

Conférence Européenne des Directeurs des Routes

Conference of European Directors of Roads

Executive summaries of CEDR reports 2014-2017

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This report provides a compilation of executive summaries from CEDR's reports published under the Third Strategic Plan(SP3). These reports were published in the period 2014-2017.

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http://www.cedr.eu/home/publications/

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Disclaimer

This document details the outputs of CEDR working groups. It does not express any view of opinions of CEDR. Readers should not regard any views as a statement of the official position of CEDR or its member countries.



1) Trans-European road network, TEN-T (Roads): 2013 Performance Report



http://www.cedr.eu/download/Publications/2014/TENT_Performance_Report_2013.pdf

Executive summary

This is the third biennial report produced by the Conference of European Directors of Roads (CEDR) on the performance of the trans-European road network, TEN-T (Roads). It shows the state of the art of the TEN-T (Roads) network on 1 January 2013. The 2013 TEN-T (Roads) performance report builds on previous reports to show that it is possible to produce comparable information on the performance of the TEN-T (Roads) network within the majority of CEDR member countries.

To date, 24 of the 27 CEDR member countries have chosen to participate in the TEN-T (Roads) performance report. Together, these countries cover more than 86,000 km of the total 103,000km TEN-T (Roads) network. This network represents the most important roads in Europe. More than two billion vehicle kilometres are driven on this network every day.

The 2013 report is based on data from 21 countries1 and includes the following performance indicators:

Structure of the network Performance of the network Road Type Average Traffic Flow Number of Lanes Traffic Density Length of Bridges Proportion of Heavy Goods



Vehicles Length of Tunnels Heavy Goods Vehicles Traffic Flow Road Environment Fatal Accident Rate ITS and PPP Schemes Performance of ITS Sections

Definitions of the performance indicators are given in Section 8, Appendix 2: BASE DATA DEFINITIONS. The only changes in data definitions from the 2011 report has been to clarify the definition of ITS and Road Environment.

As this is the third biennial performance report, and given the relative stability in the performance indicators included in the report, for the first time, changes are reported between the performance of the network in 2011 and 2013; in future, it is anticipated that longer-term trends will be able to be identified and reported.

The 2013 report shows the performance on the network on 1 January 2013. The revised TEN-T Guidelines2, which came into effect in January 2014, introduced the concepts of Comprehensive and Core TEN-T networks, for which the road infrastructure requirements differ. These changes will be reflected in the 2015 report.

The performance reporting framework continues to provide a mechanism for CEDR member countries to submit consistent data about network performance that can enable meaningful comparison of information and benchmarking between National Road Administrations (NRAs). The 2013 performance report again shows that it is possible to produce a performance report of TEN-T (Roads) within the NRAs with a common location referencing system as well as with common data definitions throughout Europe.



2) Winter service research needs



http://www.cedr.eu/download/Publications/2015/Winter_service_research_needs_2015.pdf

Executive summary

CEDR task group N3 (Winter maintenance standards) was tasked with providing CEDR with information about winter maintenance standards, procedures and operational methods and challenges as well as a list of possible research topics from the field of winter service that could be used in the coming 2015 CEDR research call.

The group divided its work into <u>3 working phases</u>



To begin with, **information about winter service organisation** was obtained through the exchange of information at task group (TG) meetings and the exchange of e-mails between members of the TG. In the second phase, a questionnaire about **operational activities and problems** in providing winter service was drawn up and distributed among members of the TG and other CEDR members.

The questionnaire was logically organised according to 7 topics and contained a total of 37 questions. The group achieved a very good response rate of 55% from all CEDR members and was able to compile quite a lot of useful information for



comparative analysis. The analysis was carried out on ten questions, determined as the most adequate for comparison. The analysis can be summed up as follows:

- 1. Most countries organise their winter service at state level.
- 2. Winter service is generally provided by a state-owned or private company.
- 3. Generally speaking, all analysed countries find it difficult to ensure the drivability of roads in winter time.
- 4. The main problems that countries face when providing winter service are: problems connected with salt spreading, heavy traffic, and operational problems relating to manpower and financial resources.
- 5. The standards and regulations for providing winter service generally meet the requirements of road users.
- 6. All analysed countries use some kind of system that connects road weather stations and sensors. They also have access to data from meteorological authorities, weather forecasts, etc.
- 7. Weather and traffic information is mainly obtained from national meteorological authorities, weather forecasts, floor sensors, and road weather stations
- 8. Most countries use the following measures for operational interventions:
 - Intervention according to previously prepared road condition scenarios.
 - Required levels of road drivability.
 - Intervention on the basis of MDSS and Road Weather Information Systems (RWIS).
 - The time interval in 24h in which the road needs to be drivable.
- 9. The usage of advanced technologies in winter service varies greatly from country to country; only a small amount of the technological solutions available are actually in use.
- 10. The main topics suggested for research relate to the salting of roads, the monitoring and evaluation of the efficiency of winter service activities, new gritting materials, Maintenance Decision Support Systems (MDSS), and new weather forecasting technologies.

After reviewing the answers to the questionnaire and carrying out comparative analysis, the task group was able to identify the research **topics that would probably be of common interest** to all CEDR members. Topics were rated according to their importance for the analysed countries:



- 1. Guidelines for winter service
- 2. Calibration mechanisms for machinery
- 3. New gritting materials
- 4. Maintenance Decisions Support Systems (MDSS)
- 5. Salt and gritting material consumption

The task group then focused on coming up with solutions for its task and comparing possible ways forward. The task group concludes that with regard to winter service topics, CEDR members can choose between three solutions:

- 1. CEDR invests in the above-mentioned research topics, which are recognised as being of common interest to all members of the group and to the NRAs that answered the questionnaire.
- 2. CEDR does not invest in research topics from the field of 'winter service' as there is enough ongoing research already but should instead invest in obtaining information about research results and new technologies relating to the above-mentioned topics.
- 3. CEDR continues its investment in the topic of winter service through the work of its task groups, focusing its attention on 'How to improve maintenance with less money?'

After comparing the solutions (their social, economic, and environmental consequences), it seems that solution No. 2 is the most appropriate for CEDR members in the current circumstances. Consequently, CEDR task group N3 (Winter maintenance standards) recommends that CEDR does not include the topic of winter service in its research call, but first invests in obtaining information about completed (and on-going) research from the field of winter service, which should be abundant. Additional funds could be better invested in encouraging countries to implement new, already available technologies into their winter service practice.



3) CEDR Call 2012: Safety Final Programme Report ASAP and BRoWSER Projects



http://www.cedr.eu/download/Publications/2016/CEDR-CR-2016-2-Call-2012-Safety.pdf

Executive Summary

This Final Programme Report covers two projects (ASAP and BRoWSER) from the CEDR Research Call 2012 on Safety, which address key issues around road worker and road user safety. Funding was provided by the national road authorities of Belgium (Flanders), Germany, Ireland, Norway, Sweden and the UK.

The ASAP project - Appropriate Speed saves All People - looks at recommending the best methods of controlling speeding through roadwork zones. The BRoWSER project - Baselining Roadworks Safety on European Roads - considers two aspects, improving data collection on worker injuries and near misses, and understanding the optimum roadworks layouts that enable road users to approach, travel through and exit works without causing injury to workers and others.

Both the ASAP and BRoWSER projects directly relate to the safety of people who work on roads who are directly exposed to risks from road user activities. These include all people engaged in construction, maintenance and renewal schemes, vehicle recovery operators and any other activities where live traffic is present including traffic management and incident support services. The aim is to reduce risks to road workers with an ultimate objective of Zero Harm. To achieve this requires better information on incidents across Europe, consideration of standards applicable to works, analysis of the effects of vehicle speed on the risk to the workforce and examination of work zone inspection regimes.



This report presents the main outcomes from the BRoWSER and ASAP projects and aims to bring together the conclusions and recommendations of the projects, based on the final project deliverables and conclusions from the three dissemination workshops carried out after the completion of the projects.

In moving towards a more common European approach for roadworks with respect to speed management, layouts and data collection, increased collaboration and cooperation between countries is of major importance. There is potentially great benefit in sharing best practice between different countries, but also between organisations and authorities within the same country. Increased harmonisation and sharing of best practice may allow national road administrations to utilise the experiences of others to facilitate and accelerate deployment within their own countries.

