XVI WORLD WINTER SERVICE AND ROAD RESILIENCE CONGRESS
CALGARY, CANADA - 7-11 FEBRUARY 2022

Session Report

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TECHNICAL SESSION R8.2: ROUNDTABLE ON RESILIENCE: CROSS- CUTTING ISSUES
THURSDAY FEBRUARY 10, 08.00 AM TO 09:30 AM

1. KEYWORDS

Resilience, Climate Change, Cross-cutting Issues, Network Resilience, Structural Resilience, Disaster Management, Asset Management

2. PRESENTATION OF THE SESSION

In this current PIARC cycle there are four cross-cutting issues which are being progressed across PIARC Technical Committees (TC) and Task Forces. These include innovation, climate change, resilience and safety. This session deals with the cross-cutting issues of climate change and in particular, resilience. A key focus of this round table is to enhance the collaboration between PIARC TC's who are covering these topics in their Technical Committees. This session comprised presentations from PIARC Technical Committees (TC 1.4, TC1.5, ST4, and TC3.3) and covered topics of resilience of transport networks, societal resilience relating to disaster management, and structural resilience. The presentations were followed by a round table discussion across related Technical Committees to identify how these issues are currently being handled, overview of definitions and parameters of resilience, tools, methodologies and frameworks, and provided an opportunity to share best-practice approaches. The round table also discussed how to foster cooperation and ensure that the developments of each related Committee are complementary. The outcome achieved was the sharing of inputs to assist in the development of products underpinned by the cross-cutting issues.

3. PROGRAMME OF THE SESSION

Session Chair: Ms Caroline Evans
Session Organiser: PIARC TC 1.4 on Climate Change and Resilience of Road Networks.
Session Secretary: Robert Kafalenos, Member TC 1.4 USA (also assisted by Mr Craig Love, Member TC1.4 UK).

Person	Organisation, Position	Title of the presentation
Caroline EVANS Robert KAFALENOS	Chair of PIARC's TC 1.4; Principal Policy Advisor at the National Transport Commission, Australia PIARC Member TC1.4, USA & Environmental Protection Specialist, Sustainable Transportation and Resilience Team at the Federal Highway Administration, US Dept of Transportation	Welcoming and introduction
Caroline EVANS Yukio ADACHI Margo BRIESSINCK Dimitrios PAPASTERGIOU Ingo KAUNDINYA Enrico MITTIGA Gerardo FLINTSCH	Chair PIARC TC 1.4, Australia Chair PIARC TC 1.5, Japan Chair PIARC TC 4.1, Belgium PIARC TC 4.2, Working Group Leader, Switzerland Chair PIARC TC 4.4, Germany PIARC TC 4.3, Working Group Leader, Italy Chair PIARC TC 3.3, USA	Overview of PIARC TCs relating to cross cutting issues
Robert KAFALENOS	PIARC Member TC1.4, FHWA, USA	Outline of topics for the Round table

Louis BETTINI	PIARC English Speaking Secretary TC 1.4; Principal Sustainability Advisor, Main Roads Western Australia – Australia	Resilience of transport networks, including climate change
Marcelo MEDINA Tomohiro FUJITA	PIARC TC 1.5 Spanish Speaking Secretary PIARC TC 1.5 Member (Young Professional)	Societal resilience related to disaster management
Margo BRIESSINCK Dimitrios PAPASTERGIOU Enrico MITTIGA Tiago MASSINGUE Gerardo FLINTSCH	Chair PIARC TC 1.4, Belgium PIARC TC 4.2, Working Group Leader, Switzerland PIARC TC 4.3, Working Group Leader, Italy PIARC TC 4.4, English Speaking Secretary South Africa Chair PIARC TC 3.3, USA	Structural resilience
All speakers	PIARC TC's 1.4, 1.5, ST4 and TC3.3	Round table discussion
Caroline EVANS Robert KAFALENOS	Chair of PIARC's TC 1.4; Principal Policy Advisor at the National Transport Commission, Australia PIARC Member TC1.4, USA & Environmental Protection Specialist, Sustainable Transportation and Resilience Team at the Federal Highway Administration, US Dept of Transportation	Conclusion of the session.

