The strategic transportation model iMove

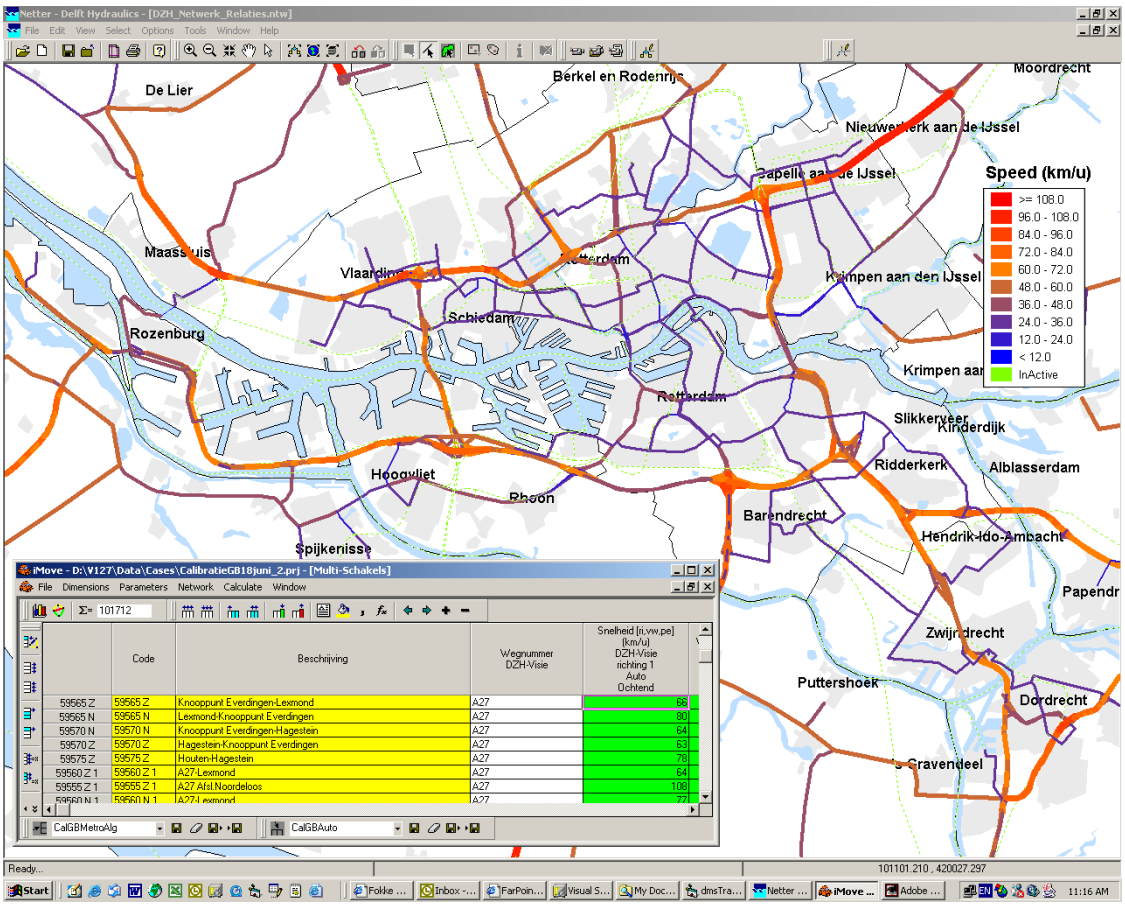
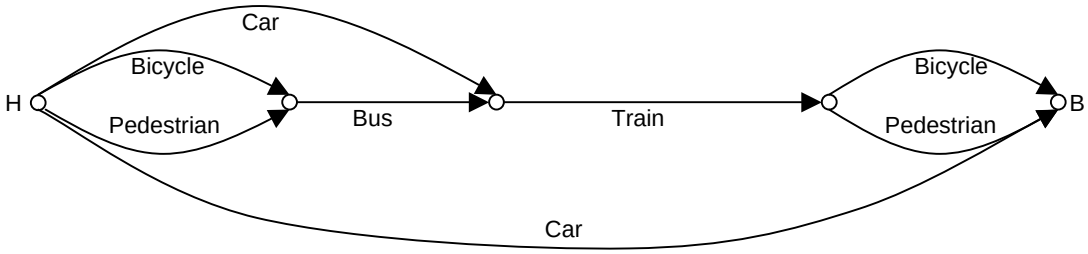


Figure 1 Screenshot of the iMove strategic transportation model with calculated car speeds

The Demis iMove transportation model was developed for multimodal travel choice modeling at a strategic level. iMove was developed by Demis in cooperation with the Technical University of Delft for the Dutch Ministry of Public Works, regional directorate South Holland. With iMove transport of both people and freight can be modeled over roads, railways and waterways. A separate module is available to estimate the effects in terms of road safety, noise and air pollution.

