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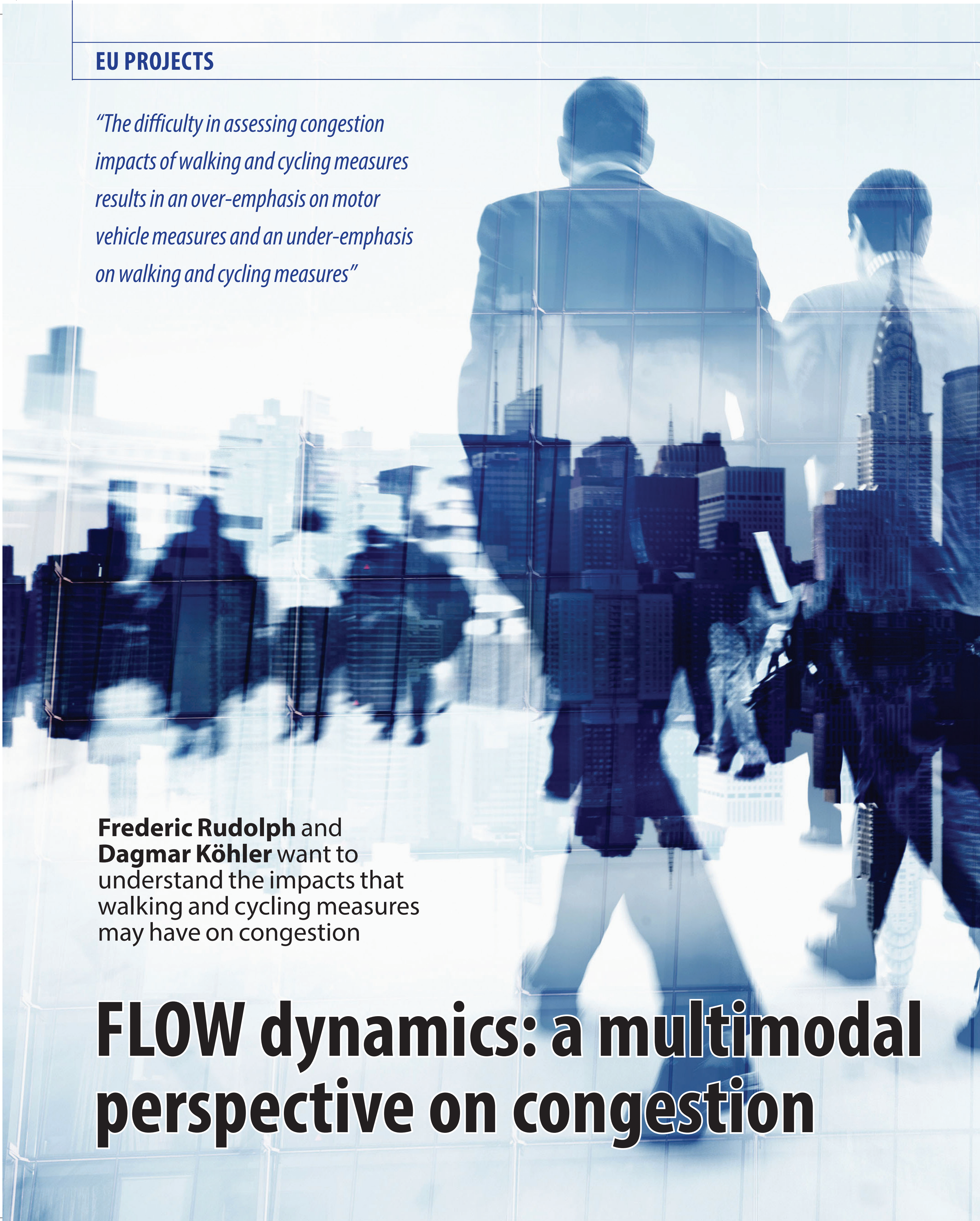


Frederic Rudolph and **Dagmar Köhler** want to understand the impacts that walking and cycling measures may have on congestion

FLOW dynamics: a multimodal perspective on congestion

◀Very little research has been carried out to determine what represents an acceptable delay for cyclists

Traffic congestion is an increasing problem in many cities. For many years, the standard response has been to increase road space for automobiles. However, cities had to witness that providing more road space inevitably leads to more automobile travel and the same levels of congestion (or worse) return quickly. However, walking and cycling have rarely been considered as measures for reducing congestion, despite their well-documented benefits for travellers and cities. So, isn't it about time that road authorities need better tools to assess the impact of walking and cycling on the performance of the transport network?

The difficulty in assessing congestion impacts of walking and cycling measures results in an over-emphasis on motor vehicle measures and an under-emphasis on walking and cycling measures. It also feeds fears that the implementation of measures supporting walking and cycling will actually increase congestion.

