CEDR TRANSNATIONAL ROAD RESEARCH PROGRAMME

Call 2017

Automation

CEDR Transnational Road Research Programme

funded by

Austria, Finland, Germany, Ireland, Netherlands, Norway, Slovenia, Sweden and the United Kingdom

Description of Research Needs (DoRN)

November 2017

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Authors of the DoRN:

Manfred HARRER	ASFINAG	Austria	(AT)
Ergo TAMMEL	Estonian Road administration	Estonia	(EE)
Torsten GEISSLER	Federal Highway Research Institute (BASt)	Germany	(DE)
Alina KOSKELA	Finnish Transport Agency	Finland	(FI)
Henk SCHUURMAN	Rijkswaterstaat	Netherlands	(NL)
Serge VAN DAM	Rijkswaterstaat	Netherlands	(NL)
Hamid ZARGHAMPOUR	Swedish Transport administration	Sweden	(SE)
Phillip PROCTOR	Highways England	England	(UK)

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 directors of 27 European road authorities. The aim of CEDR is to promote excellence in the management of roads. The website www.cedr.eu 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 Working Group (WG) to monitor European research activities and to advise the CEDR Governing Board (GB) on issues relating to research. WG Innovation (WGI) responsibilities include dissemination of research results as well as initiating research programmes that support CEDR members in current and future situations.

CEDR gave a mandate to its Working Group Innovation (WGI) 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:

- WGI only proposes suitable research topics and identifies good research proposals;
- WGI presents research proposals, when appropriate, to the CEDR GB for decision; the CEDR GB will decide what programmes are taken forward;
- all call procedures shall be open and transparent and all European countries 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 2017

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

The participating NRAs in this Call are Austria, Finland, Germany, Ireland, Netherlands, Norway, Slovenia, Sweden and the United Kingdom. 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 WG Innovation 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.

WG Innovation 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 WG Innovation. 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 European 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
- Vision on the topic.

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 investigate what transformational change automation will create for National Road Authorities (NRA's). Specifically what new opportunities will automation produce and what core business changes are required to unlock these opportunities?

This research will focus on crosscutting automation up to 2040 that supports:-

1) Road safety

2) Traffic efficiency

3) Environment

4) Customer service

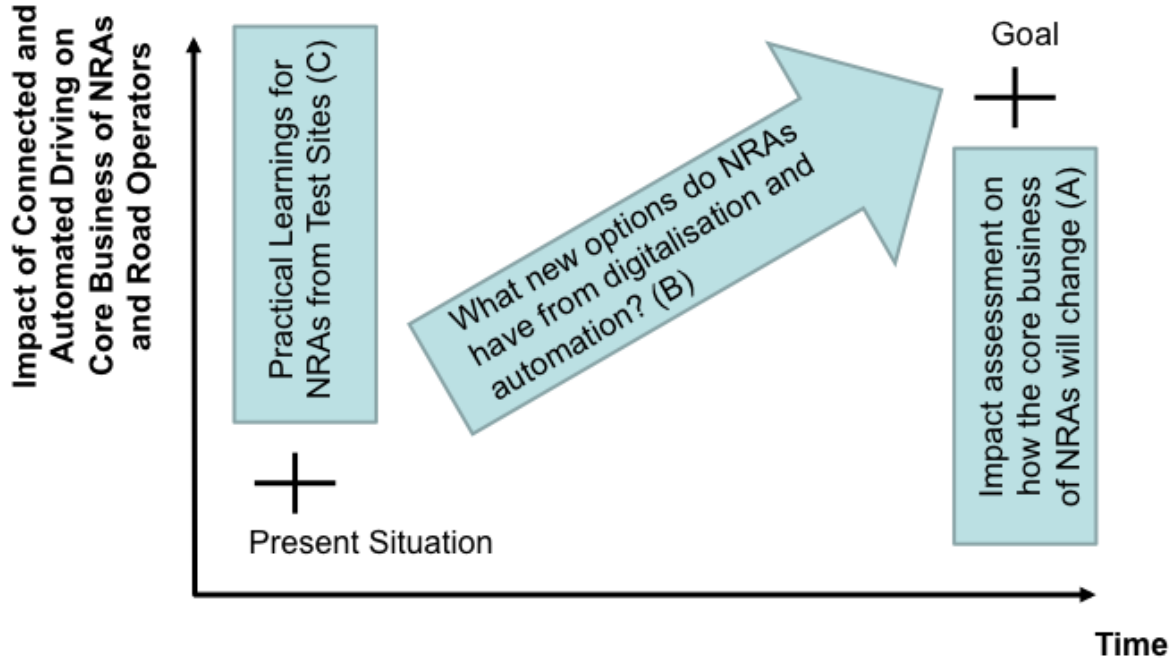
The call has three sub-themes:

A: How will automation change the core business of NRA's?

B: What new options do NRAs have from digitalisation and automation?

C: Practical learnings for NRAs from test sites

Visualisation of the three sub-themes



Applicants should ensure their project proposals are clearly linked to one or more of the three objectives listed above. Proposals should emphasize 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 aim of this research programme is to investigate what transformational change automation will create for National Road Authorities (NRA's). The scope of the term 'automation' with regards to this call includes both the ongoing development of automated and connected vehicles, leading to an automated traffic system, as well as the automation of maintenance and construction processes and the full range of road operation.