Mobility and the resulting transport is good for the economy and for the job market. However there are also negative impacts, such as traffic accident victims, noise and air pollution. One way to reduce the negative impacts is to take measures to reduce the number of kilometers traveled by car. Alternative transport modes, such as bus, train, bicycle and so forth, need to be made more attractive for the travelers. Often only a combination of different transport modes is attractive enough to form a realistic alternative for using the car.

Figure 2 Examples of multimodal trips



Route 1: Car (single mode)
Route 2: Car, Train, Bicycle
Route 3: Car, Train, Pedestrian
Route 4: Bicycle, Bus, Train, Bicycle
Route 5: Bicycle, Bus, Train, Pedestrian
Route 6: Pedestrian, Bus, Train, Bicycle
Route 7: Pedestrian, Bus, Train, Pedestrian

Multimodal trips, i.e. trips consisting of two or more vehicular modes, are a common travel phenomenon and are becoming more important in the future. Possible advantages of multimodal transport are a reduction of long distance car trips by offering better access to long distance public transport and improving the accessibility of city centers for instance by introducing transfer points to high quality public transport services at the outskirts of the city. A study on travel behavior in the Netherlands showed that currently only 3% of all trips could be classified as multimodal trips. For long distance trips and for trips to and from the main cities, this percentage appears to be 15% and 20% respectively.

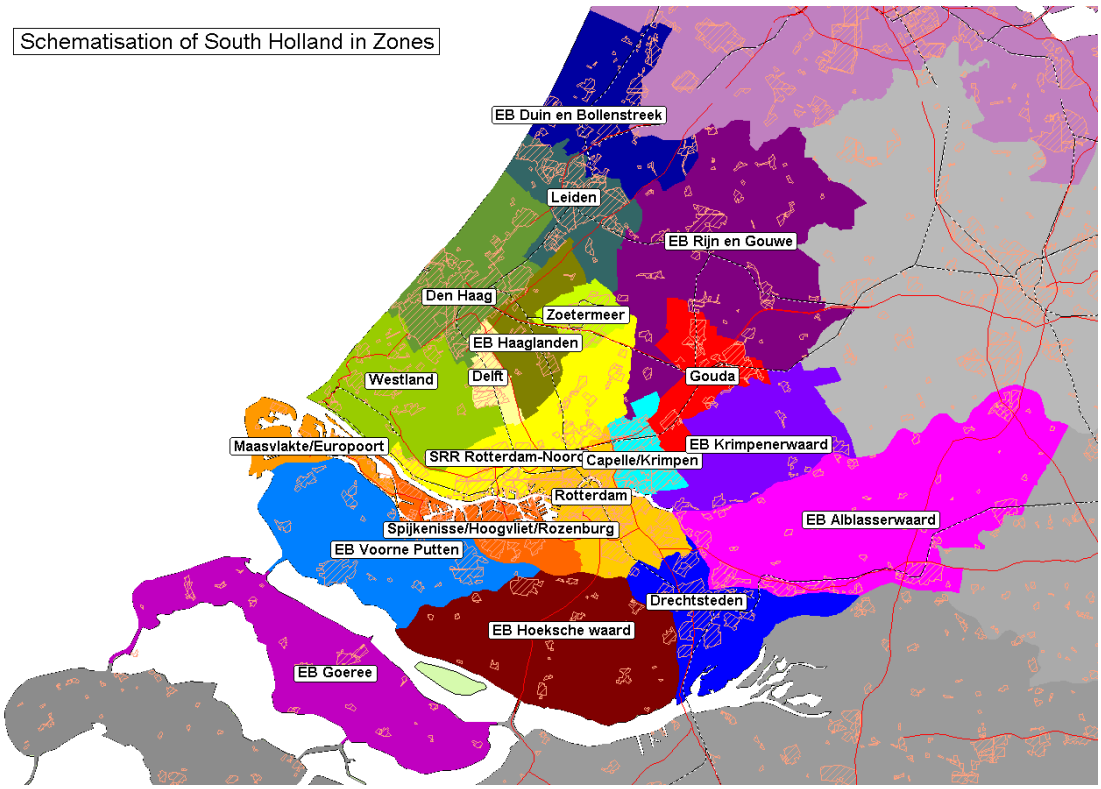


Figure 3 Example of the zones used in South Holland

In order to achieve the possible benefits of multimodal transport it is necessary to provide facilities for multimodal transport, for instance for transfers between modes. Such transfer points require a stop or station offering high quality public transport services and sufficient parking facilities for private cars and bicycles, and it is important to assess the performance of such transfer points in advance.

