



**Conférence Européenne
des Directeurs des Routes**
**Conference of European
Directors of Roads**

CEDR TRANSNATIONAL ROAD RESEARCH PROGRAMME

Call 2014

Mobility & ITS

CEDR Transnational Road Research Programme
funded by
**Finland, Germany, Norway, the Netherlands, Sweden,
United Kingdom and Austria**

Description of Research Needs (DoRN)

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1 General introduction

This Call for Proposals is launched by the Conference of European Directors of Roads (CEDR). CEDR is an organisation which brings together the road directors of 25 European countries. The aim of CEDR is to contribute to the development of road engineering as part of an integrated transport system under the social, economical and environmental aspects of sustainability and to promote co-operation between the National Road Administrations. The website www.cedr.fr contains a full description of its structure and activities.

CEDR recognises the importance of research in the development of sustainable transport and has established a Technical Group (TG) to monitor European research activities and to advise the CEDR Board on issues relating to research. TG Research responsibilities include dissemination of research results as well as initiating research programmes that support CEDR members in current and future situations.

This Transnational Research Programme follows on from previous programmes organised under the ERA-NET ROAD brand. “ERA-NET ROAD – Coordination and implementation of Road Research in Europe” was a Coordination and Support Action funded by the 7th Framework Programme of the European Commission which concluded in December 2011. The goal of ERA-NET ROAD (ENR) was to develop a platform for international cooperation and collaboration in research areas of common interest. This included the production of an “ENR-toolkit” for carrying out transnational research and trials of the various procedures developed through a series of projects and programmes funded directly by European Road Administrations. Full details of the research projects commissioned through this process can also be viewed at the ENR website www.eranetroad.org.

The Governing Board of CEDR (CEDR GB) recognised in June 2010 that ERA-NET ROAD was delivering significant value for money as it structured the way CEDR members identify commonalities, reduce duplication of research and plan for transnational calls if needed. CEDR gave a mandate to its Technical Group Research (TG Research) to identify opportunities for further transnational road research programmes on the basis of the excellent start and of the experience gained during the ERA-NET ROAD project. CEDR also requested that:

- TGR only proposes suitable research topics and identifies good research proposals;
- TGR presents research proposals, when appropriate, to CEDR GB for decision; CEDR GB will decide what programmes are taken forward;
- all call procedures shall be open and transparent and all EU members shall be invited to participate, with no advantages given to preferred suppliers or groups of suppliers; and
- the costs of developing and managing the transnational calls shall be supported only by those CEDR members taking part in the programme.

2 Introduction to Call 2014

This Transnational Research Programme was developed initially within the framework of ENR and was then taken forward by TG Research to fulfil the common interests of the National Road Administration (NRA) members of CEDR.

The participating NRAs in this Call are Finland, Germany, Norway, the Netherlands, Sweden, United Kingdom and Austria. As in previous collaborative research programmes, the participating members will establish a Programme Executive Board (PEB) made up of experts in the topics to be covered. The Common Obligation Programme Model from the “ENR-toolkit” has been adopted, with some modifications to take account of the role of TG Research in the process. The research budget will be jointly provided by the NRAs who provide participants to the PEB as listed above. PEB members will designate one of them to act as chair.

TG research has, on behalf of CEDR, appointed a Programme Manager (ProgM) to take over the administration of this Call for Proposals. For this programme, the ProgM will be the Austrian Research Promotion Agency. Responsibilities of the ProgM include preparation of the Call for Proposals, financial management of the programme and setting up and managing the contracts with the research providers. These responsibilities will be conducted by the ProgM in its country under its law and regulations under the direction of TG Research. The terms under which the ProgM and PEB will operate will be set out in a Collaboration Agreement, signed by senior representatives of each participating NRA.

Applications are invited from suitable qualified consortia in response to this Call for Proposals. Consortia must consist of at least two legal entities from different EU countries. Individuals and organisations involved in the formulation of the Call specification are prohibited from any involvement in proposals. Applications should focus on the sharing of national research, knowledge and experience at all levels as an important prerequisite for achieving the goals of CEDR and its members. It is particularly important that the results can be easily implemented through various demonstration projects in order to contextualise **the benefits of the transnational collaboration**. The applications will be evaluated by the PEB in relation to:

- Extent to which the proposal meets the requirement of the DoRN
- Technical quality of proposal
- Track record of consortium members
- Management of project
- Value for money.

