Conférence Européenne
des Directeurs des Routes

Conference of European
Directors of Roads

CEDR TRANSNATIONAL ROAD RESEARCH PROGRAMME

Call 2024

Safe System Implementation

CEDR Transnational Road Research Programme

funded by

(countries to be confirmed)

Description of Research Needs (DoRN)

DRAFT

Draft DoRN has no details of the potential budget or the funding countries, but it has all the necessary technical details.

Publishing DoRN does not constitute a commitment by CEDR or any of its members to launch the corresponding research call.

May 2024

Table of contents

Authors of the DoRN

Matt Staton, National Highways, UK (Chair)
Nikolaos Adamidis, National Highways, UK
Matt Pilsbury, National Highways, UK
Simon Sternlund, Trafikverket, Sweden
Liessa Iliaens, Flemish Road Agency, Belgium
Bas Janssen, Rijkswaterstaat, Netherlands
Mona Tveraaen, Norwegian Public Roads Administration, Norway

Call 2024 Programme Manager

Naida Muirhead, CEDR

1 General Introduction

This Description of Research Needs (DoRN) relates to a Call for Proposals entitled **CEDR Transnational Road Research Programme Call 2024** launched by the Conference of European Directors of Roads (CEDR). CEDR is an organisation which brings together the directors of 29 European road authorities. CEDR provides a platform for cooperation and promotion of improvements to the road system and its infrastructure, as an integral part of a sustainable transport system in Europe. 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 Working Groups (WGs) aimed at the analysis of relevant and specific topics of interest from an NRA perspective. Through CEDR Working Groups, CEDR members work together to identify needs for research collaboration and manage research activities.

The Governing Board of CEDR (CEDR GB) has given a mandate to relevant WGs to identify opportunities for transnational road research programmes on an annual basis. CEDR GB also requested that:

- WGs only propose suitable research topics and identifies good research proposals;
- WGs present 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 organisation from 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 and their partners taking part in the programme.

2 Introduction to Call 2024

The CEDR Transnational Research Road Programme is supported by CEDR to fulfil the common interests of the National Road Authority (NRA) members of CEDR. The participating NRAs in this Call are (to be determined). 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 PEB will act as a steering committee for the programme. The research budget will be jointly provided by the participating NRAs: the participating NRAs will also nominate the individual member of the PEB. The PEB has designated (to be determined) to act as PEB chair.

CEDR GB has, appointed the CEDR Secretariat to assume the role of Programme Manager (ProgMan) to take over the administration of this Call for Proposals. For this Call, the ProgMan will be Naida Muirhead. The responsibilities of the ProgMan 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 ProgMan in its country under its law and regulations. The terms under which the ProgMan 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 contractors in response to this Call for Proposals. In the case of groupings, there are no geographic restrictions on consortia partners provided that any project consortium is led by a legal entity established in a European country.

Individuals and organisations involved in the development or approval of the Call or its management 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. This will accelerate the development of faster and durable methods and techniques for road maintenance and management. It is particularly important that the results be easily implementable by road authorities across Europe, and applicants are encouraged to include case studies and demonstration projects in submissions so as to contextualise the research and illustrate the benefits of transnational collaboration.

In addition to cooperation with the PEB, selected projects are also expected to work with relevant CEDR Working Groups, activities and other bodies (such as the Executive Board) and include them in the projects' activities (e.g. workshops, etc.). For this call, particular attention may be given, individually or collectively, to WG Road Safety (WG RS).

Applications will be evaluated by the PEB in relation to:

- Extent to which the proposal meets the requirement of the DoRN
- 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 programme is to support national road authorities (NRAs) in the implementation of the Safe System approach. This programme needs to be relevant to all NRAs and therefore must consider the current position of each road authority in relation to Safe System adoption and implementation as well as the constraints relevant to each respective country, including but not limited to: cultural, fiscal, geographical and organisational differences.

