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PIARC Special Project

Artificial Intelligence in the road sector

CALL FOR PROPOSALS

Deadline for submission of proposals: 15 March 2024

1 PURPOSE AND STRATEGIC SIGNIFICANCE

1.1 Introduction

Artificial Intelligence (AI) and the Generative AI (Gen AI) are concepts and areas of practical application that are quickly growing, in terms of interest, products and services across multiple sectors. The concept is also relevant to the road, transport and mobility sectors in areas such as infrastructure design, operations and management, service provision and meeting the needs of customers. It may apply to the external services delivered, and internal processes operated, by road and transport agencies and other stakeholder organizations.

Emerging policies and practices for AI in the roads and transport sector are still novel, emerging and not completely understood. Governments are making efforts around the world to set policies that correctly state the use of AI within the country / region and across sectors. Understanding the potential applications, their potential and actual benefits, challenges and risks is critical to inform and guide future approaches in the road sector.

Understanding of this new technology will be key to the success of AI in order to enhance the road sector practices. This item will impact all aspects related to management of road infrastructure including workforce management and traffic management.

Public trust and workforce trust will also be key to the success of the deployment of AI in the road sector, especially as a common application of AI will involve controlling the movement of vehicles, e.g., through AI operated traffic signals, connected fleets etc. Other critical AI applications include safety of vulnerable road users and road infrastructure design, construction, inspection, operations, management and maintenance of all road infrastructure assets.

Other key issues to the success of AI in the road sector will include coherent policy, technological maturity, cybersecurity, impact on workforce and their skills, governance, risk management... This project must explore what all the issues and success factors are and how the road sector should deal with them.

1.2 Definition of AI in the road sector

Artificial Intelligence, and Generative AI (considered as a subset of AI): the ability of a digital computers, machines or software to perform tasks commonly associated with intelligent beings. The term is frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experience.

Artificial Intelligence applied to the road sector: when applying AI to the road sector, some programs can augment human decisions in performing certain specific tasks, so some activities within the road sector can be performed more efficiently. Particularly, a key benefit of AI is on tasks where machines can enhance humans' capabilities, which often involves repetitive tasks across large amounts of data, for example, objects detection in video, etc. In parallel, AI is also opening new opportunities for new services and management that was not possible previously.

1.3 Context

There is a need for the global road/transport sector to explore how AI is currently being used and is likely to be used in the coming years up to 2030. Such as identifying the beneficial use cases of the current generation of Large Language Models (LLMs). It is important that this information is brought to the attention of the roads sector from decision-makers to practitioners, academia, and wider stakeholders to highlight the benefits, as well as address potential concerns surrounding AI and propose solutions to mitigate them.

There are numerous opportunities for the use of AI, within the road and mobility sectors. This study will help us understand what these opportunities are, their current level of understanding and application, and early results around the globe. This will provide PIARC members with the opportunity to leverage the experience of others to expedite the efficient, economical, and safe deployment of the technology. Some countries will be more advanced with the use of AI so there is an opportunity to share lessons from the experience of others.

Several PIARC member countries are establishing AI strategies generally and in the road or transport sector in particular. For example, the UK Government have developed a National AI Strategy that aims to invest in the long-term needs of the AI ecosystem, ensuring that AI benefits all sectors and regions, and that AI is governed effectively. In the United States the National Artificial Intelligence Initiative is overseeing and implementing the United States National AI Strategy.

The project would align with the Gender Inclusion Strategy that PIARC has adopted in 2022 as the study should look at AI in terms of the mitigation of risks associated with any potential bias in application. AI will have a global impact and is therefore relevant to all PIARC working topics and member countries.

1.4 Purpose of the project

The purpose of this Special Project is to develop a horizontal scan across the road sector to point out all the fields where AI can be efficiently introduced over the coming years up to 2030. The horizontal scan must consider the field of expertise of almost all PIARC Technical Committees, which are expected to cover all road related fields relevant to PIARC member countries: <https://www.piarc.org/en/PIARC-Association-Roads-and-Road-Transportation/PIARC-Technical-Committees>

The key questions this Special Project will seek to address – with a focus on road infrastructure design, construction, inspection, operations, management and maintenance; as well as road safety; rather than on vehicles - are:

1. Currently, where is AI either being investigated, piloted, or initially deployed within the road and mobility sector? What are the current set of potential AI use cases and how do they offer benefits to road and transport agencies, customers and stakeholders?
2. What sector-specific issues does the application of AI to roads, transport and mobility face relative to overall trends and experience from other sectors?
3. What is the vision for AI in the road sector? What is the current outlook in terms of

regulations across the world?