Details of these evaluation criteria and how they will be interpreted and applied by the PEB are presented in the Guide for Applicants (GfA) which accompanies this Call for Proposals.

3 Aim of the Call

The aim of this research programme is to advance national road authorities' understanding of mobility as a service, autonomous driving and the business case for connected vehicles.

The call has three sub-themes:

A: Mobility as a Service (MaaS)

B: The journey to High and Full automation

C: The business case for connected and co-operative vehicles

Applicants should ensure their project proposals are clearly linked to one or more of the three objectives listed above. Proposals should emphasise the trans-national benefit of the project outcomes for the participating Road Authorities in the context of getting the most out of Intelligent Infrastructure (these will be high level, generic benefits and it is up to the road authority to apply those to its own network to exploit those benefits).

4 Reasons for the Transnational Research Programme

The main reason for this Transnational Research Programme is to gain better knowledge and guidance of how to use ITS to support Mobility across Road Authorities in CEDR.

The aim of this research programme is to advance national road authorities' understanding of mobility as a service, autonomous driving and the business case for connected vehicles.

This Call for Proposals has the following objective and expected outputs:

A: Mobility as a Service

Mobility as a Service is the new paradigm of mobility and transport, where users' mobility and transportation needs could be easily met under one service agreement between the user and the Mobility operator. Mobility as a Service (MaaS) means an overall change in the entire transport system and in the roles of the operators in the transport sector, and is expected to result in an efficient, safe and clean transport system. For example users are able to plan, book and pay their door-to-door travel or transport just once from one mobility operator, or to purchase a mobility package enabling free choice of mode included in the package. A number of different services already exist, most on some sub-areas of MaaS such as car- or ride-sharing, and also a few real but quite restricted MaaS services.

The main challenges of MaaS development and deployment are:

- business models and business cases in different operating environments
- benefits and costs of MaaS to different stakeholders and user segments
- Understanding of what impact mobility as a service has on NRA's existing infrastructure - for example is there sufficient parking capacity for modal shift• legal issues related to the operation of MaaS including ownership of data, liability etc.
- roles and responsibilities of the different public and private stakeholders
- systems and stakeholders required by MaaS: Systems - real-time mobility information systems, identification/validation systems (identification of the user as well as the transport service used), payment systems, mobility for both people and goods, the service portfolio (MaaS and accompanying services); Stakeholders - personal/organisational/authority customers, mobility operators, transport operators, road authorities and operators, service providers, etc.

This research will additionally support NRAs in the following areas

Stakeholders and their roles in different types of MaaS

The task identifies what kind of functions and stakeholders are required by the different types of MaaS mobility accounts, vehicle-sharing, demand responsive services) in different operating environments (e.g. mega-cities, cities, peri-urban, inter-urban, rural). For each type of MaaS, it is also essential to identify who is the key champion and stakeholder. For the national road authorities, the important question is: what are the functions and roles of the national road authorities – and how they will change. The changes in the value chains should also be addressed.

The benefits of different types of MaaS

For the road authorities the key impact will likely be the reduction of traffic demand especially in the peak periods, and the more efficient use of the existing network capacity. These are the reasons why the road authorities and operators are keen to promote the development and deployment of MaaS.

The research task will study the effects of MaaS on mobility of both people and goods, automobile use, traffic demand, throughput, flow, safety, emissions, and noise as well as the overall transport system.

The effects of different types of MaaS concepts should be differentiated for different user segments in different operating environments (mega-cities, cities, peri-urban, inter-urban, rural).

For the national road authorities, a key research question will be the impacts of MaaS on the core tasks of the road authorities/operators, and what consequences will these impacts have on the functions, organisation and budgetary needs of the road authorities and operators.

The provision of data versus services

The focus of the provision of data versus services by operators should be investigated, Identify the strengths, weaknesses, opportunities and threats associated with different strategies. Understand what is the influence of incorrect or low-quality data - for example If users are informed and/or transported with low quality data, who is responsible in both scenarios.

