figure 6: Examples of digital data collection and sharing

For example, automated vehicle manufacturers can use digital interfaces directly for real-time traffic information. This can be extended by further features such as event information from video detection or accurate maps that guide vehicles through roadworks with changed lane settings. The important enabler for such services is the interconnection between traffic management and vehicles.

4.1.5   Connectivity to automated vehicles

Nowadays, traffic information is sent to vehicles via radio, navigation systems, and smartphones. Traffic information is consumed by a vehicle's on-board systems and displayed to the driver, who in turn reacts to the information. In the case of an automated vehicle, the vehicle itself—rather than the driver—becomes part of the traffic control loop. Therefore, the communication requirements grow towards better coverage for seamless connectivity and the ability to deliver real-time information all the time. While the ICT industry delivers technology, road operators and vehicle manufacturers need to work on a better integration of interfaces between traffic management and connected vehicles. For example, future traffic management should be able to receive single-vehicle data in real time, to advise on speed and inter-vehicle gaps, and to assign lanes in order to optimise the overall traffic flow.
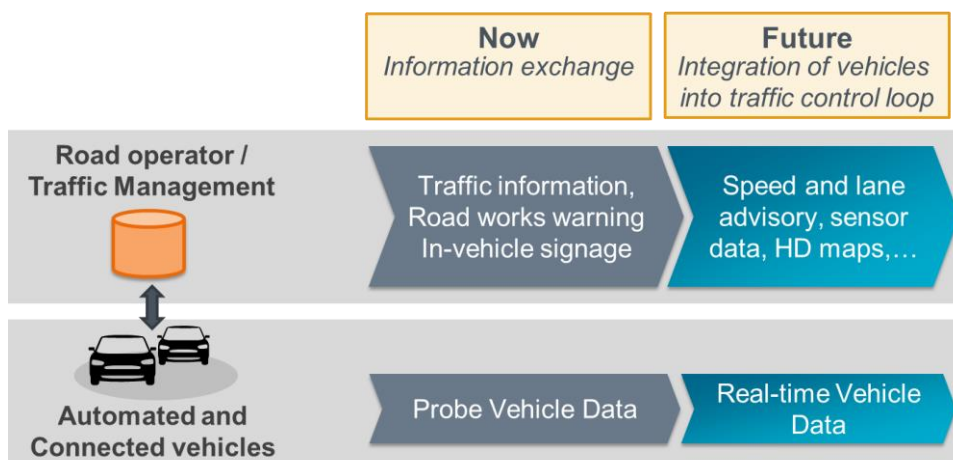
Figure 7: Expected change in the communication requirements for automated driving

The connectivity to automated vehicles can be realised via dedicated short-range communications and cellular networks. Both technologies have their specific advantages in technical, operational, and economical terms. For road operators, it is important not to exclude possibilities to reach certain road users. Special attention is needed for safety-related messages. The strategy is to support interfaces where cloud services can connect to the traffic management centre and deliver data to/from automated vehicles, and support a roadside infrastructure for cooperative systems.
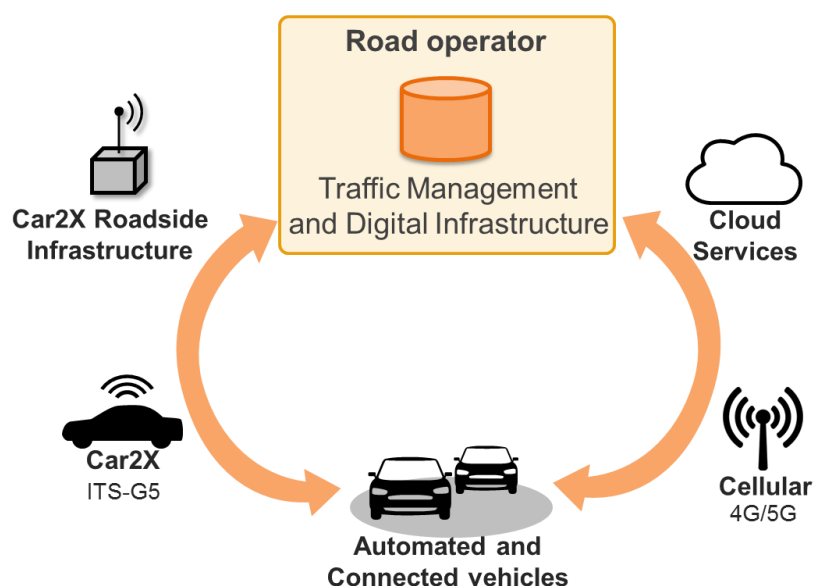
Figure 8: Short-range and cloud communication in automated driving

4.1.6 Conclusion

NRAs play a role in the testing and introduction of automated vehicles. Their main role is to develop the digital infrastructure to support the testing and introduction of automated vehicles in accordance with the European Action Plan for Automated Driving.

The digital infrastructure and connectivity are key enablers for managing mixed traffic, especially in the introduction phase of automated driving. Here, cooperation between automobile manufacturers and road operators is important, especially regarding the interconnection of infrastructure and vehicles. Connecting automated vehicles and traffic management is necessary to fully exploit the potential of automated driving in terms of road safety and traffic efficiency.

4.2 Truck platooning

In addition to other previous trials, an important step in truck platooning was the European truck platooning challenge 2016. Under the Dutch presidency of the Council of the EU, this challenge demonstrated the possibility of truck platooning on public roads on 6 April 2016.

Six countries and six vehicle manufacturers, other industries, and road authorities managed to put platoons on a highway with a distance of 0.8 seconds or 10 metres. The automation level was based on the basic standard SAE level 1 with cooperative adaptive cruise control (CACC) linking the platoons with WiFi, radar, and LIDAR.

The political umbrella for this challenge was the declaration of Amsterdam presented on 14–15 April 2016. It demonstrated for the first time the political willingness and priority attached to automated and connected mobility. The declaration was signed by the 28 European ministers of transport.

Other important components were:

a) The truck platooning challenge involved a large network of around 150 people and organisations from the automotive industry and supply industries as well as shippers, research institutes, and others. They share a common interest and knowledge in this field and progress in a harmonised way.

b) Potential impacts are being assessed, but further outcomes need to be investigated, including:
   1 traffic modelling and forecasting, in order to be able to make recommendations on traffic efficiency, vehicle behaviour, and lane management. Forecast calculation should also take place in order to calculate growing number of platoons over the years;
   2 the optimisation of platoons and the infrastructure for platoons;
   3 regulatory challenges and standards.

c) Removing administrative and legislative barriers was another important component of the truck platooning challenge. The strong involvement of CEDR members, local authorities, and the industry network started major joint work on the evaluation of the technical and administrative criteria to allow exemption from existing rules and regulations. Further legislation is needed so that both harmonisation and member states' mutual recognition of the special truck platoon demonstrated in the event can be achieved.

The next step in the European truck platooning challenge is a continuation of several demonstrations/trials and large scale cross-border challenge probably in 2018.

The continuation of the actual governance of the truck platooning challenge is ensured by
- a steering group comprising the 'six ambassadors' (ACEA[6], CLEPA[7], CEDR[8], EReg[9], ESC[10], IRU[11]);
- the existing network of participants, including six truck manufacturers (DAF, DAIMLER, IVECO, MAN, VOLVO), and NRAs;
- ERTICO taking over the secretariat from Rijkswaterstaat;

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[6] European Automobile Manufacturers Association
[7] European automotive suppliers association
[8] European Conference of Directors of Roads
[9] Association of European Vehicle and Driver Registration Authorities
[10] European Shippers Council
[11] world's road transport organisation

- a concrete action plan that is currently being elaborated and discussed.

Projects for the ART 03 Multibrand platooning call provide a major opportunity to continue large-scale testing on a multibrand basis.

Certain truck platooning challenges have already started or are ongoing in some countries. In the Netherlands, other organisations (such as AHOLD, Albert Heijn, and Jumbo) have joined the initiative. They will conduct extensive tests with the Dutch authorities, potentially including cross-border tests with Belgium-Flanders and on the basis of a regular logistics approach. In the UK, the platooning demonstration is focusing on road safety, vehicle safety, network operation and infrastructure, network management, fuel efficiency, carbon savings, driver behaviour, vehicle maintenance, commercial benefits, and economic benefits. In some other countries, legislation on automated driving is evolving.

Other automated trials are also being conducted. In Belgium, for example, an AON insurance initiative took place on the same basis as the Dutch initiative. Thirty semi-automated passenger (SAE level 1 to 2) cars drove in groups of five on highways and secondary roads. The vehicles in question were essentially commercially available vehicles with Adaptive Cruise Control (ACC) and Lane Keeping Assistance Systems (LKAS). The two focus areas were to observe both the dynamic behaviour of the vehicles in a 'platoon' and human factors.

4.3   CEDR position

CEDR has followed and discussed the activities relating to automated driving with the automobile industry, equipment providers, and other related stakeholders. The expectations of the other stakeholders with regard to NRAs were compiled in the spring of 2014. Such expectations included the existence of harmonised road markings and fixed as well as variable traffic signs, accurate location of roads and their infrastructure, capability for V2I communication, and the existence of good-quality real-time information on the status of the road network including traffic conditions, incidents etc., and prevailing traffic management plans. Legal aspects were discussed in part in the autumn of 2014, and a dedicated meeting on the topic was arranged for June 2015 to discuss NRA strategies and actions concerning automated driving up to 2020.

CEDR was also informed about FEHRL's plans for a US scanning tour on automated roads which took place between 7 and 12 December 2014. Representatives of several CEDR members (the German Federal Highway Research Institute (BASt), the Dutch Rijkswaterstaat and Danish Road Directorate) joined the tour, which included visits to institutions and laboratories in Washington DC and Michigan.

In April 2016, the European Transport Ministers issued a declaration on connected and automated driving, indicating strong EU and Member State support for the development and deployment of road vehicle automation. A week later, the CEDR Governing Board discussed road vehicle automation in a dedicated workshop facilitated by TG N7. This position paper on road vehicle automation, which is appended to this report, reflects the GB view based on that workshop. In doing so, this position paper complements the CEDR ITS Position Paper

The main messages of the road vehicle automation position paper are:
- Automation is already happening and is becoming increasingly important.