There are obvious challenges in implementing a common pan-European database which includes all relevant data. Although a Europe-wide roll-out of a full database would be extremely difficult, benefits can be achieved in small increments. Currently there appears to be such a serious lack of data that any improvement would be of use. In some cases, the issue may be more a lack of access to the data, or a lack of knowledge of which data already exist as well as who is the responsible body. Possible bodies that might be able to support data collection through the use of existing data are hospitals, insurance companies and contractors. Small steps in this area could have a big impact.

The general lack of data about road worker accidents as well as discrepancies between countries as regards roadwork layouts motivates action on European level as well as EU-specific initiatives. The question of who should implement the harmonisation process is open. The question has been passed to the CEDR Task group on Road Safety.



Call 2012: Road owners adapting to Climate Change ROADAPT and CliPDaR projects.



http://www.cedr.eu/download/Publications/2016/CEDR-CR-2016-1-Climate-Change-Call2012final.pdf

Executive Summary

Infrastructure is the backbone of our society. Citizens, companies and governments have come to rely on and expect uninterrupted availability of the road network. Climate change is an important topic within the context of designing, maintaining and operating traffic networks. Most transport infrastructure is intended to be available (in service) to the public for several decades. The life cycles of assets in transport are long enough to take the full strain that comes with climate change; however, climate impact is experienced on a small scale. Crops are destroyed by floods, timber is felled by heavy storms and infrastructure is devastated by various kinds of extreme events. The adaptation of road networks to a changing climate is one of the important issues that road authorities have begun to address and that needs to be further continued in the near future.

The main objective of the Conference of European Directors of Roads (CEDR) Call 2012 "Road owners adapting to climate change" is to provide road owners with adaptation technologies and the models and tools to support decision-making concerning adaptation measures for the road infrastructure. The ROADAPT (Roads for today, Adapted for tomorrow) and CliPDaR (Design guideline for a transnational database of downscaled Climate Projection Data for Road impact models) projects form an integral part of this 2012 CEDR research programme.



This report provides an analysis of the two projects and provides and overview of the final conference held in Brussels (on 27-28th October 2015). Concise recommendations are given on how to disseminate and implement the products of both projects.

Outputs of the ROADAPT project

Outputs of the ROADAPT project contain tools for risk identification, analysis, evaluation, and mitigation. The set consists of 6 guidelines and 3 case studies. The aim of the Guideline on the use of data (and data requirements) for the current and future climate for road infrastructure is to give background information and guidelines for tailored and consistent climate data and information for studies on the impact of the current and future climate for transnational road networks in Europe that are suitable for National Road Authorities (NRAs).

The QuickScan methodology produces a first (quick) estimate of the major risks that can be associated with weather conditions both in the current climate and in the future, together with an action plan for adaptation. The list of top risks allows an NRA to consciously and effectively focus on specific areas in their network and/or on specific threats. Focusing on the top risks enables existing resources to be used more efficiently.

The objective of the vulnerability assessment tool is to describe the efficient, existing tools for assessing vulnerabilities within road networks, with a focus on networks managed by NRAs. In addition, a new comprehensive vulnerability assessment methodology is suggested, based on and compatible with the RIMAROCC method. Using the vulnerability maps created in the process, it should be possible to combine these with detailed climate change projections. An extensive database that helps with the selection of adaptation measures and strategies for the mitigation of the effects of climate events was designed and set up within the ROADAPT project. The database contains more than 500 measures to support road owners with a decision-making tool.

The method for Socio-economic impacts analysis is well interconnected with the methodology for the QuickScan and the vulnerability assessment, as the selection of the threats to be evaluated is based on their outputs.

Selection of adaptation measures and strategies for mitigation is a 10-step approach for selecting an adaptation strategy containing a database.

Outputs of the CliPDaR project

The deliverables of CliPDaR aim at enabling the road owner to make informed and efficient decisions on whether a proposed climate change scenario is suitable to derive particular adaptation measures or not. The information given enables customised climate change scenarios to be established, which help to answer particular problems regarding future transport infrastructure. This is accomplished by a guideline that helps decision makers through the whole process from the socio-economic scenarios to the adaptation measures to be put into effect. Ensemble approach to climate scenarios and the description of the downscaling of climate data are the highlights of the CliPDaR project.



Outcomes of the projects and this report:

The research focuses on awareness of the impact of climate change - crushing the stereotype that climate change is just another conspiracy theory. ROADAPT and CliPDaR together with some presentations from the final conference have provided hard evidence that climate change and extreme weather events are becoming more and more common, especially for coastal territories, and generates significant additional cost to infrastructure construction and maintenance. This awareness needs to be spread across the pool of decision makers.

Experience of champions (Nordic countries, Germany, the Netherlands).

Some countries have already set up adaptation strategies or are in the process of developing them. These are mostly countries that have begun to experience extreme weather events on a regular or seasonal basis. Presentations from Denmark, Sweden, Norway, and the Netherlands clearly show that the road to adaptation to climate change is not easy but in the long term it will pay off. It should be noted that climate change mitigation is essential. An estimate from the Netherlands shows that if we do not keep the global temperature rise at 2°C but let it escalate to 5.5°C, the amount of the world's GDP that will be necessary to mitigate the damage will rise from 2% to at least 8% by 2100.

A large part of this report is devoted to recommendations within three main domains – dissemination, implementation and future research. Recommendations are found at the end of each of the project chapters. These are mainly dealing with each particular product or outcome, providing hints on implementation and future research. More general recommendations covering both projects and sometimes stretching outside the boundaries of particular projects are given at the end of this report. These recommendations are sub-divided into specific sections for dissemination - awareness creation, and implementation - strategy and action plan development, application in transport network management.



5) Efficiency in road public procurement



http://www.cedr.eu/download/Publications/2016/Efficiency-in-Road-Public-Procurement.pdf

Executive summary

Over the past decade, the topic of procurement has become increasingly important. Not only because overall government spending on procurement is estimated to be 16 per cent of the European Union's GDP, but also because of the increasing importance that is attached to government buying power as a policy instrument. This and the development of European procurement legislation mean that our traditional procuring agencies have to make a fast transition and become much more professional. NRAs face common issues/challenges. Thus far, each NRA has been finding its own way to cope with these issues/challenges, for example regarding the instruments used to award the most economically advantageous tender or for stimulating innovations. In 2012, CEDR decided to set up a task group to explore common problems in awarding contracts and find fitting solutions, build a discussion platform, and identify steps that will help CEDR become a reliable stakeholder on public procurement issues.

Procurement topics: selection and description in the report

This report is the result of a survey conducted within task group S6 (TG S6) into perceived common procurement issues and the solutions applied in participating countries. Eight survey topics were selected on the basis of:

• **urgency and difficulty** (qualification and selection of bidders, the most economically advantageous tender, abnormally low tenders, dispute resolution);



- political urgency (the role of small and medium-sized enterprises, social return);
- additions to the new Procurement Directive (innovation, past performance).

For each topic, this report describes the current state of European legislation, the current practice in the countries represented in TG S6, a best practice case from one of the participating countries, and the changes on the specific topic in the new Procurement Directive 2014/24/EU. This directive had to be transposed into national legislation by EU member states by 16 April 2016.

TG S6 does not seek to provide solutions to all NRA procurement challenges. However, by providing practical solutions and examples of best practice, it will give each NRA the opportunity to address these issues in a practical way and to know where to find contacts in other NRAs.

Conclusions, based on the discussions in TG S6

In general, the new Procurement Directive provides guidance for NRAs on the procurement issues they face. However, as far as the selected topics are concerned, this guidance is not always as helpful as many countries had hoped, e.g. when it comes to the positive use of past performance or the identification and handling of abnormally low tenders. The general conclusion on these topics is that sharing experience will help NRAs find best practice for implementation of the new directive. This could help NRAs work with the directive in a sound and efficient way.