Automation has and will continue to change our way of life. The main reason for this Transnational Research Programme is National Road Authorities need to understand how to embrace new technology to improve road safety, traffic efficiency, the environment, customer satisfaction, maintenance and construction processes. For example; how do NRA's make automation part of the working processes across sectors and organisational boundaries, that contribute to goals such as zero fatalities, zero emissions, 24/7 availability, efficiency savings, reliability and environmental protection.

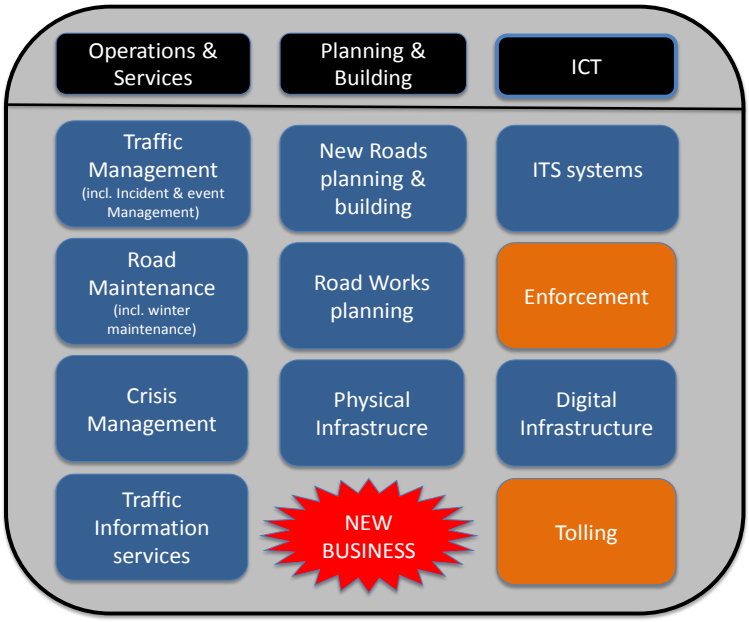
5 Research Objectives

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

5.1 Topic A: How will automation change the core business of NRA's?

What are the influences of automation on the core business in relation to road safety, traffic efficiency, the environment, customer service, maintenance and construction processes. How will the current core business on operations & services, planning & building and ICT change in the future?

Overview of NRA's core business



Some considerations:

- **Road Safety:** how can automation support, within a generation, roads as safe to travel on as railways. How and to what extent can NRA's strive for zero fatalities of road-workers and road users. What new risks will be introduced in the traffic system and what should road operators do to mitigate those?
- **Traffic efficiency:** Road congestion is one of the most serious transport problems we face today, bad for motorists, business and the environment. So NRA's need to tackle overcrowding on their busiest routes today to avoid gridlock tomorrow. NRA's know that simply building new road capacity on its own is not a practical response to future congestion. What will be the impact of automated and connected driving on the traffic flow? How can automation support traffic efficiency by increasing lane capacity on existing assets? What will be needed in terms of traffic management by NRA's to realize increased traffic efficiency?

- **Maintainability:** how automation can support asset management efficiency savings as this is the biggest spend for most NRA's. How do NRA's achieve maintenance and construction provision 30% cheaper than today. Road authorities need to understand how automation can support cost reductions in road maintenance and construction for example sensors from connected vehicles can detect potholes, ride quality, slip resistance and even soft estate grassland and foliage obstructing signs and signals. What development is needed to collect, bundled, analyse and understand the available vehicle data?
- **Identify unintended consequences and impacts on business as usual:** could automation result in; rutting, extended headways, reduced capacity, mixed fleet and the consequences and impacts on business as usual. To what extent could vulnerable infrastructure be at risk by for instance truck platooning? What mitigation could reduce these issues?

Other considerations may include:

- Technology readiness
- Data availability and quality
- Description of data requirements
- Maturity of standards
- Increase the life of the road/structures, reduced wear
- Do structures need to be strengthened
- Automated maintenance
- Maintenance planning
- Data collecting and monitoring

Expected outputs

To support NRA's in the development of automation

- Development and implementation of a road map including identification of core business implementation issues
- Changing roles and responsibilities of the different stakeholders and especially NRA's
- Impact and socio-economic assessment of impacts of different types of automation in different operating environments
- Assessment of impact on NRA's core business and functions including maintenance and construction
- Identification of legal enablers and challenges
- Minimum data requirements for automation to facilitate service provision
- Recommendations for the required digital infrastructure
- Recommendations for road safety, traffic efficiency, environment, customer service, maintenance and construction
- Advice on unintended consequences and mitigation

5.2 Topic B: What new options do NRA's have from digitalisation and automation?

This research will look to develop a step by step transition toward full digitalisation of the road network. By learning from other stakeholders and the data and service providers to understand where NRA's should position themselves in the digital world.