- CEDR supports the European Transport Ministers' Declaration of Amsterdam on connected and automated driving, and will work towards a common strategy for CEDR and NRAs.
- CEDR and NRAs need to act now since automation is disruptive, will affect NRAs' core business of network operation, and is developing very quickly. Moreover, it is only by being active CEDR that NRAs will be able to promote their interests and ensure that both travellers and road operators benefit from data.
- As all NRAs are not likely to act proactively, some NRAs need to take more active role than others, benefiting from 'learning by experience' using a rapid learning circle via piloting and test areas while exchanging experiences, sharing knowledge, and discussing common views on road vehicle automation among NRAs within the framework of CEDR cooperation.
- There is a need for strong public partnerships of NRAs across the world and of road operators across Europe. There is also a need for public-private cooperation with industry and service providers in the automotive, telecommunications, IT, mobility, and other relevant sectors in close liaison with the European Commission.
- It is important to agree on what is required of NRAs in the field of automated driving and set requirements that are optimal and realistic in terms of cost-benefits and cost-efficiency.

5 Cooperation with ITS stakeholders

5.1 European Commission

Because of the EU ITS Action Plan and Directive, the European Commission (EC) is a very important stakeholder for NRAs. This is why there has been cooperation with the EC at a number of levels and in a number of ways.

ITS was on the agenda at the meetings between the Director Generals of DG MOVE (Matthias Ruete, João Aguiar Machado, Henrik Hololei) and the CEDR Management Committee in 2013–2016.

TG N7 organised four bilateral meetings with DG MOVE's ITS Unit in late June/early July in 2013, 2014, 2015, and 2016. Current hot topics and the organisation of EC–CEDR cooperation were discussed at these meetings.

DG MOVE officers are on TG N7's mailing lists and are invited to all meetings. A DG MOVE officer participated in the first meeting held in Brussels, and to facilitate such participation one meeting each year was held in Brussels. Julie Raffaillac and Isabelle Vandoorne of DG MOVE have provided valuable feedback and input to TG N7 meetings even when they were not able to participate in person.

5.2 EIP projects

The EU EIP (European ITS Platform) aims to continue harmonised, voluntary ITS deployment by road authorities and operators on a European scale. It serves as the technical knowledge management centre in the field of ITS. EU EIP (2016–2020) is complemented by several large-scale corridor ITS deployment projects: URSA MAJOR, NEXT-ITS, CROCODILE, MedTIS, and Arc Atlantique. All of them are now in their second phase (until 2018). Similar to the predecessor projects (e.g. EasyWay EIP, EIP+), CEDR provides support because of its goal, the European-scale deployment coordination and the congruency with the needs and priorities of the NRAs and the ITS Directive. It supports this type of project as part of the NRAs' deployment programme. CEDR aims to provide strategic guidance for such projects, where most NRAs are involved and which support CEDR's strategic objectives.

The EIP project maintained the Deployment Guidelines, contributed to the specifications to be adopted under the ITS Directive (including improving already published specifications), maintained and developed harmonisation tools, and updated the roadmap for European ITS deployment. Cooperation between TG N7 and the EIP was largely facilitated by the involvement of TG N7 experts as EIP activity leaders and/or national contact points. EIP workshops, fora, and surveys were promoted to people on the NRA contact lists.

The liaison remained active throughout the EIP+ project (2014–2015), where cooperative ITS was added as a work item, and continues in the EU EIP project (2015–2020), where automation, as a work item of specific interest to CEDR, was also added.

The cooperation between CEDR and the EIP projects has also covered the following issues:

- service-level criteria, quality requirements, and quality assessment of real-time, safety-related and multimodal travel and traffic information (with contribution from TISA, see chapter 4.5);
- a consolidated NRA view on the Single Point of Access as a recurrent feature in specifications for priority actions under the ITS Directive (2010/40/EU);
- CEDR as a provider of political support for DATEX II;
- C-ITS and automation as emerging areas of NRA interest;
- cooperative ITS deployment issues and plans of the road authorities and operators, including the provision of deployment guidance, and
- road operator's requirements relating to vehicle automation related, deployment plans, socio-economic assessment, and the automation of road operators' own ITS.

From late 2015 onwards, the EU EIP project has also included Transport Network ITS Spatial Data Deployment Platform (TN-ITS) activities. TN-ITS aims to facilitate and foster the exchange of ITS-related spatial data between European public road authorities as data providers, and map makers and other parties as data users. TN-ITS is concerned with the exchange of information on changes in static road attributes, which are of a more or less permanent nature, even though they may sometimes change. Many CEDR members are engaged in the work as active partners. The member of TG N7 from Estonia has liaised with TN-ITS on CEDR's behalf.

The prospects for future cooperation can be summed up as follows:
- continuing corridor-related deployment projects, deploying traffic information and traffic management services in a harmonised way (Ursa Major, Crocodile, Next ITS, MedTIS, Arc Atlantique) with TEN-T and CEF funding support;
- the Connecting Europe Facility (CEF) as the main existing funding instrument for infrastructure investment (including ITS deployment) in the period 2014–2020 will also provide support to pilot deployments of cooperative ITS and automated driving where European coordination and harmonisation are supported by specific support projects.

5.3 iMobility

The iMobility Forum focuses on intelligent vehicles and infrastructure. It is a multi-stakeholder forum that has set itself the goal of accelerating the deployment of safe, smart, and clean road mobility—mainly in vehicles but also on the roadside. The cooperation on iMobility is quite unique since there is a close cooperation between industry and public parties in the various working groups. The following working groups were active in the period 2013–2015:
- Automation
- Human Machine Interaction
- Implementation Road Maps
- International Cooperation
- Legal Issues
- Probe Data
- Research and Innovation
- Safe Applications
- Vulnerable Road Users

CEDR has actively participated in the Steering Group of the iMobility Forum. The most relevant working groups with regard to the core business of NRAs are the working groups Implementation Road Maps, Probe Data, and Research and Innovation. The working groups Automation, Legal Issues, and International Cooperation also work on areas with high relevance for NRAs.

NRAs co-chair two of the working groups: Implementation Road Maps and Research and Innovation.

The Implementation Road Maps working group aims to promote and monitor the deployment of priority systems by investigating how to promote the roll-out and deployment of vehicle- and infrastructure-based systems and regularly monitoring the deployment status of existing applications in terms of vehicle fleet penetration and road network coverage. The work focuses on selected priority systems that are mature enough for deployment and effective with regard to reaching the iMobility goal of safe, efficient, smart, and clean road mobility. The working group has actively discussed the socio-economic benefits of the priority systems and maintained a related web site www.imobility-effects-database.org

The Research and Innovation (R&I) Working Group deals with research and innovation issues for the whole forum in the domain of ICT for smart, clean and efficient mobility for the road transport of goods and people. The main objective of the R&I WG is to develop and agree on research and innovation roadmaps for the medium- and long-term. The key deliverable of the R&I WG was the 'Recommendations for H2020 2016–2017 Research Need'. First draft recommendations were delivered in autumn 2014 with all the details prepared for spring 2015.

Due to the EC's withdrawal of support for the forum in early 2016, the work of the forum has slowed down considerably and its future seems quite uncertain.

5.4   Amsterdam Group

The Amsterdam Group was formed as a strategic partnership between the automotive industry (Car2Car Communication Consortium) and infrastructure organisations (CEDR, ASECAP, POLIS) as committed core stakeholders in C-ITS deployment. It is focused on deploying simple services with a clear user benefit supported by a solid business model from 2015 onwards. In this way, the deployment is viable even with limited penetration in the vehicle fleet and limited hot spot implementation of short-range communications infrastructure.

The role of the Amsterdam Group is to facilitate consensus-building on deployment-related matters at European level, to initiate work on important issues needed for (initial) deployment based on a roadmap, and to consolidate the findings from deployment initiatives as a basis for further agreement among the deployment partners. In the light of these action lines, the following progress has been made (see also the regular status reports prepared for CEDR EB meetings):
- A key result of the Amsterdam Group is the roadmap between the automotive industry and infrastructure organisations on initial deployment of Cooperative ITS in Europe (2013). The roadmap serves as a guiding star for members for the deployment of C-ITS in corridors. The roadmap was presented and discussed at various TG N7 meetings and has achieved the full support of the CEDR GB.
- The strategic direction of the Amsterdam Group, cooperation with stakeholders, and the

monitoring of the status of open issues for initial deployment are discussed and agreed in quarterly plenary meetings. These issues are all prepared by the co-chairs team.

- The Amsterdam Group has organised a series of public workshops on C-ITS deployment (Brussels, 25 September 2013; Roskilde, 15 September 2015; Schiphol, 26 April 2016) in order to foster the harmonisation and interoperability of initial services. The workshops have targeted an audience of more than 50 participants. Presentations and summary reports are available from the Amsterdam Group website. Workshops and webinars are co-organised with the Horizon 2020 Support Action CODECS (2015–2018), as was previously the case with COMeSafety2 (2011–2013).
- The Amsterdam Group has also presented itself at a number of high-profile events such as the ITS World and ITS European Congresses, the ITS Conference of the European Commission (2013), the Transport Research Arena, and the European Voice. Documentation of the workshops and presentations can be found at www.amsterdamgroup.eu. At both ITS Congresses, meetings were organised with ITS Japan to exchange views and gain an insight into the Japanese ITS-spot approach.
  The mutual agreement of services for initial deployment has been one of the first achievements of the Amsterdam Group. Functional descriptions of the applications with infrastructure involvement have been driven by specific automotive–infrastructure task forces interacting with the Amsterdam Group plenary. Final white papers (example: roadworks warning) were published in spring 2016 on the Amsterdam Group website. These papers include the profiling of standards for infrastructure applications and input for standardisation organisations regarding the amendment of standards.

5.5 C-ITS Deployment Platform

In 2014, the European Commission set up the C-ITS Platform to accelerate the deployment of Cooperative ITS in Europe. Since November 2014, more than 100 experts from Member States, different industries, and interest organisations have worked towards achieving a shared view on C-ITS Deployment and agreed actions. The Final Report of the C-ITS Platform (Phase 1) was published in January 2016 and is available at http://ec.europa.eu/transport/themes/its/doc/c-its-platform-final-report-january-2016.pdf.

The second phase of the platform, now also addressing the links between C-ITS and automation, is expected to present its first conclusions after the summer of 2017. The second phase addresses security, compliance assessment, data protection, and privacy. The automation-related topics are physical and digital road infrastructure, enhanced traffic management, road safety and urban areas. A horizontal working group will focus on more generic topics such as business models issues.