Innovation

- Under the previous directive, procuring agencies faced various kinds of obstacles when it came to procuring innovation: legal and financial obstacles, risk avoidance, and problems with intellectual property rights.
- The new directive provides new opportunities for innovation by introducing the public procurement of innovation procedures. Although the new directive is expected to at least eliminate legal obstacles and facilitate risk avoidance, the new procedure is not expected to address all obstacles faced by NRAs.
- The Swedish Transport Administration shows that the combination of functional specifications and adequate investment incentives for providers helps stimulate companies to create innovations as long as the risks involved are not too great.

Small and medium-sized enterprises:

- The new directive encourages the role of small and medium-sized enterprises (SMEs). The challenge to member states is to stimulate the role of SMEs without giving up the advantages of aggregated public purchases. Efficient, SME-friendly procurement is possible.
- The Irish NRA, for example, has ample experience in combining several measures such as market analysis, the subdivision of contracts into lots, and decreased requirements for capacity and turnover.



Qualification and selection of bidders:

- The qualification and selection of bidders is challenging when it comes to formulating the best and most appropriate criteria, especially when foreign bidders are involved. NRAs expect e-Certis to be a help when it comes to fact-checking bidders' self-declarations.
- The survey shows that the majority of NRAs use selection criteria such as reference projects, experience, and/or financial criteria/cash flow. When it comes to identifying effective selection criteria, NRAs can learn from each other, which could lower transaction costs. In Estonia, for example, time is saved during the tender procedure by having tenderers deliver proof of key personnel's technical and professional abilities after winning the bid, instead of before.

Past performance:

- Past performance is essentially a selection tool. It focuses on the performance of a company instead of the bid during the tender. Past performance is only included in the new directive as an incentive against misconduct. The NRAs represented in TG S6 regret that the new directive does not provide for the option of rewarding good (past) behaviour. This is why the use of 'past performance' differs throughout Europe.
- TG S6 proposes that CEDR members share information and perform a joint evaluation in this area. Italy, for example, has developed an effective vendor rating system.

Most economically advantageous tender (MEAT):

- The new directive provides more direction regarding the inclusion of qualitative and social aspects in tenders. The effectiveness of MEAT is nevertheless determined by how countries substantiate it. NRAs could learn a number of things from each other, e.g. how to make quality a substantive part of MEAT and how to monitor MEAT in the execution phase of projects.
- Experience in the Netherlands shows that the winning bid is often both the most economically advantageous and the least expensive bid. When given the right incentives, contractors are stimulated to focus on the needs of the procuring authority and to find appropriate, efficient, and effective solutions.

Social return:

- Many member states are experimenting with how to increase social return on investment in an effective and durable way. Social return is primarily politically driven. Sharing experience might help NRAs to learn more quickly so that they can jointly develop durable methods for social return.
- The Swedish Transport Administration creates between 200 and 1,500 internships, apprenticeships, and full-time jobs per annum by including clauses for social return in their contracts.



Abnormally low tenders (ALT):

- Unfortunately, the new directive does not provide any more guidance on abnormally low tenders than the previous directive. The difficulties faced by CEDR members in proving abnormally low tenders are expected to continue.
- In 2016, TG S6 will work on a brochure outlining best practice in the way NRAs handle ALTs. It will definitely include Poland's systematic approach to assessing a bid, which provides structure and guidance.

Dispute resolution:

Dispute resolution is not part of the procurement directive. The Remedies Directive, however, does not help overcome disputes. This is costly, time consuming, and not very practical. The sharing of experience within CEDR could help NRAs arrive at a practical common approach to dispute resolution and could help CEDR influence a revision of the Remedies Directive.

Continuation: procurement within CEDR

To develop procurement further within CEDR, several development tracks are needed. CEDR should move from sharing knowledge at an operational level (e.g. in the eight chosen topics) to more tactical and strategic topics.

The tactical level comprises issues that concern the way NRAs contract work, deliveries, or services. For example, the shift from products to services and the use of alliance contracts, concessions, and framework contracts. On the tactical level, the new Procurement Directive contains new procurement methods, such as the negotiation method and the innovation partnership.

Strategic issues concern decisions about 'make, buy, and share' and strategies on (early) market involvement. These will be part of early project decisions, where scope, environment, and cooperation issues are still open. However, this can also involve the market in new developments such as smart mobility. This broadening of scope will help professionalise the procurement function within NRAs.

Other than that, CEDR can take the lead in new procurement initiatives, for example by organising a number of shared innovation procurements. A combination of greater sharing of experience and increased cooperation on procurement will help CEDR become a more reliable partner on procurement issues for other stakeholders such as the European Commission.



6) Management of contaminated runoff water: current practice and future



research needs

http://www.cedr.eu/download/Publications/2016/CEDR2016-1-Management-of-contaminatedrunoff-water.pdf

Executive summary

Transport and mobility are fundamental to modern society. However, roads pervade the landscape, and their short- and long-term physical, chemical, and biological impacts may harm both public health and the environment. For example, increased traffic loadings and the construction of new roads may pose a serious threat to the aquatic environment, for instance because of contaminated runoff. For this reason, awareness of environmental constraints is important, which is why the reduction of pollution is a key challenge for national road administrations (NRAs).

The EU Water Framework Directive (WFD) aims to protect and improve the ecological status of water bodies in order to promote sustainable watershed use. This requires that 'good status' should be achieved for all surface and groundwater bodies by 2015 or 2027 at the latest. Although much effort has been made to meet the objectives of the WFD, 47 per cent of EU surface waters have still not achieved good ecological status. Runoff water from the construction and operation of roads contains a plethora of chemicals including particles, nutrients, salts, metals, and persistent organic pollutants (POPs). Consequently, NRAs must ensure that their water management practices meet the requirements of the WFD, thereby ensuring sustainable development of the road network.



A CEDR task group, TG I5 (Water Quality), led by Norway and with members from Austria, Denmark, Ireland, Italy, Sweden, and Switzerland was formed in 2013. The group sought to provide answers to the following questions:

- 1. When should contaminated runoff water be treated to meet the requirements in relevant EU directives (e.g. the WFD)?
- 2. What is the best practice when treatment is mandatory?
- 3. What will the research needs on these matters be within the next decade?

The work was divided into two subtasks;

- 1. A state-of-the art report (SoAR), covering questions 1 and 2.
- 2. Research needs, covering question 3.

The present report compiles the results of both subtasks and aims to review current practice regarding the management of contaminated runoff water during the planning, construction, and operation of roads by European NRAs. It also examines whether current management is compliant with the requirements of the WFD. Direct or indirect impacts on water bodies of a more physical character (e.g. landscape damages, canalisation etc.), water quantity, and climate change were not included in this work. However, it should be stressed that these aspects are also highly relevant in the WFD.

The report also presents future research needs. The content of this report is based on findings and information gained through discussions during meetings, countryspecific mini-reports on these matters, and a workshop with invited NRA experts from Germany, Poland, and the UK. In short, this work is not a comprehensive review of grey literature or articles published in peer-review scientific journals.

The TG's review shows that all countries need to address environmental issues such as water quality when planning, building, and operating the road network in order to meet the requirements of environmental authorities and national and international regulations such as the WFD.



7) Energy efficiency in road operations and management



http://www.cedr.eu/download/Publications/2016/CEDR2016-3_Energy-Efficiency_final.pdf

Executive summary

In setting its third Strategic Plan (SP3), the Conference of European Directors of Roads (CEDR) recognised energy efficiency in road operations and management as one of their key challenges. The aim of Task Group I3 (Energy Efficiency) is to disseminate to CEDR members best practice on approaches to reducing energy use when operating and managing road networks.

Energy costs represent 10–20% of routine maintenance budgets. In general, those costs are rising while the budgets available to pay them are falling. Energy costs may only represent as little as 2% of the whole life costs of a length of road network. This can result in these costs not receiving as much attention as required and often being dismissed as 'an unavoidable cost'.

There is a general consensus among the public and politicians to migrate to a lowcarbon economy. However, emissions associated with maintenance and operation only account for less than 1/50th (2%) of the emissions from vehicles using the network – less if a country produces a lot of energy using renewable sources. It is, nevertheless, incumbent upon road operators to reduce the net contribution of that 2% and to do so in a cost-efficient manner without affecting the operation of the network or the safety of those using and maintaining it.