4. What are the opportunities, barriers and risks for wider AI use in both Low and Middle Income Countries (LMIC) and High Income Countries (HIC)? There are some roads technologies that have been feasible or available based on AI for some years, but which have not been implemented due to a lack of finance, will, or business case. Lack of data readiness and workforce readiness have been identified as critical barriers. How can national road administrations, and public sector in general tackle these barriers?
5. What are the key issues for the security, control, access to, and governance of, data and algorithms between sectors – business, academic, and government – and across national jurisdictions in LMIC and HIC?
6. How should road authorities and agencies set guidelines and regulation for private sector to develop AI in the road sector? Including ethics, protecting public interests, pursuing public policy goals etc.
7. What is the needed knowledge level of AI for different road practitioners, policy makers and decision makers. What is the change management strategy that road organizations need to put in place in order to be ready for this change around the use of AI? How the workforce can be prepared? What are the departments / teams to prioritize? For instance, do they only need to know how to use the applications, or do they need to be deep in the understanding of mechanisms and algorithms?
8. How does AI impact Gender Inclusion and Diversity, and what are the associated risks and mitigation strategies?
9. How does AI impact social equity, and what are the associated risks and mitigation strategies?
10. What new capabilities can be brought to bear to address existing challenges; what solutions can be improved with emerging AI technology and what things do we think are visible on the 2030 horizon, but are not here yet?
11. How could National Road Authorities foster effective and beneficial development of AI in the road sector over 2030 horizon?
12. What specific areas should PIARC focus on in the current Strategic Planning Cycle (2024 – 2027) outlining the key recommendations for the roads sector?¹

¹ This may include suggestions for further more specific Special Projects to look at AI in detail in some specific fields

1.5 Out of scope

AI development and possibilities beyond the 2030 horizon are out of scope. The study might mention them when relevant, but it should not focus on them.

The project must offer a general horizontal scan across all specialties of the road sector, therefore deep dives in a specific subject or field are welcome as examples, provided that they do not challenge work devoted to the general view over all other fields within the road sector.

This project is focused on the roads, transport and mobility sectors. Generic analysis of AI overall should be avoided except in terms of its application to roads.

2 METHODOLOGY AND APPROACH

2.1 Key areas and approach

The answer should include a description of the approach to be taken to collecting and compiling the information being requested. Please take into account that the first two points are the two key areas for consideration in the project and a more thorough description is expected.

The proposal should answer the following questions about the tenderer's approach:

1. How will you collate information from different road administration authorities, transport regulators and operators, other public administrations, academia and relevant industry from international road sector, including successful and unsuccessful case studies, national strategies and business cases that deal with AI in the road sector?
2. LMIC represent an important share of PIARC membership and it is crucial that their needs, opportunities and challenges are addressed within PIARC activities.
 - a. How will the study consider the reality of lower to middle-income countries?
 - b. How will case studies from LMIC be collated?
 - c. How will their needs be taken into account?
 - d. How will some of the findings of the project be identified as particularly suitable for LMIC?
 - e. How will you ensure any recommendations/next steps can be implemented by LMIC?
3. How will the study identify opportunities, challenges and risks, as well as enablers and barriers to delivery, for road and transport policies and strategies dealing with AI?
4. What will be the study milestones in terms of deliverables? What will be the approach for monitoring the progress and to include the inputs from the Project Oversight Team (POT)? It is recommended to organize monthly videoconferences, and to share with the POT regularly intermediate deliverables asking for feedback.
5. How will the management of the project be organized, including quality assurance and quality control without taking significant resources from the project?
6. How will you mobilize the diverse range of skills needed to complete this work? We consider that the range of skills needed includes understanding technologies, collecting case studies, analyzing policies and strategies, in very different fields within the road sector: infrastructure

management, road network operations, road safety, disaster management, road transport, services provided to road users... but also sociology when assessing trust and other barriers to implementation.

7. How will the study make recommendations to National Road Administrations, road and transport agencies, and PIARC members specifically, to effectively and beneficially develop AI?
8. How will the study propose recommendations to PIARC for taking further into account the AI in their road sector, including in the current Strategic Planning Cycle 2024 - 2027?

2.2 Options

The proposal can be structured as a core proposal plus additional options.

The bid would then include a core proposal within the proposed budget, and then some options which would be described in detail as well as priced.