The next steps (including addressing recent challenges) include:
- As interest in deployment steadily grows, there is an increasing need for consolidation and harmonisation. Ensuring harmonised C-ITS deployment based on Europe-wide standards is a value in itself. The Amsterdam Group accommodates these needs by organising exchange meetings between deployment initiatives (corridor-based, urban-based). The next meeting of the workshop series is organised for the beginning of 2017.
- CEDR is represented in the European Commission's C-ITS Platform. The platform scope remains broad but in the process of work, it will mostly attract topics where European action can add value, e.g. the security framework. Because of the informal cooperation, messages

from the Amsterdam Group will be put to the platform by the representative(s) of CEDR and other umbrella organisations (including their members) providing support to the Amsterdam Group.

- CEDR has repeatedly invited other umbrella organisations to chair the Amsterdam Group, but is still the chair (i.e. there has been no rotation). The Amsterdam Group performs its role very well. This is recognised and acknowledged in the C-ITS arena. Although the Amsterdam Group can initiate work quite easily, actually getting the work done poses a continuous challenge. An appropriate means of approaching this challenge could be to mobilise additional resources with the help of (co-funded) 'satellite' projects. This could potentially leverage the achievements and influence of the Amsterdam Group.
- In order to ensure the interoperability of pilot deployments, the most notable cooperation platform, C-Roads, will begin work in autumn 2016 (WGs on pilot tracking, technical issues, organisational issues, evaluation and assessment). The national deployment initiatives from the C-Roads family, INTERCOR and existing initiatives, will contribute to the C-Roads Platform. C-Roads will become the technical knowledge centre for C-ITS whereas the Amsterdam Group focuses more on the strategic aspects of innovative technology deployment between NRAs and other key deployment partners. This reconfirms the inherent principle of the Amsterdam Group, namely that it only takes action when an issue cannot be resolved elsewhere.

5.6   DATEX II

With the start of the new 5-year DATEX II programme (2016–2020) and co-funding from DG MOVE of up to 2 million euros, the hosting of the project/programme changed from DG MOVE to CEDR. Rijkswaterstaat, a CEDR member, acts as the coordinator of the programme.

Although this programme is primarily a continuation of former programmes from previous years, some new topics have been introduced in DATEX II such as the Urban Dimension, enhanced support of open data, and user support related to implementation of EU delegated acts.

The DATEX II organisation consists of the Steering Group and the Technical Management Group. The Stakeholder Advisory Board (STAB) is a new part of the organisation that seeks to establish a closer connection between DATEX II and users by sharing ideas about the development and improvement of DATEX II. Links between DATEX II and CEDR were maintained by members of DATEX II programme management attending TG N7 meetings.

The DATEX II User Forum, which has been organised once every two years since 2010, is the main event for engagement with the DATEX II user community. During the lifetime of TG N7, two fora were organised: 19/20 May 2014 in Prague and 13/14 September 2016 in Dublin. A representative of CEDR, the hosting organisation, gave the welcome address at the 2016 User Forum.

5.7   TISA

The collaboration with TISA, in particular with the TISA working group 'ITS Directive', which began in SP2, has continued. During SP2, the main interest was to arrive at a common view on

the value chain for traffic information and to exchange views concerning safety-related traffic information. The focus of both TISA and TG N7 has since shifted to the following issues:

- real-time traffic information (see chapter 3.1.2): the delegated act for priority action (b) was prepared in 2014;
- quality requirements and quality assessment of real time and safety-related traffic information (which is facilitated by the EIP project with TISA contribution, see chapter 4.2),
- cooperative ITS, allowing for the provision of coherent traffic information to drivers (strategic routing information in the road network, tactical information on the spot).

TG N7 invited TISA to present TISA's holistic view on traffic information (including Cooperative ITS) at the TG N7 meeting held in January 2014. TISA proposed maintaining close collaboration between influential entities (e.g. CEDR, EIP, Amsterdam Group...), reusing existing concepts and standards, and collaborating on the establishment of uniform methods of traffic information quality assurance. NRA experts were very interested in the presentation, which was followed by a lively discussion. One resulting action was a TISA presentation to the Amsterdam Group in May 2014. It was agreed that the Amsterdam Group and TISA would cooperate on hybrid communication concepts, focusing on related technical solutions, organisational aspects and business models.

5.8   Other stakeholders

Members of TG N7 have also participated in the work of a number of fora and platforms described below. In all cases, a specific CEDR member liaised between the forum/platform and CEDR.

Traffic Management 2.0 (TM2.0)

TM2.0 is an ERTICO-led open group of significant players (road authorities and service providers) from the global traffic management and mobility service market who joined forces driven by the common vision and desire to 'enable vehicle interaction with traffic management', which will inevitably accelerate the development of individual mobility services and improve the effectiveness of accurate and efficient traffic management and control together with the growing use of navigation systems inside vehicles.

The overall objective of TM2.0 is to provide a discussion forum for the topic of interactive traffic management for all relevant stakeholders in the entire traffic management procedure value chain. CEDR is the best platform for representing NRAs' interests in the European dimension of this subject.

The initial objective of the group was to develop and adopt transparent and open processes, striving for the broad inclusion of all players and strong representation of both NRAs and private stakeholders providing services and products for traffic management and mobility services. The medium-term objectives were to define win-win deployment scenarios for all relevant stakeholders, define a Europe-wide cooperation concept that is regarded as useful by most stakeholders in Europe, guidelines and recommendations for the players in traffic management and policy-/decision-makers, and to establish synergies with existing activities and initiate new ones.

CEDR was well equipped to contribute to these European requirement discussions through TG N7.

The long-term objective has been to act as an enabler for vehicle interaction with traffic management by defining an interface, which will facilitate the exchange of data between vehicles and traffic management procedures supporting the entire value chain for consistent traffic management and control and traffic information services.

ERTICO Task Force on Communication Technologies for C-ITS

This task force involved a group of ERTICO partners. It was tasked with investigating different communication technologies for Cooperative ITS services (C-ITS). This investigation provided an analysis of the deployment of cooperative intelligent transport systems where different communication technologies will complement each other in an optimal way, providing the services and evolving over time. In this context, Intelligent Transport Systems and Services were defined as the integration of information and communications technology with transport infrastructure, vehicles, and users. Through cooperation and the sharing of vital information, C-ITS will provide more efficiency for transport networks, with greater safety and less impact on the environment on another track. The task force was active from March to October 2014, and provided a final report in 2015.

Two TG N7 members were involved in the work of the task force and kept CEDR informed of its work and results.

6 Liaison with other CEDR task groups

6.1 TG S1 (EU law-making process)

Regulatory initiatives launched by the European Commission have significant implications for the work of NRAs. It is, therefore, necessary to know about EC initiatives and to promote cooperation with EU institutions. Task groups S1 and N7 have established a contact point-based information exchange and alerting procedure. It is activated on a case-by-case basis. Most of the exchange during the reporting period related to the ITS Directive (2010/40/EU) and delegated acts for the priority actions allocated under it, including their preparation process.

6.2 TG N1 (Performance indicators)

On the basis of the work completed in SP1 and SP2, TG N1 further enhanced the performance reporting framework for reports to the EB, GB, and the European Commission. This framework is based on a basic set of 'performance indicators' (such as geometry, traffic, etc.). Within the framework of the TEN-T guidelines, the EC introduced additional reporting requirements regarding the information provided to the EC by Member States. N1 adapted its reporting framework to the requirements for the EC's database, TENtec, in order to simplify the work to be done by Member States. It also developed an additional set of performance indicators (PI) based on clear data definitions and improved data collection methods. Some of the latter dealt with ITS as the ITS performance indicators used in the past were quite ambiguous and prevented sensible comparison of the different countries' situations.

The leaders of TGs N1 and N7 had preliminary discussions about ITS key performance indicators, resulting in a first proposal for such KPIs in April 2014. TG N7 continued the liaison, taking on board the European Commission's (DG MOVE) 2014 project on Key Performance Indicators for ITS. The first set of ITS KPIs was collected by TG N1 from the NRAs in 2015.

6.3 TG N5 (Road Safety)

CEDR's TG N5 aimed to continue the successful sharing of information in the field of road safety between CEDR member countries and to identify common trends in their road safety strategies.

By exchanging information within the task group, TG N5 helped member countries to effectively implement the Directive on Road Infrastructure Safety Management (2008/96/EC), to implement relevant best practice solutions from the five ERA-NET projects in 'Safety at the Heart of Road Design', and to encourage NRAs to improve/maintain their databases in order to support further research in the field of road safety. TG N5 furthermore contributed to efforts to reduce the number of road users and road workers killed or injured in traffic accidents in road work zones, and helped define common future research needs in the field of road safety. Finally, it aimed to keep member countries up to date on the status of ITS in the area of road safety.

For the last objective and in order allow CEDR to identify key ITS tools affecting road safety, there was a need for liaison between TGs N5 and N7. The leaders of the two task groups were in

touch on a number of occasions, and a member of each TG attended a meeting of the other TG. TG N7 helped N5 identify major safety challenges in 2016.

6.4   TG N6 (Congestion)

CEDR task group N6 focused on congestion and integrated network management at an operational level. Most integrated network management strategies and measures are heavily influenced by ITS deployment on the road networks, and both traditional and new ITS deployment needs to be integrated across various dimensions in order to achieve maximum effectiveness on road networks. These topics and issues are highly relevant for TG N7. For this reason, the two groups agreed to cooperate on several issues and to share information in order to enhance results.

TGs N6 and N7 completed some activities together, and each group reported to its members on what the other was doing. One NRA was represented in both groups. Moreover, joint meetings were held to exchange knowledge and output. The first joint N6/N7 meeting was held in Copenhagen on 16 September 2015; the second one in Vienna on 24 February 2016.

Some of the main topics and activities are mentioned below.