The EU-CIVITAS project FLOW has developed a multimodal methodology that better includes non-motorised modes by evaluating the impacts of cycling and walking measures on transport network performance and congestion. Two important innovations used in developing this methodology are:

1. The user perspective: Walking and cycling are active modes and there is a difference between ideal and acceptable travel time. Whereas car drivers aim at attaining the ideal travel time, travel times longer than "ideal" may be acceptable for pedestrians and cyclists to increase safety and comfort of the route.

There is little research on "acceptable" delay for walking and cycling, therefore FLOW adopted the use of minimum travel time as a reference value for the acceptable travel time for all modes of travel. Delay is experienced when the actual travel time exceeds a threshold that the user perceives as acceptable. The perception of delay depends on journey purpose, the ratio of delay to overall journey time and factors such as the need to use public transport for part of the journey.

2. The core of the FLOW methodology is the development of one single multimodal performance index (MPI). The MPI considers all transport modes that operate at a given place and describes transport network service quality. It is calculated by aggregating mode-specific key performance indicators for level of service (LOS).

KEY PERFORMANCE INDICATORS

The FLOW methodology uses key performance indicators (KPIs) to operationalise its multimodal understanding. It describes the state of traffic flow for all traffic participants, which allows to analyse the transport network performance for all modes. The KPIs are:

1. Delay – the additional travel time experienced by a traffic participant compared to the minimum travel time from origin to destination.
2. Density – a measure of the number of persons or vehicles using a given space.
3. Level of service (LOS) – a measure reflecting the quality of service experienced by traffic participants at different levels of infrastructure use (i.e. more or fewer people travelling).

The first step is to calculate the KPIs separately for each mode.

Delay should be used to calculate impacts of a measure at a junction or along a corridor consisting of a number of junctions. It is defined as the mean time loss per traffic participant along a route. The FLOW methodology calculates this for motor vehicles following standard engineering practice as the difference between the actual travel time and free-flow conditions. For cyclists, FLOW defines minimum travel time as the average cycling speed multiplied by the distance over the network from origin to destination. For pedestrians, FLOW defines minimum travel time as the time it would take to walk as the crow flies between two points at an average walking speed. However, more research is needed to determine what is experienced as "acceptable".

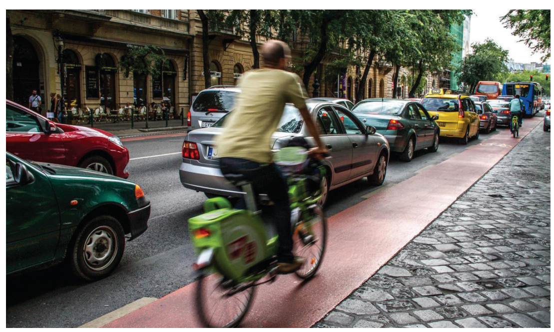
For density, FLOW adopts the commonly accepted definition based on the proximity of vehicles or persons to one another. Density can be used to analyse measures relating to a road segment between two junctions. It is defined as the number of vehicles (cars, public transport vehicles or bicycles) as well as persons occupying a given length of roadway lane, usually specified as one kilometre.

Level of service (LOS) transforms delay and density into a single measure to reflect the quality of service experienced by traffic participants.

LEARN MORE

FLOW e-course

Throughout 2017, FLOW is offering a series of three free webinars and corresponding e-courses. Each e-course is offered for four weeks and allows for interaction with FLOW experts and with colleagues from across Europe.
http://www.h2020-flow.eu/



▲ Budapest applies the FLOW methodology. The city wants to understand what impact walking and cycling measures have on road congestion Photo: BKK

Once a city has calculated values for these KPIs, a threshold value needs to be defined to decide which network performance is considered acceptable or not. This is the congestion threshold, which is a political decision. One way of thinking is that the treshold represents the point at which the city believes intervention is neccessary.

MULTIMODAL PERFORMANCE

Once the KPIs have been calculated separately for each mode, the FLOW Multimodal Transport Analysis Methodology creates a single multimodal performance index (MPI). This is done by aggregating the individual mode-specific values into mean multimodal LOS values. This theoretical value represents the efficiency of the transport system element for all modes.

Most current definitions of congestion focus solely on high motor vehicle density or delay times, thereby neglecting available infrastructure capacity for non-motorised transport. The aggregated multimodal approach considers all modes of transport. It points out the multimodal transport system's capacity reserve and highlights the potential for underused modes to take up excess demand. The methodology enables policy makers to consider all modes as both potential sources and potential remedies for urban congestion. Thus aggregation emphasises the importance of a balanced and integrated transport system.

FLOW IN PRACTICE

FLOW's ideas are being tested in its partner cities of Budapest, Dublin, Gdynia, Lisbon, Munich and Sofia. The FLOW Multimodal Transport Analysis Methodology is being used by the cities to assess the impact their walking and cycling measures have on the transport network performance.

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