Therefore, the aim is to first understand the current interpretation and adoption of the Safe System across NRAs. Second, to assess the cultural maturity of each NRA in relation to Safe System implementation. And third, to provide solutions that enable systematic analysis of the data available to a road authority which identifies the most effective and efficient combination of road safety countermeasures within their available resource and therefore aid implementation and prioritisation.

4 Reasons for this Transnational Road Research Programme

The European Transport Safety Council (ETSC) report that there were 20,678 deaths on EU roads in 2022. This reflects a 9% reduction against 2019 levels but is insufficient progress to meet the EU target to half road deaths by 2030, compared to the 2019 levels[1]. For CEDR

[1] https://etsc.eu/17th-annual-road-safety-performance-index-pin-report/

member countries[2] there were more than 22,000 deaths in the latest available year's data[3]. This means that countries across Europe require concerted efforts to reduce road casualties over the coming years. This is reiterated in a recent report by the European Court of Auditors[4]. International consensus[5] is that adoption of an integrated approach such as the Safe System approach is a way these efforts can be coordinated.

Since the conception of Vision Zero (Sweden) and Sustainable Safety (the Netherlands) in the 1990s there has been growing international interest in, and adoption of, what is now commonly referred to as the Safe System approach[6] to incident and casualty reduction. In several countries this is true at governmental, strategic and local road network levels. The Safe System helps strategists and policy makers unravel some of the complexities surrounding understanding why collisions occur and the relationships between those collisions and outcome severity – specifically why collisions can lead to severe injury or loss of life. It also suggests the general categories of countermeasures that need to be put in place to reduce incident numbers and injury severity.

In the European Court of Auditors report[7] it is acknowledged that the *Road Infrastructure Safety Management (RISM) Directive 2008/96/EC, as amended by (EU) 2019/1936,* provides a common methodology for both the reactive and proactive assessment of motorways, TEN-T and primary roads at a network level. However, it recommends the provision of *"further guidance in order to address the main risk factors more effectively (including speed and infrastructure design for roads with the highest number of fatalities)."* This research programme focuses on how further guidance could be developed to support Safe System implementation.

Whilst the adoption of a strategic approach has worked well in countries such as Sweden, the Netherlands and Norway and has been shown to support coordination and selection of countermeasures, this approach cannot be readily or consistently operationalised. Even in these countries, big efforts are required to meet ambitious targets towards zero. Therefore, across all NRAs support is required to implement Safe System-based countermeasures, particularly relating to cultural maturity around the Safe System approach and managing competing priorities. The Safe System is based on a set of principles and pillars that define those variables which are thought to be most directly connected to injury collisions. It provides no direct insights into the actions or countermeasures that would be most appropriate to addressing safety issues on a specific network or affecting specific populations of road users. It therefore also currently fails to provide any insights into the most effective mix of measures needed to have the most beneficial outcomes. Tools, such as the Road Safety Decision Support System (DSS) delivered under the SafetyCube project (www.roadsafety-dss.eu) may provide some form of decision-making support around individual countermeasures or issues but do not provide a consistent approach to implementing the Safe System principles that can be used as a blueprint by governments or road authorities with a diverse set of road safety challenges (such as traffic levels, terrain or climate conditions).

---

[2] https://www.cedr.eu/members

[3] Data from International Traffic Safety Data and Analysis Group (IRTAD) Annual Report 2023 (2022 data) https://www.itf-oecd.org/sites/default/files/docs/irtad-road-safety-annual-report-2023.pdf supplemented with World Health Organisation (2019) data for countries not included in the IRTAD report https://apps.who.int/gho/data/node.main.A997

[4] https://www.eca.europa.eu/en/publications/sr-2024-04

[5] https://www.roadsafetysweden.com/about-the-conference/stockholm-declaration/

[6] https://www.itf-oecd.org/sites/default/files/docs/safe-system-in-action.pdf

[7] https://www.eca.europa.eu/en/publications/sr-2024-04

It is acknowledged that NRAs are unlikely to possess all the levers necessary to implement countermeasures across the Safe System, with road infrastructure and traffic management improvements most within their control. However, NRAs are in a key position of influence to engage other stakeholders who can implement change in other areas, therefore in taking an NRA-centric approach, this work will still enable focus on countermeasures across the Safe System and the NRAs role in their implementation, whether that be directly or through influencing others.