There are numerous interventions available to road operators that can be used to reduce energy use. This situation is both positive (options are available) and negative (it is hard to select the best option). This document identifies most of the



interventions currently implemented by at least one NRA together with an easily understood assessment of the economic return, environmental and safety impact, and political acceptability of these interventions. The list can be used by different NRAs in different ways: for some, it will be a list of new opportunities; for others, it will be a checklist that they can use to ensure they are doing everything that can be done.

However, implementing any new initiative, such as energy reduction, into a large, complex, and inter-connected business such as national roads operators has its challenges. It can be highly disruptive if approached incorrectly. This report provides a pathway to achieve and sustain a reduction in energy use. It is based on the approach used by many multinational businesses and has a successful track record. The first step is for directors to announce that they want to see a change and will support those undertaking change.

The blockers to any change are usually a lack of budget and a lack of appropriately skilled staff. However, it should not be forgotten that using energy – and thereby generating a carbon footprint – is an unpopular, expensive, and labour-intensive activity. Reducing energy use will always result in a reduced whole life cost. It may require greater upfront costs in some instances, but if that is unaffordable, other solutions exist. Staff are generally well skilled in reducing energy costs. Again, their household energy costs are only in the region of 2% of their income, but they understand the technologies and economic cases of technologies such as LED lights, solar panels, and reducing hours of operation. They do not view it as an unavoidable cost.

Identifying what to target is relatively easy, it is every asset that consumes energy. Priority should be given to the greatest consumers of energy because that is where the greatest savings can be achieved.

The greatest consumer of energy is usually road lighting. Reducing energy use for road lighting provides economic benefits in terms of reduced energy bills, environmental benefits in terms of reduced CO₂ emissions and reduced light pollution, and societal benefits in terms of reduced road worker exposure to risk through a reduced maintenance burden.



8) Trans-European Road Network, TEN-T (Roads): 2015 Performance Report



http://www.cedr.eu/download/Publications/2016/CEDR2016-4 N1 TEN-T-Performance-Report.pdf

Executive summary

This is the fourth biennial report that CEDR has published on the performance of the TEN-T (Roads) network within CEDR member countries. CEDR's intention in collecting and publishing this information is to establish a stable set of data with which to monitor trends and identify changes in the performance of the TEN-T (Roads) network. As such, the report is a useful source of information for individual National Road Administrations (NRAs), regulatory bodies, and others for benchmarking purposes and for setting national performance targets.

The first Performance Report was published in 2009 and since then, despite being voluntary, 24 of CEDR's 28 member countries have chosen to participate in at least one of the four reports. Together, these 24 countries cover approximately 90,000 km of the total 103,000 km TEN-T (Roads) network. This network represents the most important roads in Europe. More than two billion vehicle kilometres are driven on this network every day.

The following performance indicators are included in the fourth CEDR performance report:

Structure of the network	Performance of the network
Road Type Average	AverageTraffic Flow
Number of Lanes	Traffic Density



Length of Bridges	Proportion of Heavy Goods Vehicles
Length of Tunnels	Heavy Goods Vehicles Traffic Flow
Road Environment	Fatal Accident Rate
ITS	Planned Capacity improvements

The 2015 report provides a detailed snapshot of the performance of the TEN-T (Roads) network in CEDR member countries in 2015 and identifies overall trends in the performance of the network as a whole. The report shows that:

- The TEN-T network *includes the most important roads in Europe*. 60% of the network consists of motorways (this proportion is gradually increasing) and 17% is made of up roads with more than 4 lanes. The network also includes 1,200 km of bridges and more than 1,000 km of tunnels. Investment in the TEN-T network is continuing, with planned capacity improvements identified on nearly 25% of the network.
- 2. The network is also **very heavily trafficked**. More than 40% of the network carries in excess of 20,000 vehicles per day while 6% carries more than 80,000 vehicles per day, Traffic Density exceeds 12,000 vehicles per lane per day on 15% of the network, and HGVs comprise more than 20% of all traffic on nearly 20% of the network. The Traffic Flow for both all vehicles and HGVs specifically is increasing, particularly on motorways.
- 3. However, despite this, the network *is relatively safe*. The average Fatal Accident Rate on motorways is less than 2 fatal accidents per BVehKm and less than 6 per BVehKm on non-motorways. However, at the same time, there are wide variations across the network.

The main change impacting on the 2015 report has been the implementation of the new TEN-T Guidelines in January 2014, which have resulted in CEDR members making significant changes to the roads included in the TEN-T as well as some recategorisation of motorways and non-motorways.

The 2015 report again demonstrates CEDR's ability to collect and report consistent data about network performance that can enable meaningful comparison of information and benchmarking between NRAs and that can support wider CEDR initiatives both now and in the future.



9) Acting on climate change



http://www.cedr.eu/download/Publications/2016/CEDR2016-5_Acting-on-climate-change.pdf

Executive summary

During the COP21 meeting in Paris in 2015, it was decided to have a comprehensive plan for acting on climate change. Although this meeting did not provide legally binding agreements, the message was still clear: climate change is becoming increasingly evident, and the consequences will affect us all, including all types of transportation modes.

For national road authorities, it is important to recognise the changes in time in order to reduce greenhouse gas emissions and provide more resilience for existing and proposed roads.

Acting on climate change is not a unified topic for road owners; both mitigation and adaptation to climate change are different sub-topics. The objective of mitigation is to minimise the magnitude and impacts of climate change by introducing methodologies to minimise greenhouse gas emissions (GHG). The objective of adaptation is to upgrade the infrastructure to increase resilience and robustness, e.g. to flooding.

Despite the dissimilarities, adaptation and mitigation share the need for long-term planning for an uncertain but undoubtedly different future. Both topics are, therefore, presented in this report.



Planning for GHG reductions according to national targets

The planning of the transport system is usually based on the forecasting of future traffic volumes. The forecast is based on current trends in society, predictions of future economic growth, and costs of transport. All over Europe, these trends and models point towards further growth in transport and traffic volumes. The highest growth is predicted in Eastern Europe, where car ownership is getting closer to the levels in Western Europe. Safety factors and seamless mobility can justify improved road networks, but the forecasts also indicate a need for larger roads with greater capacity. These new roads lead not only to more traffic and, therefore, more GHG emissions, but also to higher energy use and GHG emissions during construction, operation, and maintenance. In its last report, the IPCC warned that infrastructure developments that lock societies into GHG-intensive emissions pathways may be difficult or very costly to change and that this reinforces the importance of early action for ambitious mitigation.

In order to reach climate objectives, there is a need for technical solutions in energyefficient vehicles, partly or fully dependent on electricity and a replacement of fossil fuels with bio fuels. However, these solutions will not be enough if large reductions in GHG emissions are to be accomplished. There is then also a need to change direction in the planning and development of society and infrastructure in accordance with behavioural changes. Such a development is a clear paradigm shift from planning for more traffic with cars and trucks towards sustainable mobility with accessibility through walking, cycling, and public transport thus reducing the reliance on cars, coupled with improved logistics and a modal shift leading to reduced truck volumes. In view of the paradigm shift from today's increasing car and truck traffic towards a more sustainable transport system, forecasting is very unreliable. Consequently, other methods are needed.

Section 1 of this report focuses on climate change mitigation. Based on examples from Sweden, Norway, Hungary, and Poland, the report explores an alternative planning method. The first step is to describe the current situation, what the trends are, and what the contributing factors are, in order to provide a general picture of the problem. A clear objective is also needed. Since most countries do not have precise GHG objectives for road transport, an example of how national objectives can be translated into a road transport objective is given. Then the gap between the trend and the GHG objectives can be described for road transport. An inventory of possible measures to reduce GHG emissions should be made. This has already been done in many countries and by the EU Commission. While these inventories can be used, updates may be necessary, and consideration should be given to new ideas. Possible measures to reduce GHG emissions can be clustered into packages. From these packages, scenarios can be drawn up and tested against GHG objectives and other targets. Backcasting from the scenarios that meet objectives can be used to develop an implementation strategy that includes policy instruments and measures that allow for progress towards meeting the objectives. Due to uncertainty, it is recommended that checks be made at regular intervals to allow the strategy to be adjusted.