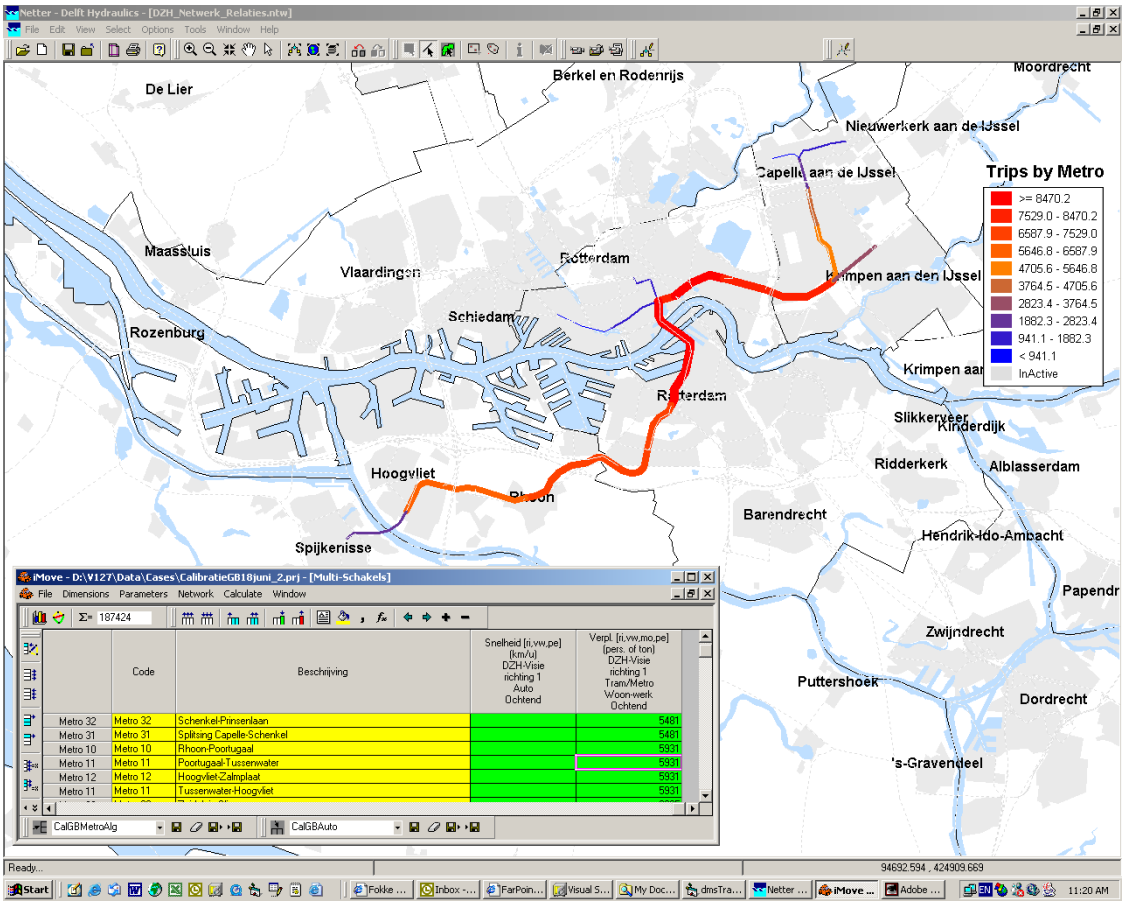


Figure 4 Calculated number of trips by metro in the rush hour

In iMove special attention is given to the creation of a meaningful list of (multimodal) route choices for each origin-destination pair. A key role is played in iMove by the geographic map based editing tool Netter that allows the user to easily implement infrastructure and traffic measures. The model is meant for interactive use in expert sessions. Input parameters and results can be visualized in any combination of data in the forms of thematic maps, tables and charts.