In 2021 CEDR published a position paper on road safety (Main Road Safety Challenges for European Road Directors the next 5-10 years – Towards the Vision Zero[8]) which highlighted that *"it is a real challenge to identify on a huge network those locations with the highest potential and after that the appropriate traffic safety countermeasures. It is also a challenge to find countermeasures that are a step towards a safe system and that do not hinder safe system solutions."* While the paper suggested prioritisation of some countermeasures, identification of the most effective long-term combination of measures, based on individual road authority data is key to supporting decision-making in this area.

In April 2024, the *CEDR Dublin Declaration*[9] was signed, which expresses a vision *"for a future proof pan-European road network to support Europe's economy, society and environment with a societal focus on road safety, connectivity, social equity and sustainability."* This vision is supported by the four themes identified in the 2021 position paper on road safety in the following ways:

1. *Road safety as a vital part of sustainability* – by improving KPIs and other metrics to ensure safety is recognised in appraisal schemes and taking into account the need to address climate change and sustainability.
2. *Road safety on the entire road network* – recognising that NRAs often manage the safest roads, it is important our work supports local road authorities in the journey towards zero everywhere and a Safe System that works across all network operators.
3. *Road safety for everyone* – ensuring we address all types of harm on the network, including vulnerable road users, suicides and road worker safety.
4. *Road safety improvements by new technology* – ensuring our work identifies how connected and automated vehicles and digital infrastructure might influence the Safe System of the future.

The *CEDR Dublin Declaration* also highlights the need for any approach going forward to account for the challenges NRAs will face associated with the need for major rehabilitation works across the network, as well as the environmental and social landscape they are operating within.

5 Research Objectives

Description of Problem/Description of Research Need

There appears to be consensus among NRAs around the broad principles underpinning the Safe System approach, namely that people make mistakes, that these should not result in death or serious injury and that the prevention of fatal and serious injuries requires a shared and multi-layered approach. However, it should not be assumed that all road authorities

[8] https://www.cedr.eu/docs/view/6183e651d28a8-en

[9] https://cedr.eu/news-data/4039/CEDR-Dublin-Declaration-signed

interpret these in the same way. Similarly, while there are many countermeasures that could be considered as aligned to the Safe System principles, application of these measures can be a challenge, even for NRAs with a clear Safe System strategy in place, let alone those for whom the approach is relatively new. The key challenge, therefore, relates to the ability to support a diverse group of NRAs (and wider local road authorities) to work towards a common goal of eliminating road deaths.

A key aspect of this is governance / road safety management and it is important to assess the cultural maturity of each NRA in relation to the Safe System in order to understand what the appropriate next steps towards improved Safe System implementation may be. From a countermeasure perspective NRAs already undertake a minimum level of assessment of their network using the network wide road safety assessments required by the EU Road Infrastructure Safety Management Directive. This data provides a key, common input any further Safe System-based assessment tool or guidance can utilise which, coupled to a cultural maturity assessment, enable a bespoke implementation programme in support of a Safe System.

Expected Outputs

The primary scope of this project is the road networks managed by the NRAs involved in the research programme. This is also described as the Pan-European Road Network (PERN)[10]. However, it is anticipated that the outputs are likely to be applicable to other non-urban roads and, in line with the CEDR Dublin Declaration, the ability for partners in local authorities to use the outputs is highly desirable. Recognizing that each road authority is unique and will have different needs, the outputs of this work are separated into four distinct parts, each of which is described below:

1. Literature review / overview

A review of existing literature to define what the Safe System is and how different countries or road authorities have interpreted and adopted the core principles. This should use the definitions in the EU road safety policy framework 2021-2030[11] as a basis for comparison with existing approaches across the member NRAs.

This should be produced in a publishable document as the first output of the project.