Workshop about new directions for traffic management
The purpose of the workshop was to discuss and imagine what challenges traffic management will face in the next 5–10 years. Participants were divided up into three transversal groups. Some of the overall findings and conclusions were:
- Challenges relating to increased congestion will continue and the focus will remain on improving traffic flow and traffic safety. This calls, among other things, for a continuing network approach from NRAs and also places high demands on the direction of new developments in automation and C-ITS
- More stakeholders are getting involved in traffic management. These stakeholders have different objectives, needs, and priorities. Stakeholders should aim to work together and have a common strategy
- NRAs and traffic management centres are expected to face many challenges in the transition phase from a low to a high degree of automation. Different penetration rates can be expected from country to country.
- Who does traffic management and who is responsible for it? NRAs will continue to operate roadside traffic management deployment but the role of the private sector and cooperation with the private sector in data generation and traveller information will increase. Harmonisation is required for route guidance and navigation services between both road-side and in-car services.
- The trend is towards more—and increasingly more advanced—equipment in vehicles and at the same time less traditional ITS roadside equipment.
- Everything is becoming more data oriented and connected, which emphasises the need for systematic data collection and exchange, data cleaning, and effective big data analysis.
- There is a need to look into the legal framework and possible harmonisation of national regulations.
- Several discussions took place on how to continue work on traffic management at CEDR level. It was proposed that TG N6, as CEDR's operational traffic management-oriented

group, would continue working on a more practical operational level of traffic management measures deployment with a network approach. It was also proposed that TG N7, which focuses more on the future, would continue working at the strategic level with focus on C-ITS and automation.

Support for the TG N6 survey
TG N7 monitored the development of the CEDR survey on integrated network management carried out by TG N6. TG N7 members also helped gather more answers and case studies, and were involved in commenting on the preliminary results and conclusions of the survey.

One of the conclusions was that many NRAs are in the process of moving from single road management towards integrated network management and cooperation with other networks and stakeholders. That will, on the one hand, enhance overall performance. On the other, it will also add complexity. That complexity will increase even more in the coming years, when congestion is expected to get worse and new developments, for example in C-ITS and automation will be introduced alongside more traditional traffic management and ITS.

Matrix with traffic management measures and ITS
The two groups worked together to identify case studies in each country that linked 10 selected classic types of traffic management measures on one side to European ITS actions as reflected in the European ITS Action Plan Directive and to other innovative measures as C-ITS and automated driving on the other. Responses were received from Austria (AT), Switzerland (CH), Denmark (DK), Finland (FI), Greece (GR), the Netherlands (NL), Sweden (SWE) and the United Kingdom (UK). These responses are summarised in the matrix below.

Traffic Management measures		Intelligent Transport Systems - ITS						
		Priority a — Multimodal Travel Info and Route Planner	Priority b — Real Time Traffic Info	Priority c — Safety Related Traffic Info	Priority d — eCall	Priority e — Secure Truck Parking Information	Cooperative ITS — C-ITS	Automated Driving — AD
	Capacity management (e,g, ramp metering, hard shoulder running, dynamic lanes etc.)	NL	Most countries active	CH, DK, NL			CH, UK	AT, CH, SWE
	Roadworks management	CH		Most countries active			Most countries active	Most countries active
	Incident management	CH, FI		All countries active	Most countries active		All countries active	
	Lane control	CH		Most countries active			AT, CH, NL	
	Variable speed limits	CH					AT, CH, GR, NL	
	Alternative route management	CH, NL					AT, CH, FI, GR	
	Roadside information	CH, NL				CH	Most countries active	
	Truck parking information	CH		CH		Most countries active	AT, CH, NL, UK	AT, CH, NL, SWE
	Management of abnormal transports		AT, FI	FI			CH	AT, CH, FI, SWE
	Winter maintenance supporting systems		All countries active				Most countries active	AT, CH, FI, SWE
	Other, please specify:							
	DK	National travel planner						Legal aspects Truck platooning
	FI		Incident warnings TM renewal T-LOIK				Incident warnings NordicWay	Incident warnings AURORA
	NL		CHARM					
	SWE		Internal deployment project				Big Data Analysis BADA	
	UK		METHOD CEDR				**Control Office System PCP Anaconda CEDR Cobra CEDR**	Dragon CITE

Figure 9: Matrix with traffic management measures relating to European ITS Actions, C-ITS, and automation, summarising responses received from eight countries

The purpose was to identify areas where ITS can support traditional TM measures through identification of relevant case studies by N6 and N7 members and to give an overview and highlight the areas where countries are active and where it would be helpful to exchange knowledge and coordinate activities.

Most of the countries presented their individual matrices and the resulting matrix summarising the results was discussed. Some of the overall findings and conclusions were:
- N7 has a more strategic approach with a special focus on the ITS area, while N6 focuses on traditional traffic management measures. The matrix shows that there is a need for more cooperation and coordination between these groups and disciplines, especially regarding roadworks management, incident management, lane control, variable speed limits, alternative route management, roadside information, and winter maintenance supporting systems in relation to the ITS Directives Priority actions (b) and (c), C-ITS, and automation.
- It is very important to provide road users with good-quality services. The ITS priority actions should help NRAs improve in this area. However, there are still differences in national policies for NRAs delivering key traffic management and traffic information services.
- The goal is to have pan-European interoperable traffic management services. Therefore, standardisation issues are relevant. Some examples are:

- o Road data warehouse is using TISA recommendations as guidance, e.g. the standard is there but not obligatory.
- o Safety messages are standardised to the access point. However, how the automotive industry should standardise messages to users has not been defined.
- o OEMs indicate that everything in the future will be processed and stored in the cloud.
- The quality of data is an issue (the quality needs to be agreed at a high-decision making level in the organisation). Data quality was the most difficult aspect in ITS priority action (c).
- Automation is going to influence all traffic management topics in the future. It will probably be a big challenge—also an economic challenge—for all NRAs to handle this well. Road users and political stakeholders will expect NRAs to continuously provide or ensure consistent traffic information and guidance in the transition period to a higher level of automation, while NRAs will, at the same time, have to downgrade/adjust and in time phase out more traditional traffic management measures.
- It is important that CEDR task groups and working groups provide recommendations and guidance to NRAs in these areas through the Governing Board to help them solve challenges with mobility, congestion, and safety.

Recommendations regarding future CEDR activities

Through joint discussions of future CEDR work on traffic management in CEDR's new action plan, AP2017–2019, ITS, automation, and C-ITS, it became evident that it would be difficult to merge the two task groups without downgrading important areas. Therefore, TGs N6 and N7 agree that a distinction between operation and strategy should be maintained in AP2017–2019. However, both also feel that close cooperation between the two groups should be maintained in order to achieve complementarity at strategic, technological, and operational levels.

6.5   TG I1 (Research)

TG N7 cooperated closely with TG I1 on innovations relating to ITS. This was built on the previous Call 2010 with the launch of new activities under Call 2015 (see Section 7).

7 Research

7.1 Research and deployment

There is a stated desire to collaborate better on planned ITS projects, for example on the programme management of pooled funds for multimodal ITS research, with the aim of strengthening national links from research and development to deployment. Improving these links will lead to faster implementation of research results and the sharing of lessons learned from European partners on completed projects.

The aim of this work stream was to investigate the development of a tool that would enable the sharing of information by partners in CEDR. In particular, for R&D activities, this would provide opportunities to get involved in projects in Europe and pool funding, if appropriate, and also to share knowledge of work that has been completed and best practice.

In terms of deployment, the tool would enable the sharing of contacts, knowledge, and best practice.

TG N7 gained feedback on the idea of a tool via a short questionnaire (6 replies out of 17). On the basis of this information, it sought to collate project and deployment information. The ultimate aim was to have something simple that could be used to make this information accessible.

Once the initial information was gathered on what partners already have available through their own websites, a key consideration was to ensure that the information provided was up to date.

The outcome of the work was that the content of the information should be linked to an organisation's information, contact names, and case studies together with a search facility. Something as simple as an Excel spreadsheet could be useful for listing content.

The CEDR website could be used to publish this information. The feasibility of this is currently being investigated.

7.2 ANACONDA

The aim of the research project ANACONDA (Assessment of user Needs for Adapting Cobra including ONline Database) is to advance national road authorities' understanding of the business case for connected and cooperative vehicles. The research will help many CEDR road authorities to identify which cooperative services deliver maximum benefit for minimum cost and enable road operators to manage the road network more cost effectively.

The overall objective of ANACONDA is to build on the successes of the previous COBRA project, to position COBRA+ as the default tool for decision-making support for deployment of C-ITS systems, encouraging and facilitating NRAs to get more value from the tool. COBRA+ will build on the strengths of the existing tool and update it to meet the requirements of users who, having made use of COBRA, now have a clearer idea of where it may be improved and enhanced. A C-ITS Monitor—to be called COBRA Monitor—will be created. This will provide a means of monitoring the current provision of roadside infrastructure and C-ITS deployment, as

well as the proposed roll-out of future C-ITS, and it will provide a means of monitoring the usage of the COBRA+ tool, and hence C-ITS implementations.

7.3   DRAGON

DRAGON (DRiving Automated vehicle Growth On National roads) gave NRAs an insight into how their services will have to change in response to the growth of connected and automated vehicles and the extent to which they could facilitate deployment. This was achieved by conducting a thorough assessment of predicted technological developments over the next 20 years, input from international experts, and case studies of particular national road authorities.

DRAGON reviewed the current situation and makes predictions regarding market penetration in the vehicle fleet. It also studied impacts, benefits, and NRA actions to enable automated driving and assessed the related costs and benefits. On this basis, it prepared a road map, action plans, and conclusions.

DRAGON held a successful workshop on the impact of automation for road authorities in Leiden in April 2016, interacted with TG N7 during the meeting in Schiphol in May 2016, and also participated in several congresses (TRA 2016, ITS European Congress 2016).

7.4   MAASiFiE

The project will identify and analyse Mobility as a Service (MaaS) models and create a 'roadmap 2025' for MaaS in Europe. The roadmap 2025 will include stakeholder roles and responsibilities, assessments of socio-economic impacts, business and operator models, and technologies for MaaS.

The project's dissemination activities include:
- a press release in October 2015;
- the production of a leaflet/brochure in October 2015 and its distribution (e.g. at ITS Bordeaux 2015, MAASiFiE project workshops, and via the Smart mobility & ITS Austria newsletter and forum);
- the preparation in October 2015 of a project PPT presentation that was presented and shared as handouts (e.g. at ITS Bordeaux 2015);
- the setting up of a project website in January 2016 (http://www.vtt.fi/sites/maasifie/);
- the presentation of MAASiFiE at the CEDR stand at TRA 2016;
- the preparation of conference papers and presentations on MAASiFiE results.

