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## Analysing THE Impact of Road Information System on Traffic Safety

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### Abstract

This paper provides a complex analysis framework for evaluating the role of appropriate transmission (appropriate quality, quantity, location and timing) of information in case of infrastructure safety and accident categories. The aim of the “infrastructure module” of the methodology is to evaluate, how much the appropriate transmission of information influences road safety at a given section of the road infrastructure. The aim of the “accident module” of the methodology is to define those types and causes of accidents, which are remarkably influenced by the appropriateness of information transmission.

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*Keywords:* road safety, information system, accident analysis, crash risk, infrastructure safety, safety indicator, risk factor analysis

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### 1. Introduction

Drivers constantly make decisions during their travel. These decisions are influenced by their rule knowledge, driving patterns and skills, as well as available information and interpretation during driving.

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Information may come from the environment or the vehicle's passenger compartment. There are direct and indirect information, and they may be related to the transport system (useful information) or not (useless information).

Drivers make decisions based on their knowledge and information available, which determine the chain of events in transportation. An error occurring in the chain causes disturbance in the transport process that must be solved as soon as it is reaching a critical level. If it fails to resolve, road traffic accidents occur. The level of road safety is therefore significantly influenced by the quality of information [1].

It is important to systematically analyse the quality and accordance of information come from the environment, and to eliminate critical errors. Analysis of the complete transport process (instead of a specific situation), as well as interpretation of interactions of situations within the chain of events are the most important components of the method.

### 1.1. *The theoretical approach of information*

One of the first designs of the information theory has been elaborated by C.E. Shannon and W. Weaver in 1949. Actually, it is a model of communication, which is not able to examine the meaning of the news [2]. In their research, transmissions of information between the transmitter and receiver sides, and potential barriers of understanding have been analyzed.

Information is basically a word for unpredictability – relation of information and uncertainty is defined in information science. Information is the third basic component of the universe beside materials and energy. It occurs in the communication of any two objects, and which is more important, it is able to multiply by itself. Thus, information can not only be derived from structured data, but it is also present in chaotic conditions. It is reducing entropy and incoordination in both cases [3].

Receiver of a news usually know less about the state of a system than the transmitter. This different level of knowledge is called entropy. Entropy is to be reduced by transmission of information [4].

The concept of information takes place on the border of natural sciences and humanities; and perhaps helps to reduce gaps between the two disciplines. According to N. Wiener (the developer of cybernetics): "Information is information, not matter or energy. No materialism which does not admit this can survive at the present day" [5]. Apparently, opinions about the concept of information are going through a similar unification that happened with the concept of energy in the 19th century.

### 1.2. *The place and role of information in the road transport system*

According to classical subdivision of the road transport system, basic components are the following:

- Human,
- Vehicle,
- Infrastructure.

Technological, economic and social development induces broader interpretation of the system. Some aspects are not sufficiently highlighted by the trichotomy. They are to be revealed by analyzing the elements of road transport system as well as the information system and relations between the drivers and the transport environment [6]. These aspects are becoming more and more important in modern information systems as market value of information is rising.

Development of telematics systems and innovative solutions provides opportunity to give personalized information to the drivers about transport processes related to road operations, route-planning, accident situations, weather conditions, etc. These "tools" are becoming more integrated in the process of controlling the transport [7].

In the trichotomy of road transport system, some relations are not strong and efficient enough without information contact. This subdivision requires effective operation of information connections between the system components. However, beside conventional road information (e.g. static information like traffic signs and road markings); broader interpretation is necessary, which can be observed for example in the philosophy of road designing (e.g. in the design principles of self-explaining roads [8]).

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