2. Cultural maturity assessment

Using models such as Hudson's safety culture ladder[12] or the Safe System Cultural Maturity Model[13], provide a mechanism for bespoke assessment of each funding NRA's cultural maturity in relation to adoption and implementation of the Safe System approach.

---

[10] The NRAs cooperating in CEDR are responsible for managing road networks that span more than one million kilometres, and also they have a role in defining the functionality of this combined network. The PERN links the urban and economic regions of Europe, such as (air/sea) ports, metropolitan agglomerations, together with rural areas. Reflecting national as well as transnational connections, roughly 60% of the PERN is motorway. Approximately 10% is part of the EU's TEN-T.

[11] https://op.europa.eu/en/publication-detail/-/publication/d7ee4b58-4bc5-11ea-8aa5-01aa75ed71a1

[12] https://www.sciencedirect.com/science/article/pii/S0925753507000227#fig2

[13] Fosdick, T., Campsall, D., Kamran, M., & Scott, S. (2024). Creating a Cultural Maturity Model to Assess Safe System Readiness Within Road Safety Organisations. *Journal of Road Safety*, *35*(1), 52-64.

This **must** include:

- A cultural maturity assessment in relation to adoption and implementation of the Safe System. For this purpose, a tool is to be developed to assess the cultural maturity of NRAs in relation to Safe System Implementation. This tool will be used to aid the implementation from part 3 as well.
- Assessment of the resources (financial and people) available.
- Identification of Safe System aligned countermeasures already being implemented.
- Identification of the data sources available to support further analysis and prioritization of additional countermeasures.
- Supporting the NRA to define what their long-term vision is for the future of their network in line with a Safe System (i.e. what would their ideal future network look like from a Safe System perspective?) and how to implement it.

This **could also** include:

- Assessment of the operating landscape e.g., societal acceptance of road safety countermeasures, to help understand whether specific interventions or combinations of interventions will have support in each road authority area.
- Conflicting or complimentary elements in relation to environmental and carbon reduction strategies.
- The relationship between infrastructure maintenance activities and system-based safety improvements.

As a minimum the assessments should be undertaken with all funding road authorities, but consideration should also be given to ensure the testing is undertaken with a diverse range of authorities to demonstrate its suitability for all CEDR members. Where the funding authorities do not provide a representative sample of the diversity of CEDR members, it is expected that the research will include further NRAs (up to 3) to demonstrate the suitability of the tool to diverse needs.

The assessments in this part are not intended for making comparisons between the cultural maturity of each road authority. They are for the individual road authority to use as they see fit, as well as to inform part 3 of the research.

3. Implementation support

Based on the assessments undertaken in part 2, a tool to support development of a bespoke action plan for the next steps of implementation to maximise long-term casualty reduction effects with the resources available. This could be a combined tool or separate to the tool delivered in part 2.

This **must** include:

- Actions the NRAs can take to improve their cultural maturity to support implementation of Safe System countermeasures, based on the results of the cultural maturity assessment undertaken in part 2.
- The ability to analyse a broad range of datasets (identified in part 2 to support prioritization and additional countermeasures), recognizing each NRA will have different data available and may be able to add more data over time.
- A prioritised list of countermeasures that provide the greatest reduction in fatal and serious casualties (based on the definition of serious the NRA provides) that are possible within the resources available. This should reflect the benefit of the

combination of measures, not just each countermeasure in isolation and should therefore avoid double-counting and support measures in synergy of casualty savings.
- Guidelines, a user manual and training to enable all member NRAs to use the tool and update their inputs periodically.
- Where data is available, countermeasures to assess and address suicide and medical episode related risks.

The tool should preferably be hosted online and must include at least five years updates and maintenance to enable it to be accessed and used by road authorities over a five-year period once the project to develop the model is completed.

As a minimum the tool should be tested during the project phase with all funding road authorities, but consideration should also be given to ensure the testing is undertaken with a diverse range of authorities to demonstrate its suitability for all CEDR members. Where the funding authorities do not provide a representative sample of the diversity of CEDR members, it is expected that the research will include further NRAs (up to 3) to demonstrate the suitability of the tool to diverse needs.