For the roadmap 2025, the MaaS concept has been defined as 'Multimodal and sustainable mobility services addressing customers' transport needs by integrating planning and payment on a one-stop-shop principle' (MAASiFiE project, 2016). Three series of workshops have been organised, each series including a workshop in each country: Austria, Finland, and Sweden. The workshops 'The need for change' were held in December 2015, the 'Impact assessment' ones from spring to autumn 2016, and the 'Creating a new model' ones in autumn 2016 for developing roadmap 2025, taking into account the roles and responsibilities of different actors in the MaaS ecosystem.

The project also carried out a state-of-the-art analysis on existing MaaS pilots, cases, and business models. However, as MaaS is continually developing and expanding, the state-of-the-art analysis has been updated throughout the project. The methods used for the analysis include literature review and interviews. In total 30 interviews were performed including authorities, municipalities, MaaS operators, ICT companies, transport operators and a mobile payment provider.

The MaaS value chain has been elaborated, describing different actors in the MaaS ecosystem and their interaction, as well as monetary and information flows. Also MaaS business and operator models have been developed.

The first step in the impact assessment work was to define KPIs for evaluating MaaS and to collect data from MaaS pilots and cases.

The work on technology for MaaS started with the collection of information on MaaS relating to technological issues through interviews. Topics covered in the interviews included useful technologies and standards for MaaS services at present and in the future, as well as interoperability and roaming issues.

More information about this project; http://www.vtt.fi/sites/maasifie

8   Meetings

TG N7 group had 13 general meetings:

- 12–13 June 2013, Helsinki
- 19–20 September 2013, Stockholm
- 16–17 January 2014, Brussels
- 22–23 May 2014, Bristol
- 23–24 September 2014, Bergisch Gladbach
- 22–23 January 2015, Oslo
- 19 March 2015, Brussels
- 16–17 September 2015, Copenhagen (the first day was a joint meeting with N6)
- 13 January 2016, Brussels
- 24–25 February 2016, Vienna (the first day was a joint meeting with N6)
- 18–19 May 2016, Amsterdam
- 29–30 September 2016, Athens
- 23–24 March 2017, Ylläs, Finnish Lapland (agreed)

TG N7 also participated in the EB meeting in Tallinn on 6 March 2014, organising a mini workshop on the CEDR ITS Position Paper. The leader of TG N7 also participated in TD Network Management Meetings in Manchester in May 2013 and April 2014.

In June 2015, TG N7 organised a workshop on automated driving in which road authorities' position on automated driving was discussed based, for example, on the results of a questionnaire. One of the outcomes was the proposal to prepare a workshop on automated driving for the CEDR EB/GB. The workshop for the GB was organised as part of the TRA conference in Warsaw on 19 April 2016.

TG N7 has organised bilateral meetings each year with DG MOVE's ITS Unit: on 5 July 2013, 4 July 2014 (during ITS Europe Helsinki), 3 July 2015, and 29 June 2016.

In addition, the group had several conference calls to prepare meetings and workshops and to reach agreement on statements and activities.

9 Future ITS and CEDR

9.1 Activities foreseen up to 2020

ITS or the application of Information and Communication Technologies (ICT) in transport will continue its fast growth, development and deployment during AP2017–2019. There obviously needs to be a transversal ITS task group in AP2017–2019 that will act as the eyes and ears of CEDR and NRAs in this domain. The aim is to 'stay ahead of the curve' in order to provide sufficient time and resources to CEDR and NRAs so that they can act when and where needed. The main elements foreseen for such a task are:

- monitoring, responding to, and initiating actions in the follow-up to the EU ITS Action Plan and Directive;
- issues relating to the large-scale deployment of cooperative ITS, and support for EC actions on the C-ITS platform;
- to contribute to reporting of the selected Key Performance Indicators (KPI) on ITS deployment and impact;
- to facilitate higher levels of automated driving on NRA roads and to discuss and agree on common views relating to the development and deployment of road vehicle automation;
- issues relating to digitalisation, the Internet of Things, Mobility as a Service and other major megatrends affecting the roles, tasks, and core business of NRAs;
- intelligent traffic management at strategic level, liaising with CEDR activities at operative level (continuation of the current N6).

These elements also include continuing to liaise with and provide strategic guidance to the CEDR representation in the 'satellite' groups which are currently facilitated via TG N7, i.e. the Amsterdam Group and DATEX II.

9.2 Expectations regarding the GB/EB

The main expectation is that GB and EB will continue to liaise at strategic level with key stakeholders in ITS development and deployment. Such stakeholders include the EC, the automotive, telecom and IT industry, ASECAP, and POLIS as well as PIARC and AASHTO.

The liaison will also include participation in different EC-initiated platforms such as the Oettinger Roundtable.

ANNEX 1 N7 Communication Plan

CEDR N7 Task Group

Communications Plan

Document control

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Author	David Cowell
Owner	Risto Kulmala
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Reviewer List

Name	Role
Risto Kulmala	Chair of Task Group 7
Hans Van Saan	CEDR GB Representative

Approvals

Name	Signature	Title	Date of Issue	Version

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Context

Intelligent Transport Systems and Services, ITS, are essential for the effective and efficient management and operation of transport networks, now and in the future. The continued development and exploitation of ITS will allow National Road Authorities provide transport services for the social benefit of everyone, whilst supporting economic development for a sustainable future.

N7 – Our Vision

Our vision is to advise CEDR and National Road Authorities, based on our knowledge and expertise, and to engage and influence major stakeholders, to aid strategic planning and decision making for ITS, for now and for the future.

N7 – Our Objectives

The task group shall deliver this vision through:
- Shared knowledge
- Collaboration
- Engagement
- Influence

by considering the ITS horizon, we are aiming for the delivery of sustainable solutions to improve the mobility of people and goods, which will benefit society in the future, and support long term economic growth. The group shall advise on the strategic choice and implementation of ITS solutions, bringing into focus:
- ITS development
- European and National ITS policy
- Opportunities and risks
- Exploitation of ITS, such as the realisation of multi-modal solutions

Part 1: Premise

1.1 Purpose of the N7 Utilising ITS for NRA's - Task Group Communications Plan

1.1.1 The purpose of this Communications Plan (CP) is to help our ITS Task Group manage and direct effective communications within CEDR, including EB, GB and other task Groups, as well as external stakeholders including the European Commission, EasyWay, I Mobility Forum, Amsterdam Group and others, through setting a framework for communication at all levels.

1.1.2 In the context of the Communications Plan, stakeholders are all bodies or individuals who participate in CEDR, may contribute to the work of CEDR and our Task Group, either directly or indirectly, and bodies who will or may be impacted by the outputs from the CEDR organisation and in particular our Task Group.

1.1.3 The Plan is a living document, which is actively maintained. The Plan is based on, and developed to support the [assumed] overall Communications Strategy for CEDR.

1.1.4 This Communications Plan has been specifically developed for our ITS Group to help us plan and deliver important communications in line with the delivery of our Work Plan.

1.1.5 The Communications Plan is contained in Part 3.

1.2 Aims of the Communications Plan

1.2.1 The Communications Plan will help us meet the following aims:
  1 Controlled communications – its happens in the right way
  2 Provision of accurate coherent messages - consistency
  3 The right message to the right organisation or body of individuals – correct audience

1.3 Expected outcomes from implementation of the Communications Plan

1.3.1 We hope that the active use of the Communications Plan will help our Group derive the following outcomes:
  1 Improved visibility and understanding of the purpose and activities of the ITS Task Group;
  2 Increased buy-in by internal and external stakeholders, increasing feedback and strengthening engagement;
  3 Improved decision making by internal stakeholders and our Task Group;
  4 Increased influence of CEDR in the ITS Community and other communities
  5 Greater likelihood of use of our deliverables / products by the wider ITS Community.

1.4 1.4 CEDR Communications Strategy

1.4.1 The overarching Communications Strategy for CEDR has not yet been defined for SP3. Our Task Group Communications Plan ideally should support the Communications

Strategy for CEDR. For the purposes of developing our Plan we can assume that the CEDR Communications Strategy will probably comprise elements of the following:

Internally within CEDR and extended CEDR community:

1   The need to exchange information of direct relevance to activities and NRA's
2   Communicate activities and progress in identified transversal Tasks
3   Communicate at the right place, time and with the right messages

Externally and extended CEDR Community*:

1.   Represent the views of CEDR as agreed by the respective members
2.   Increase awareness of CEDR and its activities
3.   Demonstrate that CEDR has credibility due to its make up
4.   It has something to say as it represents the collective views of NRA's
5.   Raise awareness of deliverables which will be of strong interest to NRA's, organisations and individuals
6.   Communicate at the right place, time and with the right messages

*The extended CEDR community are 'sponsors' such as senior managers within NRA's who contribute to CEDR but do not actively participate.

Part 2   Principles of the Communications Plan

2.1   The Communications Plan is designed to communicate the right message / information, to the right organisation in the right way and at the right time for the reasons which are highlighted in the assumed CEDR Communications Strategy given in Part 1.

2.2   Key Messages to be Communicated by the ITS Task Group

2.2.1   Messages which our Group wishes to communicate will vary for each stakeholder, and in time. It is not possible to define the specific message at this point as it is dependent on progress and content of the CEDR project and in particular our Task Group, at any given time.

2.2.2   Typically, our Task Group should be communicating the following messages in accordance with the Plan. They will need to be adapted and tailored as appropriate for our target recipient.

1   The Role of the task group and CEDR
2   The Task Group Work Plan and expected outcomes / benefits
3   Task Group activities, progress and issues
4   Expected delivery date of our work plan activities
5   Requirements for consultations with stakeholders
6   Deadlines for return of information
7   Publication of useful information produced by our Task Group for use in NRA's
8   The benefits of contributing to the CEDR project and in particular the ITS Task Group
9   The importance and benefits of using CEDR and the ITS Task Group published documents
10   The importance of being engaged in the ITS Task Group

2.3   Stakeholders

2.3.1   CEDR has a large number of stakeholders and this varies with each working group within the CEDR organisation. We need to be clear about who is key to our Task Group. The way and number of times communication takes place with our stakeholders will depend on their importance to delivery of our product / output or need to use the product created by our Group.

2.3.2   At this stage in the development of our Task Group Work Plan, we have identified the following stakeholders as being relevant to the success of our Group and with whom we will need to communicate. This is based on the structure of SP3.