Vehicles that use the infrastructure are not the only source of greenhouse gases and energy usage. Other major sources are the construction, maintenance, and repair



of the infrastructure (and also the construction, maintenance, and repair of vehicles and the production of energy). The more complicated the infrastructure project (such as tunnels and bridges), the higher the greenhouse gases emitted and energy used. This also has to be taken into account in the sustainable development of the infrastructure. This report describes both methods of calculating GHG emissions from infrastructure and methods of procuring more energy-efficient infrastructure construction, maintenance, and repair.

Strategy and action planning for adaptation activities

The degree to which roads are adapted to the challenge posed by climate change varies hugely between the different national road authorities (NRAs). At the same time, the consequences of climate change are already at a stage where roads are affected noticeably more frequently than they were a few years ago, a fact experienced and recognised by multiple NRAs. In order to maintain safety and mobility on national roads, the time has come to implement the many tools and methodologies developed in recent years in various national and international projects. However, initiating and anchoring climate change adaptation within an organisation is a demanding and oftentimes overwhelming task. This can lead to a de-prioritised approach, despite the benefits of investing in proactive adaptation measures.

Section 2, adapting roads to climate change, focuses on the following key aspects; strategy, action planning, methodologies/tools, and awareness. It is the strong belief of Task Group I4 that emphasising, describing, and template-forming these topics can lead to more climate change adaptation across borders, thereby resulting in more resilient roads.

The section on strategy focuses on management, improvement, prevention, and cooperation, and provides a template with specific examples on areas to work with. These include examples of information to road users, incident management, implementation through planning phases, tools for risk analyses, legislative work, research, information-sharing and much more. A template for an action plan is provided, giving examples of how to ensure responsibility and anchor climate change adaptation in the organisation in order to steer the organisation towards a more climate-resilient profile. An organisational awareness of climate change adaptation in an interdisciplinary context is considered undeniably crucial in this regard, since this will form the basis of how to act and prioritise resources.



10) Implementation Guide for an ISO 55001 Asset Management System



http://www.cedr.eu/download/Publications/2017/CEDR-Contractor-Report-2017-1-Implementation-Guide-for-an-ISO-55001-Managementt-System.pdf

Executive Summary

Following the publication of ISO 55000 in February 2014, the ARISE project (Application to Roads of ISO 55000 using Exemplars) was initiated by the Conference of European Directors of Roads (CEDR) in its 2014 Research Call through the topic 'Why and How to implement ISO 55000'. CEDR is an organisation which brings together the road directors of 25 European countries, and the funding partners of the current Joint Research Programme are the National Road Administrations (NRA) of Austria, Belgium-Flanders, Finland, Germany, Ireland, the Netherlands, Norway, Sweden, and the United Kingdom.

Road Administrations around Europe have been on an evolving journey towards more systematic and holistic management of their assets in recent years. Standardisation in the approach to establishing an Asset Management System (AMS) – in its broadest sense – started with the publication of the British PAS55 specification in 2008. This has now attained international standing through the development of the new ISO standard, built on the PAS55 foundation. CEDR has instigated and supported a number of research and development programmes with Asset Management (AM) as their theme, and in particular established a Task Group (N2) under TD Network Management. In addition, CEDR inherited the results of the ERANET Road II (2010 Research Call) 'Effective Asset Management' in 2013.



The ARISE project was awarded to an international team of experts from the UK and France, with access to resources in Portugal and Denmark. The team was led by WSP | Parsons Brinckerhoff, with partners EGIS Road Operation and Hyperion Infrastructure Consultancy.

ARISE has focussed on producing advice and guidance for road sector organisations considering why and how to implement ISO 55000; more specifically, after adopting the approach of ISO 55000, delivering an AMS means using ISO 55001 which is the management System Requirements. This Guide represents its primary published output, based upon examples gleaned from case studies of organisations which are at various stages of their asset management system implementation, and which have specific experience of ISO 55001 or its 'parent', PAS55. The project's aim is to facilitate open and practical dissemination of the principles of asset management as defined in ISO 55000 to as wide an audience as possible, and this Guide performs a key role in that process.

The Guide is intended to offer options and advice, rather than a 'one-size fits all' solution to establishing a formal Asset Management System that will help organisations to obtain value from their assets. It provides evidence and examples gained from the earlier stages of the ARISE research project, including priorities based on typical costs and benefits. The Guide does not contain a detailed way of assessing 'maturity', as this can be found in other literature cross-referenced in the document. It does explain the 'journey to maturity'; along the path of which certification to ISO 55001 is one key milestone. The Guide does not primarily equip those tasked with performing asset management activities with new solutions, but rather explores the reasons for adopting a strategic approach to asset management against the main themes in the international standard, ISO 55001.



11) Funding formulas for roads: Inventory and assessments



http://www.cedr.eu/download/Publications/2017/TR2017-04-Funding-formulas-for-roads.pdf

Executive Summary

The road is a public property infrastructure asset whose main purpose is to provide a public service and contribute to the economic development of each state, while also benefiting the interrelation and development of Europe as a whole and its regions. In this sense, the road, as a general concept, generates benefits both to nations, road users and the inhabitants of the regions through which they transit.

Levels of investment are quite different among countries; the OECD estimated landbased transport investments in c. 1.0% of Gross Domestic Product (GDP) for 2011; and PIARC indicated an expenditure of 0.4% only for road maintenance in 2005.

From this basic premise, there are two main approaches for funding the construction and maintenance of our roads. One implies that governments and the general public should pay (through general taxation); and the other is that those who directly benefit from roads should pay.

This report includes a complete catalogue of the different funding formulas currently available for roads and an assessment on which ones are more suitable regarding certain criteria defined in the document.

The main categories described in the catalogue are the following:

- All Purpose Taxes
- Special Purpose Road User Taxes and Fines
- Road User Charges



- Development cost charges (value capture)
- Grant Funding
- Private Donations
- Hybrid funding mechanisms

With increasing and varied demands on national exchequer budgets, new ways of funding are required for the development of new road construction, and for the refurbishment and maintenance of the existing ones. This needs to be achieved in an equitable and transparent manner, whilst ensuring that our objectives are sustainable and to contribute to national and international goals (safety, transport efficiency, competitiveness, and economic growth).

Nevertheless, not every formula suits every situation (e.g. economic cycle or maturity of the road network). It is very important to adequately select which formula use in each situation, ensuring that legal framework allows its usage, and that this decision will be the most efficient one in terms of public budget and effectiveness for investing.

In conclusion, a balance needs to exist between the cost of road infrastructure, and society's (and the road user's) willingness to pay for its use. The wider benefits of the road network may need to be highlighted more strongly by road authorities in terms of greater safety, economic development and competitiveness, greater journey time savings and more efficiency.



12) Utilising ITS for NRAs



http://www.cedr.eu/download/Publications/2017/CEDR2017-02-Utilising-ITS-for-NRAs 2.pdf

Executive Summary

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

The group has reached all of its objectives, including acting as the strategic eyes and ears of CEDR in ITS with focus on key European actions and initiatives relevant to national road authorities. The group has discussed and elaborated on important issues with the relevant stakeholders and organisations, provided strategic assistance to CEDR including advice on recommended positions and actions, maintained close liaison with the European Commission (EC) on appropriate levels, monitored, identified NRA concerns and elaborated common views with the implementation of the ITS Action Plan and Directive, provided high quality input to the EC's ITS decision making processes, and transversally discussed ITS with other CEDR tasks, supporting the utilisation of ITS.

In addition to the EC, the group has cooperated with key European ITS projects with road operator emphasis, the iMobility Forum, the DATEX project and community, Traveller Information Services Association, ERTICO taskforces and platforms as well as the cooperative ITS (C-ITS) related Amsterdam Group initiated earlier by CEDR.

The work has included participation and support to the preparation and national implementation of the EC delegated acts for EU-wide multimodal travel information



and planning services, real-time traffic information services, road safety related minimum universal traffic information free of charge to users, and intelligent truck parking information and reservation.

The importance of road vehicle connectivity and cooperative ITS grew even more than expected during the life span of the group, strongly affected by the C-ITS Platform set up by EC. This meant that the group used a lot of efforts to monitor, discuss and influence the connected and cooperative ITS landscape as the developments and deployments have a major impact on NRA core business of network operation requiring new forms of cooperation with external stakeholders while providing new and more effective tools as well. The CEDR ITS Position Paper was produced in 2014.