4. Engagement and dissemination of the research outputs

Engagement with stakeholders internally and externally to CEDR is essential to successful implementation of this research beyond the project. Engagement and dissemination activity **must** therefore include:

- Engagement with European-level stakeholders based on the outputs from the tool for the NRAs taking part in the research. Common areas of focus should be identified where CEDR members can act together to engage with stakeholders at a European level. An engagement plan for these stakeholders should be identified as part of the project.
- At least one in-person workshop for relevant CEDR Working Groups.
- An in-person ‘CEO workshop’ for the CEDR Governing Board (potentially to be held in Cyprus during their CEDR Presidency in 2026).

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 and should inform the tenderer of any similar proposals currently under submission for funding by other publicly funded calls.** Proposals should take full account of the outcomes and state-of-the-art identified in these projects listed below. Failure to take account of available research conclusions or notify the evaluators of similar proposals submitted to other funding schemes will disqualify proposals from this call or lead to termination of an awarded contract as will any form of collusion between competing proposals.

7 Additional information

The aim of this Transnational Road Research Programme is to provide applied research services for the benefit of national road administrations in Europe. The Call is open to any contractor but lead entities must be established in Europe. Applications using the templates provided must be submitted by the applicant.

The expected duration of this programme is 36 months. The target dates within this programme are as outlined in the Guide for Applicants.

The duration for individual projects can be up to 24 months within the programme timescale and commensurate with the tasks envisaged.

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

The research budget provided by the participating national road authorities for this research programme is (to be determined).

Please refer to the Guide for Applicants (GfA) for full details of how to submit proposals in response to this Call. Submissions using the templates provided must be made electronically using the CEDR Tenders portal (https://tenders.cedr.eu). Submissions received after the deadline cannot be considered.

Appendix A: Existing projects and resources

Europe wide (and global)

ERA-NET ROAD – Safety 2009 https://cedr.eu/call-2009-safety

CEDR Call 2012 Safety https://cedr.eu/call-2012-safety

CEDR Call 2013 Safety https://cedr.eu/call-2013-safety

CEDR Call 2016 Safety https://cedr.eu/peb-research-call-2016-road-safety

CEDR Call 2019 Safe Smart Highways https://cedr.eu/peb-call-2019-safe-smart-highways

CEDR Call 2022 Data https://www.cedr.eu/call-2022

European Commission, Directorate-General for Mobility and Transport, Next steps towards 'Vision Zero' – EU road safety policy framework 2021-2030, Publications Office, 2020, https://data.europa.eu/doi/10.2832/391271

CEDR Position Paper on Road Safety (2021) Main Road Safety Challenges for European Road Directors the next 5-10 years – Towards the Vision Zero https://www.cedr.eu/docs/view/6183e651d28a8-en

CEDR Dublin Declaration (2024) Time to partner for preserving Europe's road network https://cedr.eu/docs/view/6622195c2ddf7-en

European Court of Auditors (2024) Special report 04/2024: Reaching EU road safety objectives – Time to move up a gear. https://www.eca.europa.eu/en/publications/sr-2024-04

The Vision Zero Handbook: Theory, Technology and Management for a Zero Casualty Policy | SpringerLink

The European Road Safety Decision Support System (Safety Cube DSS)

European Road Safety Observatory, Road Safety Thematic Report – Safe System Approach

International Transport Forum: The Safe System Approach in Action

The Road Safety Handbook (Trafikksikkerhetshåndboken)

European Commission, 2008. "Directive 2008/96/EC of the European Parliament and of the Council of 19 November 2008 on road infrastructure safety management." Official Journal of the European Union (OJ L 319, 29.11.2008, p. 59)

Sitran, A. Delhaye, E. Uccelli, I. (2016) Directive 2008/96/EC On Road Infrastructure Safety Management: An Ex-post Assessment 5 years After its Adoption,Transportation Research Procedia, 14, 3312-3321. https://doi.org/10.1016/j.trpro.2016.05.279.

