ICT FOR TRANSPORT

MODUM

Models for Optimising Dynamic Urban Mobility

European Commission
Information Society and Media

MODUM addresses the environmental footprint in the transport sector by aiming to develop a new approach for pro-active demand-responsive management of traffic. This approach will enable energy-efficient multi-modal transport choices accommodating dynamic variations, minimising the environmental impact and improving the quality of life in urban environments.

Project acronym:
MODUM

Project title:
Models for Optimising Dynamic Urban Mobility

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Specific Targeted Research Project (STREP)

Programme:
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Objective ICT-2011.6.6 Low carbon multi-modal mobility and freight transport

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Total cost: € 3,068,365.00

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Project website: http://www.modum-project.eu

Rationale

Transport congestion problems contribute ~70% of pollutants to urban environments. The transport sector by itself consumes up to ~30% of the total energy in the EU. These figures suggest that if Europe is to reduce its CO2 emissions by making an efficient use of energy while improving the quality of life in European cities, novel approaches for the optimal management of urban transport complexity must be developed and adopted in the transport sector.

Objectives

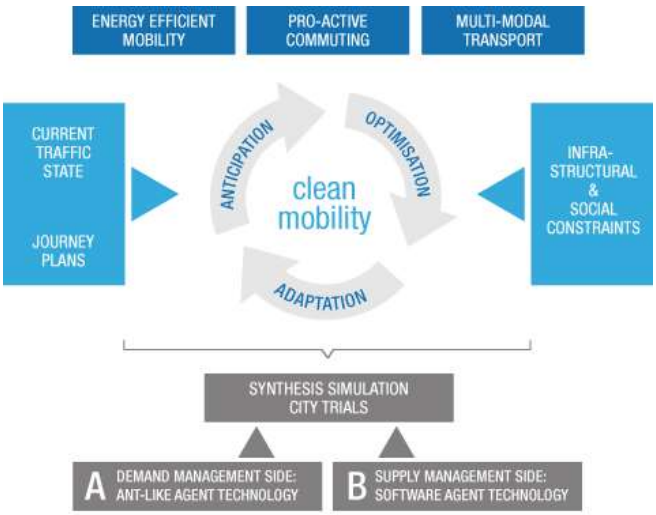
MODUM addresses the environmental footprint in the transport sector by aiming to develop a new approach for pro-active demand-responsive management of traffic. MODUM aims to enable energy-efficient multi-modal transport choices accommodating dynamic variations, minimising the environmental impact and improving the quality of life in urban environments. Moreover, MODUM will consider commuters, in combinations of both private and public transport, facing dynamic conditions such as unexpected disturbances typical for urban environments.

Approach

MODUM focuses on the comparison and the potential synthesis of two approaches: 1) a traffic flow self-organising mechanism based on ant-like agent technology and 2) a “reverse” route planning based on software agent technology; using real-time data and declared destinations. Both mechanisms have proven successful in other application domains and have the potential of utilising vehicles’ computational power

and networking capabilities for achieving their active participation in the demand-response management of urban traffic.

The metrics for the comparison of the two will be extracted from real needs of traffic control centres and from transport users in selected cities. Once the metrics are defined, a series of simulation experiments of realistic complexity will be constructed using real-time data feeds available from transport sensing infrastructure. Results from these will profile the two approaches against certain scenarios of traffic disturbances causing rapid changes in conditions. A synthesis of the two approaches will then be developed by the academic partners.



Software implementation of the synthesised approach will then be embarked upon, focusing on the telecommunication challenges of a realistic demonstrator. The developed prototype will be validated on the initial scenarios by staging real-life experiments, which the relevant traffic management structures within the traffic control centres will evaluate. Such experiments will include historical data and simulations in combination with real-time data feeds from existing infrastructure and vehicles going through a section of a city in a number of congestion profiles. Analogous experiments will include people moving in a city by different modes of transport.

The prototype will provide an implementation of an optimisation approach to traffic management, which is capable of dynamically adapting the overall flows of traffic to unexpected disturbances in order to minimise carbon emissions within an urban complex environment. To ensure practical efficiency an implementation strategy will be devised including the likely reactions of commuters to the suggestions of the system, and thus its practical efficiency. All this will produce a consequent reduction in both pollution levels and energy consumption in the transport sector.

Expected Results

MODUM aims to improve the efficiency of energy consumption and to reduce the CO2 emissions in the transport sector by building a “clean and efficient mobility”, only achievable by an appropriate combination of scientific, technical and social objectives in the area of ICT for the transport sector.

In MODUM scientific objectives push the state-of-the-art in the area of pro-active traffic control and deliver new knowledge in the area in terms of models and requirements (demand and supply side).

The technical objectives take the scientific results and convert them in prototype systems, demonstrating the feasibility and exploring technical challenges arising when the models are to be implemented in technology.

Prototype devices will be prepared for a number of vehicles for the MODUM test sites in Nottingham in UK and Sofia in Bulgaria.

The societal objectives align the technological and scientific results with the society and its people.

The results of achieving all objectives come together to support work towards the long-term impact goals, enabled by the project but not to be achieved within the project timeframe. The different types of objectives motivate different ways in which success against each objective can be measured.

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