## Executive Summary

Technical committee (TC) B1 'Road Network Operations (RNO) and Intelligent Transport Systems (ITS)' is tasked to deliver the following:

- Update of the RNO-ITS Manual website
- Lost Cost ITS report
- Big Data for Road Network Operation report

The 7th (of 8) semi-annual meeting was held in Melbourne from 9 to 11 April 2019. The members reviewed compiled materials and draft reports. Tasks to complete the report were discussed. The agenda and preparation for the World Road Congress (Abu Dhabi, 6-10 October 2019) were also discussed and agreed.

Technical sessions covered the following:

- Presentations from the TCB1 members (Low Cost ITS, Big Data for RNO and RNO/ITS Manual and Website)
- Presentations from Australian stakeholders (Austroads Guide to Traffic Management, Big Data Readiness for Road Network Operations, and Austroads Connected and Automated Vehicle Program)
- Designing the Next Generation of Traffic Management Systems in Australia

The TCB1 meeting will organise a special technical session at the World Road Congress in Abu Dhabi (October 2019).

## Background

The technical committee (TC) B1 'Road Network Operations (RNO) and Intelligent Transport Systems (ITS)' has three objectives to be delivered at the end of the 2016-2020 cycle, as follows:

- Maintenance and improvement of the RNO-ITS Manual: update the website and its contents
- Report on Low Cost ITS: use of smartphones and other cost-effective technologies for RNO
- Report on Big Data for Road Network Operations

This report covers the 5th out of 8 semi-annual meeting over the 2016-2020 cycle of PIARC which was held in Munich from 3-4 May 2018. The meeting was chaired by Jacques Ehrlich and attended by 23 members from various countries.

## Work Program

Work on all three work streams have been progressing. The working groups' progress are on-track. The Low Cost ITS report has been published, which can be downloaded via the link below:


The Low Cost ITS concept was introduced for the first time during PIARC 2012-2015 cycle. The concept described ITS services that were attractive to resource limited or Low- and Middle-Income Countries (LMICs). This was possible because of the recent emergence of inexpensive technological solutions including information systems based on the collection of probe vehicle data or information harvesting from social networks-based software applications. However, the concept was not formally defined. Upon further consideration, application of low cost ITS concerns both LMICs and High-Income Countries (HIC's). This is driven by the need to reduce public expenditure, including investment and operating costs during the life cycle of ITS services.

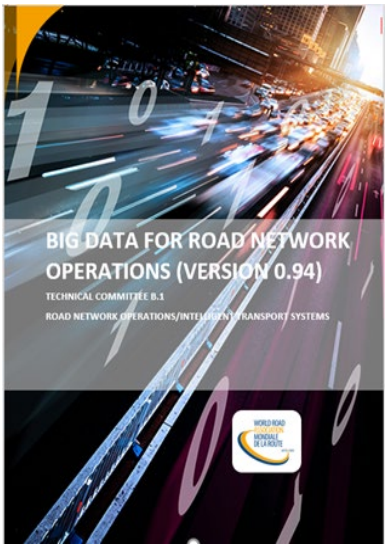
The objective of this report is to perform an in-depth investigation of the Low cost ITS concept to clarify its definition and investigate all related aspects: service areas, stakeholders and value chain, business model and costs, system architecture, quality of service, system resilience, legal aspects, privacy and standardisation. On these different aspects, whenever possible the comparison between traditional and low-cost approaches is addressed.

For this document to be more than a theoretical guide we have tried to anchor it in reality by illustrating it with twenty case studies that are available in a separate booklet.

Thus, the report should be considered a guide for practitioners to help them making the best decisions when planning to deploy a service based on a low-cost solution. However, this is also a guide for researchers to help them identify and target open issues that need further research.

https://www.piarc.org/en/order-library/30406-en-Low%20Cost%20ITS.htm

The technical report on Big Data for Road Network Operations is in draft final stage. It is currently undergoing technical editing and is expected to be published soon. The draft executive summary is below.