4. TECHNICAL FINDINGS AND DEBATE

The round table was structured to provide an overview of resilience from the perspectives of each PIARC TC. This included an overview of the work programs of each TC, and fostering cooperation at the network whole-of-system level such as holistic vulnerability and risk assessment approaches, and identification of resilience at an object level e.g. identification of measures and materials for enhancing infrastructure resilience of earthworks, bridges, tunnels and pavements. The progress of each TC involved in the round table was highlighted such as the collection of case studies, development of full reports and outputs published to date.

The topics of Resilience of transport networks, including climate change; Societal resilience related to disaster management; and Structural resilience were presented. For the first topic, this included a presentation of broad definitions identified for resilience, hazards, risks and vulnerabilities, and others, and possible application/adaptation of these to definitions to fit the relevance of the work of other TC's. Strategies and tools to increase resilience were also identified, together with addressing the needs of Low-Middle-Income Countries (LMICs) through the development of methodologies, tools and approaches which can be tailored to suit the needs of different users. The topic of societal resilience relating to disaster management included discussion about the interface between road network connectivity and information communication e.g. online (effective data collection, users interphase, informatics systems), digitalised road networks (GIS agents) and communication (websites, promotion). This session also identified "what can we do to increase resilience", where examples of structural, non-structural and social capital capacity building programs were discussed. This included important actions for utilising social capital and provision of road traffic information for evacuation and reconnecting supply chains as disaster recovery responses.

The round table also included an overview of the key issues associated with structural resilience of pavements, bridges, earth structures, tunnels and asset management approaches. Topics such as relevant impacts for structures as a result of hazards, measures to increase resilience, and definitions of resilience in the context of resilient infrastructure (for existing structures, new structures and both by way of updated action codes etc), were identified. Asset management measures for improving resilience of road networks were also discussed such as measuring resilience based on performance (functional and structural).

5. RECOMMENDATIONS FOR DECISION MAKERS, FOR PIARC OR FOR INTERNATIONAL ORGANISATIONS

Resilience is a complex concept often identified as a continuous cycle involving preparation, prevention, protection, response/recovery and adaptation. Resilience can be presented at different levels as a complex system (large-scale resilience), transport sector specific (medium-scale resilience) and resilience of

infrastructure (small-scale resilience). It was recognized that there are many definitions for resilience as a cross-cutting issue identified across the TCs represented in this round table. These definitions can be holistic and high-level and in the context of resilient infrastructure, relate to existing structures, new structures and both by way of updated action codes etc.
It was identified that there are opportunities to engage LMICs. For example the PIARC International Climate Change Adaptation Framework is being updated by TC1.4 in this current cycle to accommodate a range of different audiences who are advanced in this topic and those who wish to apply parts of the Framework according to organizational and/or regional specific needs.
In particular, it was identified that there are many definitions and approaches to resilience which should be considered across PIARC TC's, and as a result, there is a need to ensure a uniform understanding of the topic of resilience across PIARC TC's by way of a horizontal coordination processes. Opportunities to share definitions, terminology and approaches, case studies and report outcomes were identified as ways to collaborate between TCs on the cross-cutting issues of resilience.

6. PREPARATION OF THE SESSION

This session was planned, designed and organised as follows:

- The session was coordinated and led by PIARC TC 1.4 Chair Ms. Caroline EVANS, and Mr. Robert KAFALENOS.

Key contributions are acknowledged by the following PIARC TC's:

- TC 1.5 Disaster Management
- TC 4.1 Pavements
- TC 4.2 Bridges
- TC 4.3 Earthworks
- TC 4.4 Tunnels
- TC 3.3 Asset Management.

The Chairs wish to specially acknowledge all participants, attendees, and contributors and their affiliations as they are listed in the aforementioned Session Programme, PIARC's General Secretariat for their support, and the Canadian Organizing Committee for their hosting and provision of technical support.