NRA's need to digitise its existing assets and provide new digital information about the road to support its core operation and support future automated vehicles and services. NRA's challenge is to recognise what will be the responsibilities of NRAs in regards digital information supplying and what will be supplied directly by the commercial actors

NRA's could unlock significant cost savings in the medium to long term by taking advantage of existing in-vehicle devices and emerging automated vehicles to reduce or ultimately remove the reliance on traditional roadside infrastructure. However digital maps are now predominantly owned by the private sector. Currently these maps are dependent on the road side infrastructure being in place to enable them to be represented on their digital maps, such as road signs giving orders, warning signs, direction signs, and information signs. Additionally automated vehicle sensors are reliant on road markings, traffic lights, variable message signs and signals and road works signs on the road. NRA's have extensive asset management data such as the road topology, location of bridges, structures and signs that could support the safe and efficient use of automated vehicles. In this context, it is highly important to identify possible public commitments for gradual investments in platforms, allowing exchange of data between the private actors and road authorities without competing with commercial interests. With regards to the relation between road operators and OEM's concerning data sharing, this research should provide inputs that can be used by road operators in the practical translation of agreements reached with the industry in the data task force under the High Level Meeting.

Other considerations may include:

- Open drive, open maps, shapefile data storage format for storing the location, shape, and attributes of geographic features of NRA's equipment.
- Digital maps for driving assistance systems and automated vehicles
- Conflict between information provided by commercially available in-vehicle devices and the roadside infrastructure
- Cost savings in the short to medium term by taking advantage of existing and developing in-vehicle devices
- Environmental sustainability benefits.
- International mapping standards
- Business models free data vs paid for
- What options do automating vehicles give NRA's for optimizing traffic flow
- Developing business models
- Cyber security and privacy
- Governance and influence on digital platforms

Expected outputs

To support NRA's

- Build a strategy for NRA's digitalisation of their assets, that includes relevant stakeholders
- Practical roadmap (with a critical path) for step by step development and transition of road operation to digitisation
- Proposal for a set of business models for co-financing and operation of a suitable platform for data sharing between public and private sectors.
- Proposal for a suitable standard for a platform at EU-level

5.3 Topic C: Practical learnings for NRA's from test sites

The connected and automated driving test sites around the world provide a great opportunity for NRA's to learn from. These test sites can provide access to detailed information that can help support future deployment of automation technology. NRA's are interested in learning how these test sites support core business activities such as road safety, traffic efficiency, customer service, maintenance and construction.

This research will provide a comprehensive review of technological and non-technological aspects such as design build, organization, cultural, assurance and safety of the most relevant test sites from around the world, with special focus on the European test sites, reviewing their business cases and if the sites support NRAs core businesses.

NRA's would like to understand the rationale behind these test sites with a systematic overview on how NRA's shared set of issues are approached. Review/overview of all test sites are they giving NRA's what they need.

Other considerations may include:

- Introduction of level 3 and Level 4 systems in safe way
- Roads with and without physical infrastructure
- Maintainability and construction
- Roadside equipment of today and tomorrow

Expected outputs

To support a number of CEDR NRA's in the development of automation

- Report on practical learnings from test sites
- Roles and responsibilities of the different stakeholders on test sites
- Impact and socio-economic assessment of different test sites
- Test site assessment of impact on NRA core business and functions including maintenance
- Recommendations for future tests sites and identification of gaps

6 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.

7 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 CEDR Working Group “Collaborative Automated Driving” (WG CAD) is a potential supporter of the proposed projects and provides a contact to many NRAs. Hence the WG CAD shall be actively involved in the proposed projects, particularly by joining workshops such as the kick-off workshop.

Furthermore, it is encouraged to involve OEMs. The respective OEMs might be incorporated in workshops such as the kick-off workshop. Applicants are asked to attach a Letter of Intent (LoI) with the respective OEMs .

It is foreseen that project coordinators will meet the PEB to present the progress of the project once per year. Additionally, be prepared to submit papers to conferences (like TRA or FIRM). Consider these costs in your budget.

The target budget provided by the participating National Road Administrations for this programme is **EUR 1.800,000**.

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

https://www.ukcite.co.uk/

http://www.intercor-project.eu/

https://www.constructionnews.co.uk/markets/special-reports/how-to-make-a-bim-driven-motorway/10008058.article

http://connectedautomateddriving.eu

https://ec.europa.eu/transport/themes/its/c-its_en

https://amsterdamgroup.mett.nl

https://www.c-roads.eu

http://ec.europa.eu/growth/tools-databases/newsroom/cf/itemdetail.cfm?item_id=8640

http://www.acea.be/press-releases/article/connected-and-automated-driving-eata-presents-deployment-roadmap-submits-pr

https://icsw.nhtsa.gov/safercar/v2v/

http://www.volvocars.com/intl/about/our-innovation-brands/intellisafe/autonomous-driving/drive-me

https://www.volkswagen-media-services.com/en/detailpage/-/detail/With-the-aim-of-increasing-safety-in-road-traffic-Volkswagen-will-enable-vehicles-to-communicate-with-each-other-as-from-2019/view/5234247/7a5bbec13158edd433c6630f5ac445da?p_p_auth=bmqfJQ9d