Other considerations may include:

- Ensuring door to door service
- Incorporating other modes including cycling and walking
- Technology readiness
- Data availability and quality
- Description of data requirements
- Supporting the use of EVs
- Utilising MaaS in demand management with regard to tolling of bridges, roads and tunnels
- European and eventually global roaming of MaaS



Expected outputs

- To support a number of CEDR NRA's in the development of MaaS
- Short/medium term business case regarding
- Development and Implementation Road Map including identification of key implementation issues
 - Roles and responsibilities of the different stakeholders and especially NRAs
 - Analysis of legal enablers and challenges
- Impact and socio-economic assessment of impacts of different types of MaaS in different operating environments
 - Assessment of impact on NRA core business and functions
 - Minimum data requirements for MaaS to facilitate service provision
 - Recommended data versus service strategies for NRAs
- Recommendations, requirements and obligations for capacity management of Operators (especially for roads)

B: The journey to High and Full automation

NRAs need to understand what implications autonomous vehicles will have on their road networks and any introduction phases needed for all the relevant levels. A number of autonomous projects have made great claims in term of efficiently and accident reduction due to the vehicle to vehicle connectivity and the removal of human error. Road operators would like to understand what needs to be done to make the use of autonomous vehicles a real proposition.

In the table below NRA's would like to focus this work on the journey to High and Full Automation

SAE Level	SAE Name	SAE Narrative Definition	Execution of Steering/ Acceleration/ Deceleration	Monitoring of Driving Environment	Fallback Performance of Dynamic Driving Task	System capability (driving modes)	BAST Level 	NHTSA Level 
Human Driver monitors the driving environment								
0	No Automation	the full-time performance by the human driver of all aspects of the dynamic driving task	Human Driver	Human Driver	Human Driver	N/A	Driver only	0
1	Driver Assistance	the driving mode-specific execution by a driver assistance system of either steering or acceleration/deceleration	Human Driver and Systems	Human Driver	Human Driver	Some Driving Modes	Assisted	1
2	Partial Automation	Part-time or driving mode-dependent execution by one or more driver assistance systems of both steering and acceleration/deceleration. Human driver performs all other aspects of the dynamic driving task.	System	Human Driver	Human Driver	Some Driving Modes	Partially Automated	2
Automated driving system ("system") monitors the driving environment								
3	Conditional Automation	driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task - human driver does respond appropriately to a request to intervene	System	System	Human Driver	Some Driving Modes	Highly Automated	3/4
4	High Automation	driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task - human driver does not respond appropriately to a request to intervene	System	System	System	Some Driving Modes	Fully Automated	
5	Full Automation	full-time performance by an automated driving system of all aspects of the dynamic driving task under all roadway and environmental conditions that can be managed by a human driver	System	System	System	Some Driving Modes		

This research will provide a better understanding of the potential of autonomous technology with regards to;

- Autonomous vehicles and road trains
- Smooth traffic flow at peak loading,
- Improve motorway/trunk road network efficiency,
- Minimise/optimize vehicle-to-vehicle headway and vehicle-to-infrastructure distance,
- Reduce accident risk and deliver casualty reductions,
- Can instrumented /connected roads reduce risk and accelerate the implementation of autonomous vehicles.
- Is segregation of autonomous traffic required?
- How will other non-autonomous vehicles interact with fully automated vehicles.
- Entry and exit ramps connected to roads and lanes for fully automated vehicles
- Is data and information originating at NRAs relevant, supportive or necessary.
- What are the technical, organisational and legal 'Dos' and 'Don'ts' for the consecutive introduction phases

Expected outputs

To support a number of CEDR NRA's in understanding obligations and needs to be ready for Autonomous vehicles on the strategic road network

Short/medium term scenarios regarding

- Road Map of deployment phases in (at least one or more relevant) scenarios
 - Overview of different types of automated driving
 - Time horizon of automated driving with regards to NRA's:
 - What is being done today,
 - What's in the pipeline for the next 3 to 5 years, and ten years?
- The different viewpoints from industry on automated driving: the "evolution model" available and relevant results of previous/parallel projects
- Impact analysis and possible business plans
- Costs and Benefits (incl. the C/B-ratio) of the scenarios
- Analysis of legal enablers and obligations
- Impact on safety, throughput, environment
- Impact on infrastructure and road side equipment
- Impact on capacity management and other traffic management tasks

C: The business case for connected and co-operative vehicles

Road authorities use appraisal information as one of the key inputs into decisions about whether transport schemes should go ahead. The building of the business cases for investment require information on how to deliver maximum benefit for minimum cost and often requires a strong return on investment. Road authorities need to identify these road benefits for co-operative vehicle systems and intelligent infrastructure to release investment funds. This research will assist many CEDR road authorities to identify which co-operative services deliver maximum benefit and enable road operators to manage the road network more cost effectively.