Name	Internal / Extended CEDR Community* / External	Power over CEDR project and the ITS Task Group	Interest in CEDR Activities	Approach to take**
Governing Board	Internal	High	High	Active
Executive Board	Internal	High	High	Active
Advisory Group(s)	Internal	High	High	Active
Secretariat	Internal	High	High	Active
Thematic Domain Coordinators	Internal	High	High	Active
Transversal Task Group Lead – I1	Internal	Medium	High	Active
Transversal Task Group Lead – N?	Internal	Medium	High	Active
Transversal Task Group Lead – N?	Internal	Medium	High	Active
Road Directors for each participating NRA	Extended CEDR Community	Medium	Medium	Keep satisfied
Deputy Road Directors for each participating NRA	Extended CEDR Community	Medium	Medium	Keep satisfied
Managers in NRA's whose staff participate in CEDR	Extended CEDR Community	High	High	Active
Managers in NRA's who will be interested in outputs	Extended CEDR Community	Low	High	Keep informed
Amsterdam Group	External	Low	High	Keep Satisfied
ASECAP	External	Low	Medium	Keep informed
Road Operators	External	Low	Medium	Keep informed
CEN	External	Low	Medium	Keep informed
CENELEC	External	Low	Medium	Keep informed
ERTICO	External	Low	Medium	Keep informed
ETSI	External	Low	Medium	Keep informed
PIARC	External	Medium	Medium	Keep informed
EU	External	Medium	Medium - high	Keep satisfied
EasyWay	External	Medium	High	Keep

Name	Internal / Extended CEDR Community* / External	Power over CEDR project and the ITS Task Group	Interest in CEDR Activities	Approach to take**
				satisfied
iMobility Forum	External	Medium	High	Keep Satisfied
OECD	External	Low	Low	When necessary
UNECE	External	Low	Low	When necessary
FEHRL	External	Low	Low	When necessary
ITS Professionals	External	Low	Medium	Keep informed
Transport Decision Makers	External	Low	Medium	Keep informed
Transport Ministers	External	Low	Low/ medium	When necessary
The Public	External	Low	Low	When necessary

Active means that we will actively communicate with our target to inform them of progress, engage them in our Task or seek their views at specific points in our project programme and at an appropriate interval.

Keep Satisfied means that our Task Group should be aware, responsive to concerns and needs such that buy in is achieved, and the stakeholder has information to remain supportive of our activities. The Stakeholder may also wish to engage with the Group as a consultee.

Keep Informed means that we should communicate to the level that the stakeholder knows what we are doing and has the information necessary to elect to get engaged if they wish to do so.

When necessary means communication is only required on an occasional basis and probably not in a great deal of detail.

*The extended CEDR community are 'sponsors' such as senior managers within NRA's who contribute to CEDR but do not actively participate.
**the level approach will depend on the content of our Task Group work plan.

2.4 Communications Channels

2.4.1 A number of communications channels are available to our Group through which to communicate. We should consider using the following in accordance with the CP.

1 Direct email with specific message to target audience
2 Press release / article in transport press
3 Press release / article in learned press (professional journals)
4 Short reports / memos

5   Printed Newsletter
6   E newsletter
7   Exhibitions at relevant event
8   Papers presented at relevant event
9   Publication of CEDR reports
10   The CEDR website
11   Attendance at meetings

Part 3:   ITS Task Group Communications Plan – Annual

Stakeholder	Approach to take	Reason to Communicate	Message to communicate	Channel	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
Internal Stakeholders																	
Governing Board	Active	Key stakeholder, influencer,	Progress, issues and needs	Email, web, memos / reports	√			√			√			√		
Executive Board	Active	Key stakeholder, influencer,	Progress, issues and needs	Email, web, memos / reports	√			√			√			√		
Advisory Group(s)	Active	Key stakeholder, influencer,	Progress, issues and needs	Email, web, memos / reports	√			√			√			√		
Secretariat	Active	Key stakeholder, influencer,	Progress, issues and needs	Email, web, memos / reports	√			√			√			√		
Thematic Domain Coordinators	Active	Key stakeholder, influencer,	Progress, issues and needs	Email, web, memos / reports	√			√			√			√		
Task Group Leads : I1, I3, S1, S2, N6….?	Active	Key stakeholder, influencer,	Progress, issues and needs	Email, web, memos / reports	√			√			√			√	√	
Extended CEDR Community Stakeholders																	
Road Directors for each participating NRA	Keep satisfied	Funder and beneficiary of outputs	Importance of engagement, benefits, progress, activities, work plan, deliverables	Email, newsletter, web, e newsletter	√						√					
Deputy Road Directors for each participating NRA	Keep satisfied	Funder and beneficiary of outputs	Importance of engagement, benefits, progress, activities, work plan, deliverables	Email, newsletter, web, e newsletter	√						√					
Managers in NRA's whose staff participate in CEDR	Active	Key Stakeholder, influencer, beneficiary and funder	Importance of engagement, benefits, progress, activities, work plan, deliverables	Email, newsletter, web, e newsletter	√						√					
Managers in NRA's who will be interested in outputs	Keep informed	Beneficiary	Progress, activities, publication of deliverables	Email, newsletter, web, e newsletter	√						√					

Stakeholder	Approach to take	Reason to Communicate	Message to communicate	Channel	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
External Stakeholders																
ASECAP (through Amsterdam Group)	Keep informed	Influencer and possible beneficiary of deliverables	Work plan, activities, consultation requirements and deadlines, publication dates and use of published materials	Email, newsletter, e newsletter, deliverables, conference event	√						√				√	
Road Operators	Keep informed	Influencer and possible beneficiary of deliverables	Work plan, activities, consultation requirements and deadlines, publication dates and use of published materials	Email, newsletter, e newsletter, deliverables,	√						√					
CEN	Keep informed	Influencer	Consultation requirements and deadlines,	Email, e newsletter, newsletter,							√					
CENELEC	Keep informed	Influencer	Consultation requirements and deadlines,	Email, e newsletter, newsletter,							√					
ERTICO	Keep informed	Influencer	Consultation requirements and deadlines,	Email, newsletter, e newsletter, deliverables,	√						√					
ETSI	Keep informed	Influencer	Consultation requirements and deadlines,	Email, e newsletter, newsletter,							√					
PIARC	Keep informed	Influencer	Consultation requirements and deadlines,	Email, newsletter, e newsletter, deliverables,	√											
EU	Keep informed	Influencer and possible beneficiary	Work plan, activities, consultation requirements and deadlines, publication dates and use of published materials	Email, newsletter, e newsletter, deliverables, conference event	√						√					
EasyWay	Keep satisfied	Influencer and possible beneficiary	Work plan, activities, consultation requirements and deadlines, publication dates and use of published deliverables	Email, newsletter, e newsletter, deliverables, conference event	√						√				√	
iMobility Forum	Keep	Influencer and	Work plan, activities,	Email,											√	

Stakeholder	Approach to take	Reason to Communicate	Message to communicate	Channel	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
	satisfied	possible beneficiary	consultation requirements and deadlines, publication dates and use of published deliverables	newsletter, e newsletter, deliverables, conference event												
OECD	Keep satisfied	Influencer	Publication dates and deliverables	Email, e newsletter,							√					
UNECE	When necessary	Influencer	Publication dates and deliverables	Email, e newsletter,							√					
FEHRL	When necessary	Influencer	Publication dates and deliverables	Email, e newsletter, newsletter							√					
ITS Professionals	When necessary	Beneficiary of deliverables	Publication dates and deliverables, importance and benefits of use	Press release, journal, newsletter, deliverables, conference event							√					
Transport Decision Makers	Keep informed	Beneficiary of deliverables	Publication dates and deliverables	Press release, journal, newsletter, deliverables							√					
Transport Ministers	Keep informed	Beneficiary of deliverables	Publication dates and deliverables	As applicable to member state							√					
The Public	When necessary	Beneficiary of deliverables	Publication dates and deliverables	Press release							√					

M1-M12 : Month referenced to EB / GB / N7 meetings - TBA

List of Abbreviations

|	
ASECAP	European professional association of tolled motorways companies
CEDR	Conference of European Directors of Roads
CEN	*Comité Européen de Normalisation* (European Committee for Standardisation)
CENELEC	European Committee for Electro technical Standardisation
ERTICO	European Road Transport Telematics Implementation Co-ordination Organization
ETSI	European Telecommunications Standards Institute
FEHRL	Forum of European National Highway Research Laboratories
FERSI	Forum of European Road Safety Research Institutes
NRA	National Road Authority (or Administration)
OECD	Organisation for Economic Co-operation and Development
PIARC	World Road Association
UNECE	United Nations Economic Commission for Europe

ANNEX 2 ITS Position Paper

EU ITS Action Plan and Directive, European ITS Fora and CEDR

Position Paper

April 2014
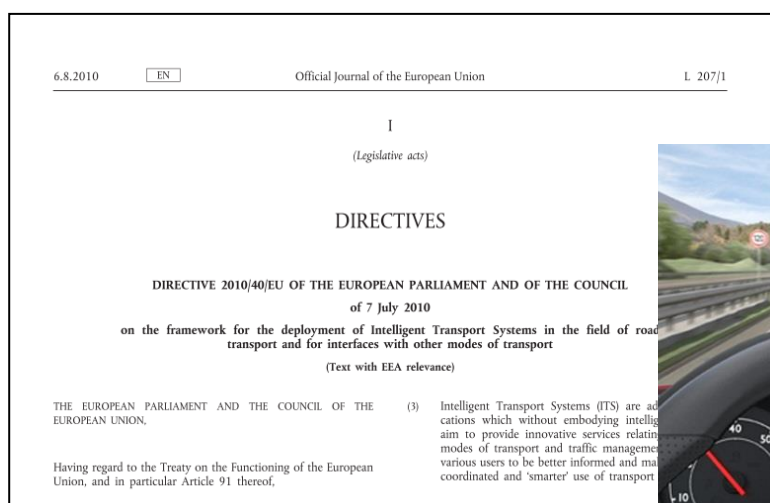
Approved by the CEDR Governing Board at their meeting on April 15th 2014 in Paris from the proposal of Task Group N7 'Utilising ITS for NRAs'

About CEDR

The Conference of European Directors of Roads (CEDR) is a platform for cooperation and promotion of improvements to the road system and its infrastructure. CEDR's twenty-seven members represent their respective national road authorities or equivalent bodies and provide support and advice on decisions concerning the road transport system that are taken at national or international level.