An even more substantial disruption in the evolution was caused by the rapid advances in the field of road vehicle automation. Facilitating automated driving was increasingly discussed in the group, especially trying to understand the needs towards, the role of, and the implications to road authorities of the development towards higher levels of automation. The work resulted in a CEDR Position Paper on the topic in 2016.

The main conclusion of the group's work is the need for CEDR to be proactive in the rapid development of ITS, and especially in the field of connected and automated transport. This is essential as the already ongoing fast developments affect road authorities profoundly and only by being active can CEDR and road authorities promote their own interests and assure benefits of these developments to road users as well as road authorities. Some authorities will have a more active role than the others, benefiting from learning by experience, but also sharing such benefits within CEDR cooperation. There is a clear need of close cooperation and even partnerships among national road authorities globally, with the industry and service providers in close liaison with the EC, and also with other activities in CEDR. It is also evident that in activities within turbulent domains — such as ITS — emerging issues need to be tackled urgently and by the best road authority experts available.



13) Reducing Congestion with integrated network management (INM)





http://www.cedr.eu/download/P_ublications/2017/CEDR2017-01-Reducing-congestion-with-integrated-network-management-INM_2.pdf

Executive Summary

Introduction

There is a clear link between growing mobility problems such as congestion and the widely acknowledged potential of smart mobility solutions. Smart mobility solutions such as integrated network management (INM) can help reduce congestion, ensure more efficient, safer, and cleaner transportation, and improve services for road users. When viewed from this perspective, integrated network management is defined as 'an approach that includes both traffic management and traffic information measures integrated and managed within a transport network' and is seen both as essential for the effective reduction of congestion and a no-regrets development.

Many NRAs are in the process of moving from single road management towards integrated network management that covers different modes, regions, borders, and/or networks. While the promises and potential of smart mobility solutions such as integrated network management are considerable and politically very popular, the implementation of these solutions is complex and has many operational, tactical, and strategic consequences that can be characterised at the very least as being challenging for the different stakeholders involved.

Many NRAs are in the process of moving from single road management towards integrated network management that covers different modes, regions, borders, and/or networks. While the promises and potential of smart mobility solutions such as integrated network management are considerable and politically very popular, the implementation of these solutions is complex and has many operational, tactical,



and strategic consequences that can be characterised at the very least as being challenging for the different stakeholders involved.

Scope of Work

According to CEDR Strategic Plan 2013-2017, the Thematic Domain (TD) Network Management focused on the role of the NRAs in safely and efficiently managing and operating the road network and developing and providing a service to road users and others who may be affected by the operation of road networks. Therefore, N6 drafted this report with special attention for the implementation and operational sides of integrated network management and for the further work that has to be done in this area.

On the basis of a thorough survey of requirements and case studies from CEDR members, the N6 Task Group strived to explain the complexity and requirements needed for managing integrated networks. Based on the survey analysis, derived lessons learned and success factors for integrated network management, recommendations for enabling and promoting the operation of connected networks related to various operational contexts were provided to the NRAs.

The results of the work of task group N6 (Congestion, TG N6) are presented in this report.

Main conclusions and recommendations

The following conclusions and recommendations are based on the objectives and findings of the N6 Task Group and the knowledge base acquired from the CEDR Europe-wide survey. Key conclusions and recommendations can be taken up and expanded upon in the coming CEDR Action Plan.

The amount of available data for traffic management is increasing rapidly as well as the number of different operating systems. As a consequence, the analysis and exchange of data, strategies and measures between different systems are important factors for a comprehensive, co-operational network-wide management.

To support and promote Integrated Network Management (INM) for the overall target of best handling of traffic problems in the future, the following points are recommended:

Close cooperation is a key necessity

Smart mobility requires connected networks. When considered from this perspective, integrated network management can be seen as key to making our roads less congested and transport more efficient, safer, and cleaner. Positive basic conditions and frameworks need to be created to ensure that all partners with different responsibilities are willing to cooperate. It is therefore important that ALL CEDR members keep working on integrated network management and cooperate closely with each other so that they can deal with any impacts that may arise and in order to ensure that they are adequately prepared for new scenarios (e.g. cooperative systems and automated driving). This N6 report is meant to support CEDR members who are and/or who want to become active in INM.



A Clear definition and consistent framework and a roadmap for INM are helpful

Integrated network management is a new and broad term. Using one definition of INM ('a traffic management approach that includes both traffic management and traffic information measures integrated and managed within a transport network') and a framework for deployment can help NRAs deploy and operate INM successfully. It is important to communicate the definition and framework within CEDR and start working with them actively. In addition, for those countries that are willing to adopt integrated network management, a step-by-step approach, including early testing phases, is useful for the smart deployment of INM with reasonable cost-benefit effects.

A Platform for knowledge exchange based on case studies is highly beneficial

A full-scale integrated network management approach is a relatively new part of most national traffic and transport policies. It can, therefore, be very helpful and cost-effective to provide a platform for knowledge exchange based on a rich knowledge base of traffic management case studies across CEDR members. Countries with little experience of INM can benefit hugely from a knowledge transfer based on best practice and relevant case studies. Consistent assessment results across case studies is quite helpful for knowledge transfer and needs to be enhanced in future phases.

Strengthening public-private cooperation for INM

In most cases, integrated network management requires cooperation between public and private partners. Different road authorities and stakeholders can have different and sometimes conflicting traffic policy goals. which can complicate efforts to find the optimum solution. Furthermore, private partners and service providers may play a bigger role and influence traffic management in a direct or indirect way. If NRAs/operators want to keep playing a strong, active role in the future, they need to be flexible to handle interaction with other key stakeholders such as suppliers, service providers, and the automotive industry and also to handle innovative measures such as cooperative systems and automated driving. A clear understanding of the proper mix and deployment time scales between conventional and innovative measures needs to be outlined, together with identification of relevant case studies, to enable a smooth transition. This calls for further strengthening of public-private cooperation, not only at strategic but also at tactical and operational levels. Public-private cooperation requires sound business cases. INM can be seen as a tool for the better utilisation of funds.

INM requires complete, high-quality data

Data completeness and quality are key aspects of the successful deployment and operation of INM schemes. Supplementary data sources such as crowd sourcing and floating car data (FCD) together with traditional data sources coupled with data quality schemes are necessary to ensure adequate quality of information. Use of supplementary data requires the opening up of cooperation with what are mostly private service providers. As a follow-up, a national database and consistent standards need to be set-up in each



member country to allow for data integration and consistent exchange of data between national access points at cross-border levels.

Consistent delivery of services needs to be ensured

With more traffic information measures taken up by private players, service level agreements (SLAs) need to be integrated at operational level to ensure consistent delivery of services within agreements between NRAs and service providers. Case studies incorporating such SLAs should be investigated in order to come up with the right mix of traffic service quality related to level and scope of utilisation with the reduction of conflicting priorities among public and private players.

Regarding all developments on information and automation level, traffic management will continue to be the tool for handling traffic in the future and maintaining an active role for NRAs. A specific task group for traffic management can capitalise on the CEDR structure for bringing about different projects and programmes across European countries and across public and private partners in the right way and according to sound business models. Within AP2017–2019, such a framework can serve as a cooperation and knowledge exchange platform for the collection and dissemination of best-practice case studies through participation of more European countries in the working group.



14) Utilising BIM for NRAs



http://www.cedr.eu/download/Publications/2017/Utilising-BIM-for-NRAs-TR2017-05.pdf

Executive summary

The purpose of this report is to inform National Road Authorities (NRAs) and other interested parties about the results of the Task group in this field.

BIM stands for Building Information Model(ling) for buildings and includes infrastructure assets. It has already been successfully used, embedded in car and aircraft industry. "Building Information Modelling (BIM) is a digital representation of physical and functional characteristics of a facility. A BIM is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle."

For NRA's BIM means focusing on Building Information Management. The main goal is to digitally procure asset data2 using open BIM standards. To enhance the possibilities of the client in handling data and improving the quality of data in the lifecycle of assets.

