Applying FLOW in multi-modal modelling

Effects of a challenging bicycle scenario (Proof of Concept)

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Case

The Metropolitan Authority for the Region of Rotterdam and The Hague (MRDH) is strongly committed to improving the modelling of cycling in its recently finalised multi-modal transport model. Goudappel Coffeng was asked to build an entirely new transport model. Specific cycling and pedestrian feeder modes for public transport have been introduced, along the existing modes cycling, car and public transport (PT). The model has undergone further improvements specifically for bicycle traffic. Using new data sources, the calculation of routes has been improved, and a distinction between faster e-bikes and regular cyclists has been introduced.

The MRDH authority has allowed us to use the multi-modal transport model to calculate the effects of a challenging bicycle improvement scenario as a proof of concept. The FLOW methodology was applied to better map the resulting multi-modal network effects.

The scenario includes several measures for pedestrians, cycling, and car traffic (see Table 1). The central part of the scenario is a cycle highway scheme with fast connections to the Hague city centre, including a connecting bicycle highway in the city centre. Figure 1 illustrates this.

Figure 1: Cycle highway corridors in the City (left) and Inner City (right)

Modelling results

The scenario proves to have major effects, with cyclists choosing to cycle longer distances and adjusting their routes so as to use the new bicycle highways. Car kilometres are reduced in the city centre and on the roads running parallel to the cycle highways. Main PT lines take advantage of improved accessibility by bike and reduced car capacity. However, minor PT lines face competition of the fast cycle routes. Figure 2 shows the increase and decrease in bike and car use in The Hague under this scenario.

Figure 2: Increase (red) and decrease (green) in bicycle use (left) and car use (right)

FLOW results

Table 1 shows the FLOW scores: the total weighted delay per person on the network for all travel modes. The scenario has a positive overall network impact on the city centre and a neutral impact on the city as a whole. The scenario leads to a substantial modal shift, with increased car delays being more than compensated for by shorter delays for cyclists. It also leads to longer travel times for drivers, but shorter travel times for pedestrians and cyclists. For every travel mode, the impact of the scenario was calculated for the city centre and for the city as a whole. The indicators per mode show the total distance and time-related impacts in these areas.

	pedestrian	bicycle	public transport	car	FLOW-score reference	FLOW-score scenario
measures	From 5 to 6 km/h in innercity	Innercity Speed + 25% Corridors + 50%	no measurements	Innercity Speed – 20% Cityring 30 km/h Corridors Capacity – 20%		
A: city centre	Km: +48% Time: -17%	Km: +34% Time: -19%	Km: -12% Time: -1%	Km: -11% Time: +18%	16	13
B: city	Km: + 1% Time: -3%	Km: +16% Time: -9%	Km: -3% Time: -2%	Km: -4% Time: +3%	19	19

Table 1: Measures, indicators per mode and FLOW scores [delays in seconds per person]

The FLOW methodology allows the overall network effects to be calculated for all modes of transport. The total weighting factors used were taken from the Hague Mobility Plan and are shown in Table 2.

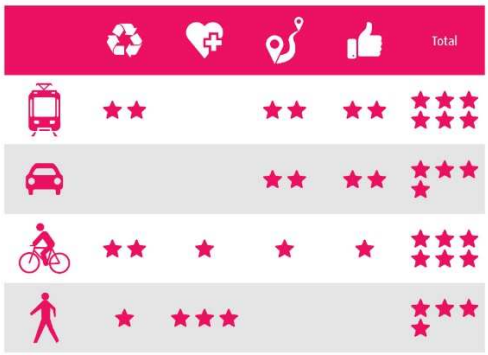

Table 2: Weighting factors per mode for sustainability, health, accessibility, and predictability