The mission of CEDR is;

- To analyse future developments of the road system and its infrastructure as part of a sustainable transport system under the environmental, economic and social aspects and identify new challenges in order to promote common strategies.
- To promote international networks of personal contacts between Road Directors and their staff.
- To provide a platform for understanding and responding to common problems.
- To develop a strong involvement in EU developments on matters relating to the road system and its infrastructure.
- To use existing representations in relevant international groups for mutual benefit.
- To make use of the results of common understandings as well as research results in each member country.

CEDR members currently have twenty-two expert committees tasked to provide technical and strategic advice on important topics. These include Road Safety as well as climate change, performance indicators, energy, procurement, financing, professional development, legislation and standards, Intelligent Transport Systems (ITS) etc.

CEDR also supports research activities through its own Transnational Research Programme which has funded numerous research projects, several on safety related topics. In 2012, the partnership with the European Commission was strengthened with the creation of the Infravation (infrastructure innovation) ERANET Plus that brings together European and US national agencies as well as the EC itself. Cooperation with the EC also facilitates many activities including those requiring cooperation with private sector stakeholders such as the automotive industry, for example, for Vehicle-to-Infrastructure (V2I) connectivity.

CEDR members address the full range of road transport and road infrastructure issues and are the key players when implementing directives, standards, or recommendations. They can develop more effective technical approaches by learning from successes and failures elsewhere.

Task Group N7 (Utilising Intelligent Transport Systems (ITS) for NRAs) has the following objectives for the period 2013-2017

- Provide CEDR strategic eyes and ears in the ITS arena, with focus on key European actions and initiatives relevant to NRAs, discussing and elaborating on important issues with the relevant stakeholders and organisations (e.g. ITS standardisation bodies, industry fora, …).
- Provide strategic assistance to EB & GB on ITS related matters, including advice on recommended position taking and actions
- Establish and maintain close liaison with the EC on appropriate levels
- Identify concerns of NRAs related to EU ITS Action Plan and Directive, monitor the progress of the implementation of the ITS Directive, and elaborate on common views,
- Where relevant, support and provide high quality input to the EC decision making process for ITS: a) How to optimise the flow of traffic taking into account safety and environment concerns (role of ITS); b) Monitor the progress on implementation of the ITS Directive; and c) Provide input and support for the CEDR representative in the ITS Advisory Group (timing partially dependent on the EC agenda)
- Transversally discuss and elaborate on ITS with other CEDR SP3 tasks, and support the utilisation of ITS by these CEDR SP3 tasks.

INTRODUCTION

ITS (Intelligent Transport Systems) is the integration of information and communication technologies with transport infrastructure, vehicles and users. ITS provides National Road Administrations (NRAs) valuable tools to enhance their core business of network operation and to improve the service to their customers as well as to reach their policy objectives. In order to maximise the benefits from ITS by providing seamless continuity of ITS services across European borders and to set up European ITS Markets, the European Commission (EC) initiated the EU ITS Action Plan and Directive. The ITS Action Plan and Directive have focused the interest of NRAs as well as other stakeholders into a number of priority services, for which CEDR and NRAs need to have a strategic view and vision to be able to act as a trusted partner towards other stakeholders including the EC. The same applies also to the key European Fora within the development and deployment of ITS. The transversal Task Group 'ITS for National Road Authorities' acts currently as the eyes and ears of CEDR towards ITS, and is providing advice and guidance to both CEDR Governing and Executive Boards, other tasks as well as NRAs on issues related to ITS. This position paper highlights CEDR's position towards the six priority services of the ITS Directive, Cooperative ITS, and the key European ITS fora.

PRIORITY ITS SERVICES

Multimodal Travel Information and Planning Services

This is the priority action a) of the ITS Directive. The multimodal travel information and planning services involve lots of different stakeholders, such as public and private road and rail authorities and operators, public and private transport operators, federal or regional governments and private service providers. The stakeholders also include many multinational companies, mostly as service providers but also in some cases as partners or competitors. In most countries, the NRAs have no obligation to develop multimodal travel service. The strategic decisions by the NRAs of the provision and the roles of a multimodal travel service as NRA's priority service vary considerable between countries. The decisions vary from a key strategic service according to the national transport policy, to no participation at all, or just to act as a content provider. The latter is the case for many NRAs. Most of the national service stakeholders see the need of implementing real-time information to the service, if they don´t already have it, in addition to the improvement of data quality and event data. The ambition for most of the multimodal services is a national door to door solution.

Due to the important role of multimodal travel information and planning services in both traffic and mobility management as well as sustainable transport, CEDR encourages NRAs to support the development, deployment and operation of these services by providing their own data and information utilising a harmonised data exchange framework for content to such services, and by promoting the use of standardised and open interfaces.

Real Time and Safety-Related Traffic Information

These are the priority actions b) and c) of the ITS Directive. Traffic information is of very high priority for the NRAs: real time traffic information because of its importance for smooth network operation and safety related traffic information because it helps to further improve road safety. Traffic information services involve a multitude of different stakeholders such as public/private road operators, public/private broadcasters or service providers, federal or regional governments, emergency centres and meteorological institutions. Multinational companies have a very important and increasing role in the provision of traffic information services. They act according to business plans and are competing with each other setting their own standards. The broadcasters have a key role in the distribution of the information in the short term, but their commitment to the implementation of the ITS Directive specifications is unclear in some countries. The challenge is to reach most road users with safety related traffic information and warnings. Concerning the obligation of service provision the situation varies in the different countries with regard to EU or national regulation or national transport policy. The user and society benefits of traffic information services are very difficult to express in money. For that reason it is hard to establish how much the NRAs should invest in the deployment, operation, and maintenance of traffic information services. A good knowledge base is contributing to informed policies and decisions and therefore, NRAs support research activities including socio-economic impacts of traffic information and other relevant ITS in collaboration with other stakeholders. Decisions on the strategic position of traffic information services are necessary currently due to the ITS Directive / specifications and the market activities of the private sector.

The ITS Directive and Specification give a basic framework for the implementation of the services and their content. The most important adaptations in the current safety related services are the need to improve the overall process especially related to data quality, timeliness, coverage and treatment of short term events. The ITS Directive refers to the TEN-T roads, but the service can be provided also on other parts of the main road network - depending on the national situation. National decisions on the EU specification's event types and parts of the road network to be covered will largely determine the investments required from the NRAs. The NRA's role is currently a content provider and also service provider for some specific services, depending on the NRA's customer policy. There is no common strategy on user rights, content branding and data exchange agreements among the NRAs. In some countries there is already a legal obligation to make content available free of charge for end users. The topic of 'Open Government Data' is still in preparation and has consequences for NRAs, the most probable ones seem to be increased requirements to quality, privacy and liability. Ways to meet the demand for an impartial and independent national body competent to assess compliance with the specifications are being discussed by many countries.

Due to the strategic role of safety-related and real-time information for network operation, the ITS Directive stressing the continuity of services across borders, and the increasing role of multinational companies, CEDR recommends that each NRA should determine their own strategic position towards these services utilising the possibilities of CEDR as a platform to discuss the strategic choices. CEDR and NRAs support European actions aiming to ensure the continuity and optimal quality of these services, where the optimality is determined according to the overall benefits and costs. CEDR and NRA will also support the harmonisation and interoperability of the services by promoting standardisation where needed.

Automatic In-vehicle Emergency Call (eCall)

This is the priority action d) of the ITS Directive. The NRAs do not have the role in the provision of the eCall service itself. However, the quicker notification and accurate positioning of accidents due to eCall will improve the incident management process of the NRAs.

Thereby CEDR supports the deployment of eCall. In order for the NRAs to fully utilise the incident information from the emergency centres/public safety answering points receiving eCalls, automated data exchange should be facilitated by bilateral agreements between these and the NRAs also including processes, roles, and protection of privacy in managing eCall reported events, with CEDR as the platform to exchange good practices with regard to these agreements

Intelligent Truck Parking Information

The specifications for this priority action e) of the ITS Directive were published by the EC in 2013. The NRA is one of the content providers for the services with also other possible roles such as service provider in the countries, where Intelligent Truck Parking is provided. Some NRAs have already made their plans for deploying Intelligent Truck Parking services because of the imminent need for such services.

CEDR recommends that the NRAs having deployed or currently deploying the services will share their experiences about the benefits, costs and deployment issues related to the services to facilitate informed decision making by all NRAs. CEDR encourages NRAs also to support efforts to facilitate continuity of these services across national borders.

Cooperative ITS

Cooperative ITS (C-ITS) is related to EC's ITS Action Plan Action Area 4 (Integration of the vehicle into the transport infrastructure). Although constituting not yet a priority action of the ITS Directive, it represents an important forthcoming deployment initiative. Cooperative ITS involve many stakeholders, including NRAs and road operators (incl. their suppliers), automotive and telecom industry as well as service providers. Priority C-ITS services are safety oriented and make traffic management more efficient as well as more reliable. Fixed and mobile roadside infrastructure for C-ITS services will be deployed mostly related to the TEN-T roads, where critical sections are involved or traffic is dense. Additional road network coverage will rely on utilising cellular networks for vehicle-infrastructure communications. In the infant days of C-ITS deployment the penetration within the vehicle fleet is not yet high enough (critical mass) for harvesting the benefits which – in medium term – NRAs and road operators can make use of in order to improve their traffic management and network operation. In this respect, a first NRA initiative for deploying initial services is the Cooperative ITS Corridor between the Netherlands, Germany and Austria. Actions by other NRAs are also being prepared. C-ITS involves several organisational and business related issues such as privacy, security framework, ownership of data, parallel Intellectual Property rights, and quality of content. All of these need to be solved for deploying C-ITS successfully.

CEDR supports the accelerated deployment of cooperative ITS together with strategic stakeholders CEDR is ready to continue to co-chair the Amsterdam Group and extend cooperation to other key stakeholders (e.g. telecom industry, routing and navigation industry) to solve the pending deployment issues. CEDR recommends the individual NRAs to enforce the deployment of day-one applications - utilising roadside and other feasible communication infrastructure - in liaison with the European cooperation groups and fora. NRAs are also recommended to actively participate in the related standardisation activities. CEDR and NRAs should closely monitor developments in the connected vehicle and road user field in order to react quickly when necessary.

EUROPEAN ITS FORA

Need for improved coordination and integration

There are currently a number of ITS bodies and fora working towards ITS deployment in Europe, such as the ITS Action Plan and Directive related bodies and groups, the iMobility Forum, the Amsterdam Group, and ERTICOs various platforms. However, many lack a clear understanding by all stakeholders of the role and tasks of the different ITS bodies, and the different platforms seem to be working on partly overlapping areas while including often many same stakeholders with some variations.