If the bid is selected, PIARC would place the order for the core proposal and maybe as well for some of the options. This would be done at PIARC's discretion.

In any case, the core proposal must answer all the expectations which are presented in this call for proposals document.

3 FINAL DELIVERABLES

The final deliverables will include:

3.1 Technical Report

The final Technical Report should generally include inputs and sections around the items listed below. Variations to this list may be proposed, but with justification and arguments for PIARC's consideration:

- A literature review.
- A collection of case studies² with a high level of overview of challenges, risks and opportunities (e.g. strategies, regulatory frameworks, organizational approaches, specific projects and national strategies). It could also be instead a collection of use cases.
- International survey results² (if undertaken) or international study conducted by the company aimed at explaining the actual adoption of AI within the road sector.
- Analysis of the current and future outlook for AI based on the analysis of the literature review conducted, case studies (or use cases) identify and international survey /study with a clear view of the challenges and opportunities for road organization in adopting AI.
- Toolkit for PIARC member organization to approach AI within their organization.
- Conclusions and recommendations for PIARC members and PIARC itself to consider.

A possible structure of the final report could be as follows, although bidders are free to propose their own structures with a rationale:

Executive Summary

1. Introduction: project background, objectives and scope.

² PIARC POT will support the dissemination of surveys and call for case studies among Technical Committees and member countries, but the responsibility to ensure appropriate answers to the surveys and call for case studies remains within the bidder of this call for proposals.

2. Methodology and approach.
3. Outcomes of the literature review.
4. Outcomes of the international survey.
5. Case studies analysis from around the world (probably classified by sub-sectors: road safety, asset management, traffic operations...).
6. Description and analysis of the use of AI in the road sector currently and 2030 (probably classified by sub-sectors: road safety, asset management, traffic operations...).
7. Description of potentials and challenges in this field.
8. Conclusions of the study.
9. Recommendations for road administrations, LMIC and PIARC.
10. References
11. Appendices (such as complete inputs from survey, additional results of the literature review, etc.)

Each chapter of the report should make reference to LMIC, when relevant. A chapter inside the report's conclusions, with possible **specific recommendations for LMIC** should also be considered.

The specific recommendations for public administration bodies and transport regulators are a key element of the report. They should be relevant for policy advisors, decision makers, practitioners and operators, including from the perspective of understanding and meeting the needs of customers, workforce and organizational management and internal road agency processes.

The specific recommendations for PIARC could include recommendations to liaise with specific industries, take part in existing conferences and/or create a new technical committee / task force on the subject or include AI aspects in the current 2024-2027 Terms of Reference of some Technical Committees.

3.2 High-Impact Summary

An independent High-Impact Summary document, setting out key aspects of the Final Report, should also be prepared.

3.3 Dissemination material

Presentation material to present the results of the Special Project at PIARC Council meeting in 4-8 November 2024 in Andorra.

The selected tenderer will also be invited to join the meeting physically or via videoconference. The retained option should be specified in the proposal.

3.4 Voluntary contribution to the next PIARC Congress

Voluntary contribution to the Session on the Special Projects inside the World Winter Service and Road Resilience Congress in Chambéry, France, 9-13 March 2026. Retained consultant will be invited to join the session (participation is optional) and to provide inputs to the Session program. This contribution will be requested after finalizing the project and out of the project budget. So, this point is provided as information.

3.5 Intellectual property and formats

The final products will be submitted in electronic form in English, using the PIARC template for Technical Report and PIARC template for PowerPoint presentations.

The report will be owned by PIARC and it will acknowledge the contribution of the external consultant.

PIARC will ensure translation into French and Spanish. In addition, they will make it available free of charge in the World Road Association's Virtual Library to ensure a large world outreach for the report.

4 KEY DATES

The proposal should also include a proposed draft of a work schedule. The schedule should identify dates or timeframes for accomplishing major milestones in the project. The work schedule will include monthly videoconference meetings and dates or timeframe for an interim product or products that allows adequate time for review and feedback prior to the final deliverable. The schedule must be completed, and final report should be delivered by 14 October 2024, so PIARC can proceed to translation and dissemination of document in advance to participants to PIARC Council meeting foreseen in Andorra 4-8 November 2024.