Currently several topics are influencing the daily works of road network operators. Automation, internet of things (IoT), smart systems, mobility, and services, or artificial intelligence and big data are some of the buzz words aiming to improve traffic operations. The aim is to use technology to solve some of the commuter's challenges to improve mobility. Among all these topics, big data and big data processing technologies are seen as the enabler to do so. Big data is promised to influence the whole value chain in the road transport sector. The main focus of this report is on the collection of big data and the description of the framework conditions for big data management and usage of it around the globe. Hereby a specific focus is on using big data for internal processes, including road network operations.

The report begins with a description on the meaning of big data in the transport domain. As there is no globally accepted definition of big data, there are three characteristics that are valid for the transport domain: volume for large quantities of data, velocity for rapid data collection and variety of data consisting of different formats usually from different sources. After this general description, the big data process from data collection towards the generation of services and associated knowledge is supposed to be described. Finally, the potential of big data in the transport domain is analysed and identified.

Chapter two focuses on the future possibilities of big data for road network operations. Herein a specific focus is given on integrated services that are enabled by big data. Again, service trends such as; cooperative, connected, and automated mobility (CCAM) and Mobility as a Service (MaaS), are discussed. The report also debates the threats of big data in terms of its processing and applications.

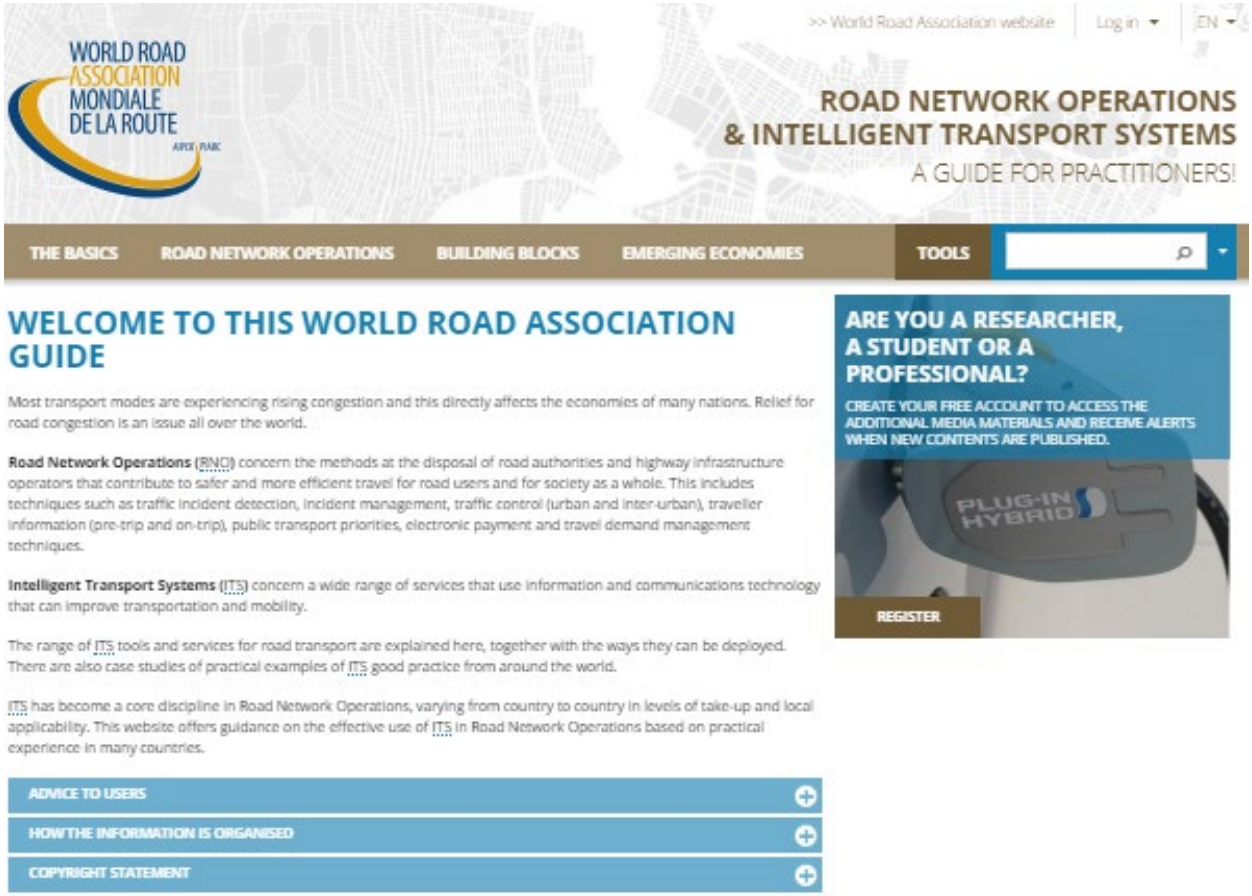
Chapter three focuses on data itself. All kinds of data have value for big data processing within road network operations. Data is analysed along its timeline from static data over real-time and dynamic data towards historical data. In addition, data sources (including detectors, sensors, third party, or social media data) are discussed and the importance of the description of these data sets as metadata is elaborated.

