An Advanced Impact Integration Platform for Cooperative Road Use – The @CRUiSE Project

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ABSTRACT

The most direct impacts of road transport relate to traffic congestion, road safety, fuel consumption, greenhouse gases emissions, pollutants concentrations/air quality and noise levels. The implementation of environmental policies in the transportation sector should consider the level of contribution of each externality and its geographical scale. Thus, in a context of increasing data availability, a relevant research topic is to explore the nature of these dynamic externalities, in order to efficiently manage current road networks. On another hand, it is indisputable that recent advances in technologies can

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affect road user's travel behavior. The use of Advanced Traffic Management Systems (ATMS) can reduce significantly transport externalities and costs by improving safety, reducing fuel consumption, congestion and greenhouse gas emissions.

The project @CRUiSE "Advanced Impact Integration Platform for Cooperative Road Use" is coordinated by the Centre for Mechanical Technology and Automation (TEMA) of the University of Aveiro (UA). It has also the participation of the Centre for Environmental and Marine Studies (CESAM) and the Institute of Telecommunications (IT) of Aveiro.

The main objective of @CRUiSE is to integrate road traffic impacts into a single analytical framework for use in ATMS. For this purpose, a GIS-based dynamic map structure is being developed in order to assimilate historical and dynamic data, integrated into a library of forecasting traffic models and associated traffic-related externalities. Instantaneous models of emissions and noise are integrated in traffic models, scenarios about air quality are analyzed based on statistical models and finally road conflicts are analyzed using safety-based models. A key feature of this platform is the recognition that the aforementioned impacts are spatiotemporally dynamic due to the heterogeneity of activity patterns of each link as well as the air pollution levels or the weather conditions. An economic risk management approach for each impact will be assigned in order to develop a unique and dynamic link-based eco-indicator. The vulnerability concept is related with the potential for a population group to experience damage in response to the influence of traffic-effects. A method to manage different sources of real-time information to determine as accurately as possible the energy/environmental network performance using smartphones applications and GPS data loggers to monitor dynamics vehicles and simultaneously, road measurements of macroscopic traffic parameters (link occupancy, traffic flows) will be made at critical points in the network. A prototype of an integrated decision support system for selecting the appropriate traffic management measures based on various scenarios will be developed.

The expected applications for this project are based on more accurate and reliable environmental indicators and traffic data, creating a unique platform that will integrate different sources of information to inform faster and more effectively the end users, transport stakeholders and environmental agencies.

Keywords: Sustainable traffic management, Eco-indicator, Externalities, Vulnerability, Floating car data.

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