These are some of the milestone to be included in the offer:

- End of March 2024: Kick-off videoconference meeting.
- Intermediate milestones to be proposed by the tenderer.
- 20 September 2024: Final draft report for POT to comment on until 4 October 2024.
- 14 October 2024: Finalization of the report in English including all final comments from POT.
- 21 October 2024: Finalization of Council presentation.
- 4-8 October 2024: Presentation at PIARC Council meeting, in presence in Andorra or by virtual participation.
- 9-13 March 2026, Voluntary presentation at the World Winter Service and Road Resilience Congress in Chambéry, France.

5 PROPOSED BUDGET

Please provide a general budget for the project. The funding requested from PIARC should not exceed 54,400 Euros all taxes included. The budget should include a general itemization of the costs of the major work elements of the project and provisional schedule of invoicing.

Invoices will be processed only for completed and approved items, with 10% of each invoice payment to be held back until final deliverables have been accepted by the Project Oversight Team and approved by PIARC.

In line with EU regulations, the payment will take place 60 days after the acceptance of the invoice by the POT.

Since a timing delivery of the outputs is at the essence of the Special Projects mechanism, late penalties could be applied if the external consultant fails to deliver the outputs in the proposed milestones. In line with French regulations, if the delay is the contractor's responsibility, the penalties will be 1% of the budget per week of delay, with a grace period of 15 days, and up to a maximum of 5% of the budget.

6 PROPOSED EXPERTS AND INTERNATIONAL NETWORK

The proposal should also include a description of the relevant expertise that qualifies the contractor to undertake the project. Specifically:

- Please describe any past or current work projects that relate to the subject of this proposal.
- Please also identify the person or persons who will be working on this project, describing their roles and estimated contribution to the project in expertise and time, and providing information on their backgrounds, experience and expertise.
- Please provide information about any other international network, other than the World Road Association, from which tenderer could receive inputs.

7 PROJECT OVERSIGHT AND PROPOSALS EVALUATION

The project will be overseen by a project evaluation and steering committee called "Project Oversight Team" (POT) to select the preferred tenderer and assist in the development of the project. These experts will be drawn from PIARC membership and will include representatives from several technical committees. Some experts will be nominated by member countries and PIARC General Secretariat staff.

The POT will assess proposals and select the preferred tenderer on the basis of its assessment of:

- a) Technical approach and methodology (up to 35 points): how the tenderer addresses the project objectives and deliverables, how effective and resilient the proposed approach and methodology are, including proposed international case studies and addressing the needs of different PIARC member countries, in particular the LMIC.
- b) Proposed work plan including intermediate milestones (up to 15 points).
- c) Value for money offered by the tenderer (up to 20 points): including the time offered by different contributors of the tenderer's team.
- d) Experience of the proposed team on the holistic vision of the road sector (up to 10 points).
- e) Experience of the proposed team on the AI applied to the road sector (up to 10 points).
- f) International experience and network of the proposed team (up to 10 points).

The POT will oversee progress of the Project, including participating in periodic calls, reviewing interim and final products. The POT will also provide any relevant information from the PIARC work to the selected tenderer (e.g., information obtained from surveys) for use in the project. In addition to review and oversight by the POT, input may also be sought from the other members of Technical

Committees and the PIARC Executive Committee and Strategic Planning Commission.

8 PROPOSAL SUBMISSION

Proposals should include the elements identified in this Call for Proposals.

Answers must include the following content and characteristics, otherwise they could not be taken into consideration:

1. Executive Summary (maximum 1 page long).
2. Introduction to the tenderer organization/company (maximum 2 pages; appendixes can be added).
3. Understanding AI in the road sector and Special Project requirements: project background, scope and objectives (maximum 1 page).
4. Proposed methodology and approach (answering to section 2 of current call for proposals).
5. Potential options and deliverables:
 - Additional options if relevant.
 - Technical report.
 - Council presentation.
 - Congress contribution.
6. Work schedule (please provide a definition of tasks and deliverables in a time frame).
7. Budget:
 - Proposed budget for PIARC.
 - Working time included in the budget for different contributors of the proposed team.
 - Proposed schedule of invoices (to be linked to deliverables).
8. Proposed experts, organization of the team and international network
(Maximum a half page by individual, including their experience in the road sector, in the mobility needs, in public policy, their international experience and their experience in LMICs; longer CVs and additional information can be added as appendixes to the proposal.)
9. Appendixes

Page limitations:

The 8 first points should be developed in a maximum of 20 pages.

The whole document should have a maximum of 50 pages including the appendixes.

Proposals should be submitted electronically in English to the World Road Association General Secretariat at:

gen-sec-piarc@piarc.org

no later than:

15 March 2024

For any questions, please send E-mail to gen-sec-piarc@piarc.org