Chapter four deals with several use cases, both from the highway domain as well as from the public transport domain. This chapter primarily focuses on the internal usage of big data processing within road network operation. Hereby the setup of a data access infrastructure, the improved traffic management, the improved road network operation services, automated weather detection services, as well as improved planning and operations tasks are described, followed by expected future applications in the areas of planning, design, and operations. After user cases in the public transport domain and the analysis of big data services enabling a sharing mobility, a specific focus is on the usage of big data for the planning, design, and operations domains of road and for road network operators.

Making transport organisations ready for big data processing and analytics is discussed afterwards in chapter five. Hereby skills needed and standards to be followed are analysed. This chapter as well includes a big data reference architecture focusing on the organisational needs for enabling big data processing. A discussion on quality, data ownership, security, and privacy concludes this chapter. Finally, conclusions and recommendations summarizing the findings of the report are given together with advice on how to deal with big data in the road network operation domain.

The PIARC RNO Manual website has been updated, with additional work on case studies on-going. The manual can be accessed from the link below.

https://rno-its.piarc.org/en




The committee will organise a special technical session during the World Road Congress in (October 2019 (Abu Dhabi). The session will include presentations of the two technical reports and the updates on the RNO Manual Website. It will also feature three related papers from authors outside of the committee, and a panel discussion.

## Knowledge Sharing Workshop and Keynote Presentation:

The TCB1 Committee hosted a knowledge sharing session on 9 April 2019. The session was followed by a social networking event. This knowledge sharing session provided an opportunity to hear from the panel of international and local experts and to exchange ideas on recent developments in road network operations and ITS. The key topics covered included:

- PIARC RNO/ITS Website
- Low Cost ITS
- Big Data for Road Network Operations
- Austroads Guide to Traffic Management
- Big Data Readiness for Road Network Operations
- CAV in Australia and Road Operator Data for CAV Operation
- Agenda for the Future of Road Network Operations

The event was attended by more than 40 stakeholders, comprising of the TCB1 Committee members and stakeholders from Australia including experts from road agencies, research institutes, universities and private sector.

A keynote presentation was also done on 10 April 2019. The topic was 'Designing the Next Generation of Traffic Management Systems in Australia'.

Presentations slides can be made available, upon request to ian.espada@arrb.com.au.

## Meeting outputs

The following were the meeting outputs:

- Reports were finalised or steps to finalisation determined
- The special technical session for the World Road Congress was developed and agreed
- Knowledge sharing and social networking was completed

## Emerging issues

There was no emerging issue to note.

## Learnings for Australia and/or New Zealand

- Report on Low Cost ITS for reference
- Report on Big Data for Road Network Operations for reference
- RNO Manual Website for reference

## Dissemination

This report is recommended for note of the Austroads Network Task Force and the Traffic Management Working Group.

## Conclusions and recommendations:

The 7th meeting achieved its purpose. The Committee's objectives are on-track to be met.

## Acknowledgements:

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