This research will support all 25 NRAs in using the COBRA tool that was developed in the ERA-NET Mobility call in 2011 funded by a few NRAs. (link to website with deliverables)

The research project needs to maintain close liaison with the EC's C-ITS Platform working on similar issues (including benefit-cost) and the EIP+ project looking at road authority and operator related aspects in deployment of C-ITS in Europe.

The first COBRA project had the following objectives:

- To setup a methodology for the impact assessment of cooperative systems on traffic flow, traffic safety and emissions.
- To analyse the impacts of cooperative systems based on real world implementations.
- To assess the costs and benefits of the deployment of cooperative systems and road side infrastructure that is required, compared to existing ITS-systems.
- To analyse the legal issues that play a role around the implementation of cooperative systems .
- To produce a set of clear recommendations for road authorities about the actions to take to enable the deployment of cooperative systems , including a roadmap to overcome possible

Expected outputs

- To support a number of CEDR NRA's in the use of the COBRA tool
- To prepare the necessary input for the tool for a selection of CEDR NRA's
- Identification of the primary C-ITS services for the selected NRAs with regard to existing roadside infrastructure, traffic control and management systems, customer services, problems, expected impacts, and foreseen costs
- Short/medium term business case/scenario(s) regarding to
- Implementation Road Map
- Cost Benefit ratio of different deployment scenarios
- Analysis of legal enablers
- Impact on safety, efficiency, energy, environment, and NRA core business
- To use the COBRA tool for several cases (c-its corridor NL-Germany-Austria, other use cases to TBD)
- To produce a C-ITS monitor for CEDR based on the input of the CEDR NRA's of the COBRA tool (road side equipment, number of connected cars, number of c-its stations,..).

5 Overview of current and previous activities

A general overview of current and existing relevant research projects undertaken across Europe and other sources of information are outlined in Appendix A. These resources and subsequent reports will provide the starting point for proposals submitted in response to this Call and proposals will be evaluated on this basis. **Applicants must not duplicate existing results or ongoing projects.** Proposals should be based on the outcomes and state-of-the-art identified in these projects listed below. Failure to take account of available research conclusions will disqualify proposals from this call.

6 Additional information

The aim of this Transnational Research Programme is to provide applied research services for the benefit of National Road Administrations in Europe. The Call is open to legal entities established in Europe. Applications using the templates provided must be submitted by a coordinator of a consortium of at least two independent organisations from different countries. A maximum 75% of the workload can be assigned to one partner.

The duration of this programme is 36 months from November to October 2017. The target dates within this programme are:

Call opens:	17. December 2014
Call closes:	18. March 2015 at 12:00 (CET) sharp
Evaluation:	March/April 2015
Selection:	End of April 2015
Project commencement:	June 2015

The duration for individual projects can be up to 24 months within the programme timescale.

The programme language is English: only proposals submitted exclusively in English are acceptable.

The target budget provided by the participating National Road Administrations for this programme is EUR 1,6 million.

Submissions received after the deadline will not be considered.

Please refer to the Guide for Applicants (GfA) for full details of how to submit proposals in response to this Call.

Appendix A: Existing projects and resources

Europe wide

<https://www.gov.uk/government/speeches/driverless-vehicles-the-uses-and-benefits>

www.sartre-project.eu/

<http://newsroom.scania.com/en-group/2013/09/30/innovative-scania-rolling-towards-platooning/>

<http://internationaltransportforum.org/cpb/projects/autonomous-driving.html>

<http://autonomous-driving.we-conect.com/en/>

http://www.bast.de/DE/FB-F/Publikationen/Download-Publikationen/Downloads/F-legal%20consequences.pdf?__blob=publicationFile&v=1

<http://vra-net.eu/about-the-vra-network/>

National programmes

<http://www.verkehrsauskunft.at/>