The focus of CEDR's Task group S3 (Information) is on the information of constructing, developing and maintaining of infrastructure for roads (and their surrounding areas). Open BIM consists of open information in the structured data sets, open exchange standards and software to use them (BIM tools). An important aspect is the open character. Open standards are needed to avoid the risk of the so-called vendor-locked-in.

The **goals** set for S3 Task group Information were:

 Sharing knowledge about open BIM; building a sustainable International (social and knowledge) community



- (More effective) influence on EC decision making regarding development, maintenance and use of Open BIM Information standards
- Shared investments in the development and use of open BIM standards to a larger extent

The **benefits** of BIM are vast: more efficiency resulting in lower costs, better information during the lifecycle of the infrastructure and higher quality. It concerns both new investment projects and asset management. It improves performance of the industry of the built environment as a whole.

To achieve the benefits of the use of BIM it is important to choose a stepwise approach procuring BIM. NRAs have to make sure the steps they choose are coordinated within and outside the organisation in the Construction sector. There are many good experiences in the different NRA's how to start and procure BIM effectively in large infrastructure projects (see paragraph 2.5). Within the Task group three different approaches to introduce BIM in NRAs were recognised:

a. BIM-approach in an alliance with the private construction sector

b. BIM approach on information delivery for and during asset management

c. Governmental BIM-policy for the supply chain.

The CEDR Task group was involved in the UK-governmental initiative to connect with the EC on BIM, which resulted in an interesting working program of BIM for public clients including all NRA's, with support from the EC (EU BIM Task group). The involvement of 13 different EU-countries on this BIM-topic show that BIM and ICT-procurement will be essential for NRA's in the coming years. This was highlighted in the publication of a CEDR BIM leaflet and an article on cost and benefits of BIM in the EU Magazine Pan European networks (Annex VI of this report).

The outputs of European BIM projects (like V-con) and BSI-projects (like IFC-Alignment) were reviewed by CEDR.

A CEDR Transnational Research Call was launched in 2015 on "Asset Information using BIM". This was funded by six CEDR-members and will be executed as a follow-up of this Task group in the period 2016-2018.

The initial goals of the task group S3 have been achieved. It has been proven that collaboration between NRA's on the topic of BIM has been very beneficial contentand financial wise. Examples of this cooperation include the aforementioned cofinancing of CEDR Research call, exchange of information with the European Commission and Building Smart initiatives.

Through the management of the 2015 Research programme, CEDR BIM network will continue sharing knowledge and experiences of implementing BIM in NRAs. The outcomes of this work will be highlighted at a dedicated BIM Workshop to be organised at the TRA2018 event in Vienna.



15) State of the art in managing road traffic noise:



http://www.cedr.eu/download/Publications/2017/CEDR2017-03-State-of-the-art-in-managing-road-traffinoise.pdf

http://www.cedr.eu/download/Publications/2017/CEDR-TR2017-01-noise-reducing-pavements.pdf http://www.cedr.eu/download/Publications/2017/CEDR-TR2017-02-noise-barriers.pdf http://www.cedr.eu/download/Publications/2017/CEDR-TR2017-03-Noise-CBA-CEA.pdf

Executive summary

A key recommendation emerging from the final summary report written by the Conference of European Directors of Roads' working group on Road Noise 2009–2013 was that national road authorities (NRAs) should use innovative noise-related research undertaken by CEDR members when defining the scope of the CEDR Task Group Road Noise 3 work programme.

The latest innovative research in the areas of noise reducing pavements, noise barriers, and cost-benefit analysis (CBA)/cost-effectiveness analysis (CEA) was comprehensively reviewed and assessed by CEDR Task Group I6 (Road Noise).

The main objective of this research review was to collate results and make the latest innovative research findings as well as the main conclusions from previous CEDR noise task groups available to CEDR member countries.

This report identifies key issues and potential research topics for a possible 2018 Noise Research Call. It also presents recommendations for each of the research areas considered.



Noise-reducing pavements

The subgroup working on noise-reducing pavements addressed some of the key issues that CEDR NRAs may encounter when considering using such pavements as a noise mitigation measure during the planning, construction and maintenance of national road schemes. Issues considered included the procurement of noise-reducing pavements as well as potential costs, the importance of high-quality construction, acoustic performance during their lifetime and incorporation of the parameter of noise into pavement management systems. While significant advances have been made in our knowledge of the performance levels of noise-reducing pavements, research is still needed in areas such as:

- enhancing the long-term performance (durability and noise-reduction capabilities) of noise-reducing pavements;
- improving our knowledge in relation to implementation of winter maintenance on porous pavements in different climatic zones;
- optimizing the noise-reduction potential of cement concrete by focusing on pavement surface texture;
- developing an asset acceptance methodology, to be adopted by CEDR member states.

Recommendations:

- CEDR recommends that NRAs evaluate the possibility of integrating the use of noise reducing pavements into the planning of new roads and the on-going maintenance of the existing road network following guidance provided in the ON-AIR Guidance Book on the Integration of Noise in Road Planning.
- CEDR recommends that NRAs give consideration to the development of specifications and performance standards relating to noise reduction to be used in the tendering process for noise reducing pavements.
- CEDR recommends that NRAs develop a common approach to integrating noise parameters into pavement management systems.
- CEDR recommends commencing demonstration projects to facilitate onsite visits to proven practice projects of noise reducing pavements on motorways and inner-city roads.

Noise barriers

In relation to noise barriers, issues considered included the working principles of noise barriers, costs, European acoustic standards for barriers, considerations when installing new barriers and monitoring barrier lifetime performance and innovative barrier solutions. Regarding our current knowledge base on noise barriers, there is a deficit in areas such as:

- improving long-term quality of noise barriers;



- in situ test methods without the need to use the carriageway side of the barrier for operators and/or equipment (for safety reasons);
- correlating results between the in-situ test methods (EN 1793-5 and -6) and laboratory based methods (EN 1793-1 and 2);
- reviewing and compiling published data on the long-term acoustic in situ performance of noise barriers.

Recommendations:

- CEDR recommends that when procuring noise barriers, NRAs insist on CE marking in accordance with EN 14388:2005 and set requirements based on laboratory-based test methods (EN 1793-1 and -2) and, in the future, on in situ test methods (EN 1793-5 and -6).
- CEDR recommends that NRAs undertake an asset acceptance assessment to ensure that new noise barriers are fit for purpose and meet NRA requirements.
- CEDR recommends that NRAs regularly monitor the actual condition of noise barriers in order to obtain basic information on future maintenance costs.

Cost-benefit analysis and cost-effective analysis

Finally, cost-benefit analysis and cost-effective analysis were addressed to highlight the need for NRAs to use such tools for addressing noise impacts from roads. The use of various noise indicators and associated cost factors have been considered and shortcomings were addressed; in particular, the current status of disabilityadjusted life-years (DALYs). Future research in this area should focus on the following:

- identifying the rationale behind the use of different cost factors in Europe for the same noise indicators;
- reviewing and revising the various cost factors, particularly health effects; considering new sources such as the forthcoming World Health Organization environmental noise guidelines for the European region.

Recommendations:

- CEDR recommends that NRAs aim to achieve a greater knowledge of the cost factors relating to road traffic noise.
- CEDR recommends that NRAs invest in the development and dissemination of knowledge of using CBA/CEA for more effective noise abatement by organising workshops on the adoption and use of CBA and CEA in NRA practices.
- For CEDR NRAs that do not currently have a methodology for conducting CBA/CEA, the subgroup report provides examples of CBA and CBE that can be modified to take account of specific national requirements.



Final remarks

Applying the knowledge presented in this report and the associated subgroup reports may lead to cost reductions for NRAs in the planning, construction and maintenance phases of both new road and existing road projects, as well as potentially reducing the number of noise-annoyed people living in close proximity to motorways.

However, it is clear that further work is needed to fill the knowledge gaps and promote the use of common methodologies across CEDR NRAs. These steps may include the further research topics identified and the commencement of demonstration projects.



16) TG Asset Management final report 2017



http://www.cedr.eu/download/Publications/2017/CEDR TR2017-06-Asset-Management.pdf

Executive Summary

This report reflects the findings of the CEDR Task Group on Asset Management within CEDR SP3, aiming to provide a perspective on strengthening of cooperation and learning from road agencies in Europe within the asset management arena.

The conclusions represent the outcome of the steps taken in the investigations.