CEDR proposes encouraging the moves towards the coordination and integration of the various European ITS deployment bodies with the lead by the European Commission in order to clarify the orientation, focus, roles and tasks of the different bodies and improve their coordination likely also resulting in a reduction of the number of different deployment cooperation bodies. CEDR is willing to engage in such coordination and integration action in support of the European Commission and other key stakeholders in ITS deployment.

European ITS Advisory Group

The European Commission has set up two important groups to facilitate the deployment of the EU ITS Action Plan and Directive. The European ITS Committee contains the representation of the Member States, and the Advisory Group a high-level representation of the key stakeholders in ITS. CEDR has a seat in the Advisory Group. The CEDR ITS task has continued the practice of providing advice and guidance to the CEDR member in the Advisory Group by compiling the NRAs' views and discussing their commonalities and differences, resulting in advice containing the overall view of the NRAs.

CEDR continues its active participation in the European ITS Advisory Group.

EasyWay Follow-ups

The EasyWay projects (supported by the EC via the TEN-T programme, followed now by Connecting Europe Facility programme) were carried out by a consortium containing almost all European Road Authorities and Road Operators in a framework of harmonised European ITS deployment via voluntary cooperation.

CEDR supports such projects aiming towards harmonised ITS deployment on the TEN-T roads, provided that the deployments are coordinated on the European level, anchored in the needs and priorities of the NRAs and the ITS Directive, and promote more efficient road network operation. CEDR also supports these projects towards EC as part of the NRAs' deployment programme. CEDR aims to provide strategic guidance to such projects, where most NRAs are involved and which support CEDR's strategic objectives. When motorway operators are involved, CEDR is ready to liaise with ASECAP concerning the strategic orientation of these projects.

iMobility Forum

The iMobility Forum (earlier known as eSafety) is dealing with intelligent vehicles and infrastructure. This multi-stakeholder forum aims to accelerate the deployment of safe, smart, and clean road mobility mainly in vehicles but also on the roadside. The cooperation in iMobility is quite unique with a close cooperation between industry and public parties in the various working groups.

CEDR recommends NRAs to actively participate in the relevant iMobility working groups, including co-chairing them, in order to increase NRA influence on the development of intelligent vehicles and infrastructure. CEDR participates actively in the iMobility Forum Steering Group continuing the work of the last couple of years, underlining the importance of the developments in iMobility to NRAs, and liaise with ASECAP to provide a common road authority and operator view to the governance of the iMobility Forum.

Amsterdam Group

The Amsterdam Group was formed as a strategic partnership between the automotive industry (Car2Car Communication Consortium) and infrastructure organisations (CEDR, ASECAP, POLIS) as committed core stakeholders in the C-ITS deployment. The deployment partnership is focused on deploying from 2015 onwards of simple non-complex services with a clear user benefit supported by a solid business model. In such a way the deployment is viable even with limited penetration in the vehicle fleet and limited hot spot implementation of short-range communications infrastructure. The role of the Amsterdam Group is thus to facilitate consensus building on deployment related matters on a European scale, to initiate work on important issues needed for (initial) deployment based on a roadmap (which serves as a guiding star for the deployment of members in corridors) and to consolidate the findings from deployment initiatives as a basis for further agreement among the deployment partners. CEDR has taken up a prominent role in chairing the Amsterdam Group from the very beginning. In May 2013, the CEDR Governing Board has mandated two NRA representatives to act on behalf of CEDR in chairing the Amsterdam Group and representing it externally as well as coordinating the related CEDR membership issues. On a European scale, the Amsterdam Group is perceived as a valuable partner in preparing C-ITS deployment.

CEDR continues its support for the Amsterdam Group.

ANNEX 3 Meetings and consultations to prepare priority action (b) 'the provision of EU-wide real-time traffic information services' (RTTI)

<u>Overview of Expert Meetings and their objectives:</u>

1. on April 15th, 2013: Presentation of EC preparatory work, comments and viewpoints of experts, key elements to be retained for specification
2. on October 10th, 2013: Progress the preparatory work for the drafting of specifications, Presentation and discussion of EC draft vision document, discussion on the possible scope of the future specifications, introduction to the Cost-Benefit analysis, provide overview of recent developments in the field of floating car data
3. on February 27th, 2014: Progress the preparatory work for the drafting of specifications, presentation and discussion of the draft objectives and the problem definition based on a draft problem tree, presentation and discussion of a EC non-paper regarding the possible main parameters of the possible future specifications, update on the status of the ongoing public consultation
4. on April 30th, 2014: Progress the preparatory work for the drafting of specifications, presentation and discussion of a revised EC non-paper regarding the possible main parameters of the specifications, presentation and discussion of the draft results of the cost-benefit analysis, presentation and discussion of the results of public consultation
5. on May 28th, 2014: Progress the preparatory work for the drafting of specifications, presentation and discussion of a revised EC non-paper regarding the possible main parameters of the specifications
6. on June 25th, April: objectives same as 5th meeting
7. on July 10th, 2014: objectives same as 6th meeting
8. Planned on October 15th, 2014: feedback on the outcomes of the EIAG consultation, presentation of EC approach towards real-time traffic information in urban areas, invitation of Joint Research Centre the explanation of the INSPIRE geoportal.

In parallel the EC informed the MS representatives in the regular <u>European ITS Committee</u> meetings, for example initially on the joint meeting of the ITS Advisory Group & ITS Committee on December 3rd , 2013, where a concept paper on real-time traffic information services was presented where the following points were discussed

- Geographical scope of the services (interoperability across the EU only on the TEN-T or on the whole interurban network or also in urban areas) whereby the right balance needs to be found between costs and benefits
- How to promote co-operation between the public sector that is mostly collecting data and the private sector that is mostly processing data and providing services?
- Finding the right balance between achieving public policy goals and societal benefits and the need to promote innovation and preserve competition in the sector?
- Should minimum requirements / standards in terms of data quality be envisaged?
- Ownership and re-use conditions of probe data generated by vehicles. Is there a role for the European Commission in this respect?

and later on the 9th European ITS Committee meeting on April 7th, 2014, about the following key results of the expert group meetings
- Main objective identified as establishing appropriate enabling framework conditions to promote the provision of accurate, reliable and content-rich real time traffic information services

- Draft specifications to be seen as part of a toolbox of measures available at EU level including R&D activities under Horizon 2020 and financial support for deployment under the Connecting Europe Facility
- Specifications clearly not meant to mandate deployment

In addition on the Public Consultation (which closed on 14 March 2014 with 101 replies received)
- Good mix of stakeholders representing various segments in the traffic information value chain covering 22 Member States
- Stakeholders broadly supportive of action at EU level to create a common EU framework fostering the provision of RTTI services but important
- differences between the views of different stakeholders groups (public, authorities, road operators, ITS service providers and ITS professionals) as regards the scope of intervention
- The need to preserve competition and innovation in the RTTI services market is highlighted
- Further improvement of quality, in particular reliability of RTTI services is considered a priority

ANNEX 4 CEDR Position on Road Vehicle Automation

Background
Automated driving is becoming increasingly important, and will place demands to NRAs (National Road Authorities) in very near future, before 2020. While automated driving will bring about several benefits to NRAs, it will cause also costs and changes in the traditional roles of the NRAs. The cooperation with key stakeholders such as vehicle manufacturers, the telecommunication industry and the IT industry will intensify as a consequence. Closer collaboration with globally operating industries makes it necessary for NRAs to intensify their European and intercontinental cooperation (Americas, Asia-Pacific). The development will also bring a number of new challenges concerning legal issues, data security, and road safety especially in the transition phase towards high automation. Coming to full automation, general mobility and interworking with other transport means will fundamentally change. Furthermore, totally new players are expected to enter the market.
In April 2016, the European Transport Ministers gave out a declaration on connected and automated driving, indicating strong EU and Member State support to developing and deploying road vehicle automation. A week later, the CEDR Governing Board discussed road vehicle automation in a dedicated workshop facilitated by CEDR Task Group 'Utilising ITS for NRAs'. This position paper reflects the GB view based on that workshop. In doing so, this position paper complements the CEDR ITS Position Paper (issued 2014).

CEDR view on road vehicle automation
CEDR
- recognizes that automation is already happening now and is becoming increasingly important
- supports the European Transport Ministers' Declaration of Amsterdam on connected and automated driving, and will work towards a common strategy for CEDR and NRAs with the aim of ensuring road safety, transport efficiency and sustainability in the process towards high level automation, including the transition phase
- recognizes the need to act right now since automation is disruptive, will affect NRA core business of network operation, is developing very fast, and only by being active CEDR and the NRAs will be able to promote their interests
- realizes that as all NRAs can act proactively, some NRAs need to take more active role than others. These active NRAs will benefit from 'learning by experience' using a rapid learning circle via piloting and test areas, and from open exchange of information between the NRAs involved in pilots and test areas.
- aims for a written policy on road trials that allow harmonisation with other NRAs to enable cross border pilots and trials
- continues exchange of experiences, sharing of knowledge, discussion on the possibly changing roles of the NRAs, and formulation of common views on road vehicle automation among NRAs within the framework of CEDR cooperation
- encourages strong liaison with European and national regulatory bodies in order to remove legal barriers for connected and automated driving
- encourages a strong public partnership of NRAs across the world, and of road operators across Europe for facilitating road vehicle automation and for forming common views on points of crucial interest for road authorities and operators
- encourages public private cooperation with industry and service providers in the automotive, telecommunications, IT, mobility, and other relevant sectors in order to ensure required research and innovation, testing and piloting, evaluation, and deployment actions.

This should be done in close liaison with the European Commission for synchronizing the European and national research, innovation and deployment funding and support.

- considers setting up a multi-stakeholder coordination group (referring to the working model of the Amsterdam Group) on road vehicle automation and/or selected aspects of it
- highlights the importance of agreeing on the requirements of automated driving towards NRAs with regard to the types and quality of the physical infrastructure, the digital infrastructure, the traffic management/ control/ information centres, real-time information systems and services, as well as traffic management and circulation plans, etc. The requirements should be set on the level, which is optimal from the cost-benefit and cost-efficiency perspectives

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Conference of European Directors of Roads
Avenue d'Auderghem 22-28
1040 Brussels, Belgium

9 791093 321240