Persia, L., Usami, D. S., De Simone, F., De La Beaumelle, V. F., Yannis, G., Laiou, A., ... & Salathè, M. (2016). Management of road infrastructure safety. Transportation research procedia, 14, 3436-3445. https://doi.org/10.1016/j.trpro.2016.05.303

Safe System implementation tool - ITF Summit 2024 (itf-oecd.org)

National programmes

Matts-Åke Belin, Ragnar Andersson, Per Nilsen (2016). Vision Zeros – from Idea to Implementation - A Programme for Implementation Research within the Transport Sector, 2017:032, ISBN: 978-91-7725-000-5.

Hauer, Ezra. "Computing what the public wants: Some issues in road safety cost–benefit analysis." *Accident Analysis & Prevention* 43.1 (2011): 151-164. https://doi.org/10.1016/j.aap.2010.08.004

Kristianssen, Ann-Catrin, et al. "Swedish Vision Zero policies for safety–A comparative policy content analysis." *Safety science* 103 (2018): 260-269. https://doi.org/10.1016/j.ssci.2017.11.005

A. Lie, C. Tingvall, Are crash causation studies the best way to understand system failures – Who can we blame?, Accident Analysis & Prevention, Volume 196, 2024, 107432, ISSN 0001-4575, https://doi.org/10.1016/j.aap.2023.107432.

Rizzi, M., Strandroth, J. (2022). Road Safety Analysis. In: Edvardsson Björnberg, K., Belin, MÅ., Hansson, S.O., Tingvall, C. (eds) The Vision Zero Handbook. Springer, Cham. https://doi.org/10.1007/978-3-030-23176-7_33-1

Rizzi M, Fredriksson R, Krafft M. Government Status Report Sweden, 27th ESV Conf. Yokohama 2023. https://index.mirasmart.com/27esv/PDFfiles/27ESV-000347.pdf

Rizzi, Matteo, et al. "Proposed speed limits for the 2030 motor vehicle." 27th International Technical Conference on the Enhanced Safety of Vehicles (ESV) National Highway Traffic Safety Administration. No. 23-0166. 2023. https://index.mirasmart.com/27esv/PDFfiles/27ESV-000166.pdf

Tingvall, C. *et al.* (2022). Saving Lives Beyond 2020: The Next Steps. In: Edvardsson Björnberg, K., Belin, MÅ., Hansson, S.O., Tingvall, C. (eds) The Vision Zero Handbook. Springer, Cham. https://doi.org/10.1007/978-3-030-23176-7_48-1

Abebe, Henok Girma, and Sven Ove Hansson. "Can Cost Benefit Analysis and Vision Zero be Reconciled?." (2021). https://urn.kb.se/resolve?urn=urn:nbn:se:kth:diva-302387

Elvik, R. (2022). Vision Zero in Norway. In The Vision Zero Handbook: Theory, Technology and Management for a Zero Casualty Policy (pp. 295-306). Cham: Springer International Publishing. https://link.springer.com/content/pdf/10.1007/978-3-030-76505-7_10.pdf

Elvik, R. (2023) What would a road safety policy fully consistent with safe system principles mean for road safety? Accident Analysis & Prevention, 193, 107336, https://doi.org/10.1016/j.aap.2023.107336.

Elvik, R. (2009). An exploratory analysis of models for estimating the combined effects of road safety measures. Accident Analysis & Prevention, 41(4), 876-880. https://doi.org/10.1016/j.aap.2009.05.003

Fosdick, T., Campsall, D., Kamran, M., & Scott, S. (2024). Creating a Cultural Maturity Model to Assess Safe System Readiness Within Road Safety Organisations. Journal of Road Safety, 35(1), 52-64. https://doi.org/10.33492/JRS-D-24-1-2125507

Hudson, P. (2007). Implementing a safety culture in a major multi-national, *Safety Science,* 45(6), 697-722. https://doi.org/10.1016/j.ssci.2007.04.005

Sustainable Safety 3rd Edition: the advanced vision for 2018-2030 https://sustainablesafety.nl/

National Highways Road to Zero Harm