The first step was to identify and characterize the current frameworks in use in order to show commonalities, variations and differences in approaches (chapter 2). The second step was to enrich these views with an inventory of contemporary research initiatives in the field of asset management (chapter 3). In the third step the building blocks from step one and two are used to build a maturity matrix as a framework to strengthen inter-organizational learning (chapter 4). This maturity matrix is tested and refined in case studies in the fourth step (chapter 5).

The aim of the Task group as described in the CEDR SP3 was:

- 1. To analyse how the <u>life cycle costs</u> (LCC) are defined, how they are reflected in the accounting system, and how they are allocated to the various stretches of the road network;
- 2. To analyse the <u>data collected</u> in order to recommend a set of common definitions, language and a common core system, based on a risk based approach, framed in a comprehensive and enlarged "Best practice guide";



- 3. To identify the necessary <u>steps</u> to set up an LCC integrated system for CEDR NRAs and to widen the LCC system into a comprehensive Asset Management system (AMS).
- 4. To prepare a <u>best practice guide</u> for the implementation of an Asset Management system for road authorities, able to provide both theoretical and practical tools to improve the quality and efficiency of road infrastructure through the effective management of assets in accordance with risk analysis, user expectations and government requirements;
- 5. To follow the process of development and introduction of the <u>ISO</u> <u>55000</u> Asset Management System Standard and discuss the option for CEDR members and, if necessarily, steering into the right direction;
- 6. To assess the option of launching a <u>new international study like</u> <u>BEXPRAC</u>, based on performance management, i.e. study based on a homogeneous comparison between CEDR member countries.

The goal of the TG has been to combine all six outputs with the need to deliver guidance for the implementation of asset management in Road authorities. In a dynamic complex economic environment road authorities are faced with ever increasing maintenance commitments and decreasing funding envelopes. Such exigencies have forced road authorities to rethink their management strategies towards achieving more for less. Over the past decade or so, the concept and practise of asset management has provided the platform for change.

The first three tasks were all related to life cycle costs. Since this inherently links to any asset management system (AMS) it has not been dealt with separately.

Finally, in addressing the overall objectives this report gives an overview of several frameworks and proposes a maturity matrix based on a simplified framework with five dimensions:

- Stakeholders
- People and organisation
- Strategy and planning
- Asset knowledge and information
- Risk management

In delivering this report it should be noted that the group examined Asset Management related research which has been done or is still undergoing in order to provide a comprehensive outcome.



17) Conditions for efficient road transport in Europe





http://www.cedr.eu/download/Publications/2017/2017-5-Conditions-for-efficient-roadtransport-report.pdf

Executive summary

Freight transport needs are expected to grow significantly by 2030. In spite of ambitions to ensure that this growth is absorbed by rail, short sea shipping, and inland waterways, it is becoming increasingly clear that a significant proportion of freight transport growth will have to be absorbed by roads (EC 2008). Even if multimodality is optimised, the first and last leg of transport operations will take place on the road. Furthermore, in its current state, the rail network is either limited in capacity in some places (e.g. Sweden) or does not offer the necessary reliability for time-sensitive transport operations (e.g. the transport of perishable goods). Moreover, the planning and construction of new rail infrastructure can take up to 20 years. In the light of all this, it makes sense to examine potential ways to make road transport operations as efficient as possible.

Directive 96/53/EC leaves room for individual countries to deviate on their own territory from agreed maximum weights and, to some extent, dimensions. Many member states have made use of, or are planning to make use of, this possibility, while others maintain that the limits laid down in the directive should not be exceeded. The result is that legislation on weights and dimensions varies greatly from country to country and from region to region within Europe. This is due partly to varying infrastructure prerequisites that naturally limit the possibility of permitting longer or heavier vehicles and partly to the on-going debate on the effects on the



modal shift. The issue remains politically sensitive, involving many conflicting interests and agendas, as demonstrated by the controversy sparked by the recent introduction of longer vehicles in Germany.

Of the 26 countries represented in CEDR, 14 deviate from the maximum length and/or maximum gross weight for heavy duty vehicles agreed in Directive 96/53/EC. For these countries, the main reason for this deviation is that it allows them to accommodate the growth of road freight transport, to accommodate the needs of specific logistics tasks (e.g. the transport of vehicles or timber) and to reduce CO₂ emissions. Those opposed to increases in the maximum weights and dimensions fear competition with other modes and a negative impact on traffic safety and the life span of road and bridge structures. The differences in viewpoints among CEDR members led to the setting up of Task Group N4 (Heavy Vehicles) in CEDR's Strategic Plan 2013–2017.

The variety of viewpoints on weights and dimensions within CEDR makes it difficult to agree on how heavy vehicles' weights and dimensions can be adapted to maintain or increase the performance of the road network. In order to allow CEDR's members to identify common positions on these issues and to help create strong, professionally grounded positions on subjects relating to the weights and dimensions of heavy vehicles, the group was tasked with compiling an inventory of on-going developments and ways of thinking about the weights and dimensions of heavy vehicles within CEDR countries.

Task Group N4 (TG N4) has taken into account the broader perspective of the link between access policy (mainly weights and dimensions) and road freight transport. The group has tried to draw conclusions and make recommendations that will help CEDR members evaluate their access policies in order to meet the challenges of ageing infrastructure, accommodate the growth of road freight transport, and lower emissions.

In order to get an overview of the CEDR members' different ways of thinking about the weights and dimensions of heavy duty vehicles, TG N4 conducted a survey in the form of a questionnaire (Part 1).

The task group analysed the responses and drew conclusions. Although it was not possible to get a complete overview, it was possible to provide a good picture of the differences in access policies between countries/regions in Europe. From a scientific perspective, the results can only be viewed as indicative.

The results showed, among other things, that the demand for extra weights and dimensions and the extent to which countries made use of the possibility to deviate from the EU-standards (i.e. not to comply with Directive 96/53/EC, amended by Directive 2015/719) differs according to type of transport and region. If the growth in freight transport by 2030 has to be accommodated mainly by roads, it could be beneficial to focus on longer vehicle combinations such as the Lang-Lkw rather than on EMS.

The questionnaire and feedback from CEDR showed that many organisations represented in CEDR are interested in the development of harmonised performance-based standards (PBS) for infrastructure, which could be used for the objective assessment of the suitability of roads for vehicle combinations with weights



and/or dimensions exceeding the specified limits in Directive 96/53/EC. Such an approach would be applicable to all heavy-duty vehicles above 3.5 tonnes.

The group commissioned The Swedish National Road and Transport Research Institute (VTI) to conduct a study and literature review of the above topic. In 2015, VTI published the results in the report "*Performance-based standards for vehicle combinations with weight and/or dimensions exceeding the specified limits in the Directive* 96/53/EC (Part 2)".

The pre-study showed that vehicle-related topics are thoroughly regulated by EU legislation and are, therefore, very difficult to alter, as well as already being well described in existing literature. Road infrastructure factors, on the other hand, are to a much greater degree subject to national variations.

The results of the VTI study led to the formulation of a DoRN (*Description of Research Needs*) for Part C of the 2015 Call Freight and Logistics in a Multimodal Context (Part 3). The FALCON group was selected for part C: Fit for purpose road vehicles to influence modal choice (performance-based standards) and for final dissemination. The project is set to finish in April 2018 with final dissemination in the autumn of the same year.

The result of the FALCON project will be a proposal for a Smart Infrastructure Access Policy (SIAP) that is performance based as a one-solution tool, which can be developed even more widely in future. The project will reflect on the capabilities and design criteria of the current infrastructure network including roads, bridges, and tunnels. It could help road owners to handle the growth of heavy duty transport in a better and more unified way.

The results of the two research projects (parts 1 + 2) and the description of the current FALCON project (part 3) can be found in this report. The conclusions and recommendations in this report can also be used as suggestions for the FALCON project, which is currently underway. To be able to implement these recommendations and the results of the FALCON project, a working group should continue work on these criteria to ensure that the results of the project are implemented through PBS criteria and to facilitate the use of these criteria in CEDR countries. Such a group should preferably be organised by CEDR.

Ref: CEDR technical report 2017/07 – Executive summaries of CEDR reports 2014-2017



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