In iMove the study area is divided in a limited number of zones (Figure 3 shows an example figure 3). Nodes and links represent the network of roads, railways and waterways. One or more connectors link each zone with nodes of the network. All trips in the network have a zone as origin and a zone as destination.

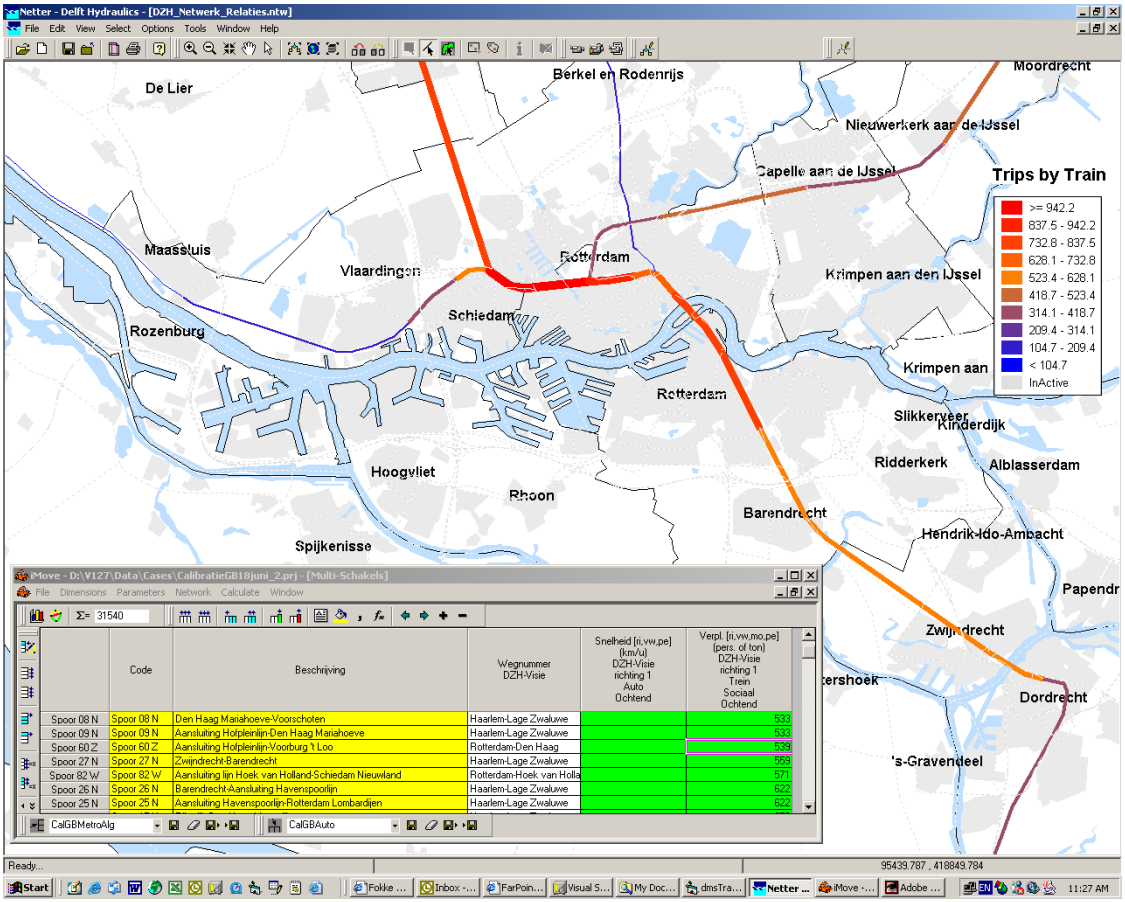


Figure 5 Calculated number of trips by train in the rush hour

iMove is like most strategic transport models static. This means that for each time period in the model the calculated traffic intensities represent the average situation of the whole period. The calculation follows the following steps:

Production and attraction of trips is calculated for each trip purpose by zone (trip generation) and then distributed and balanced across the study area (trip distribution). The result is an Origin-Destination (OD) table per trip purpose.

1. An integrated route choice model is used to generate multimodal routes and assign the trips based on a generalized cost of the route per category of traveler. The generalized cost is based on distance, travel time and actual costs. For multimodal routes the cost of switching modes is taken into account, e.g. parking costs and transfer time. In iMove the user can select as route choice model 1) All or nothing, 2) Multinomial Logit model (MNL) and 3) Paired Combinatorial Logit model (PCL).
2. An iterative loop is used to correct the generalized cost of transport on the links for any congestion effects. The user defines the maximum number of iterations in this loop.

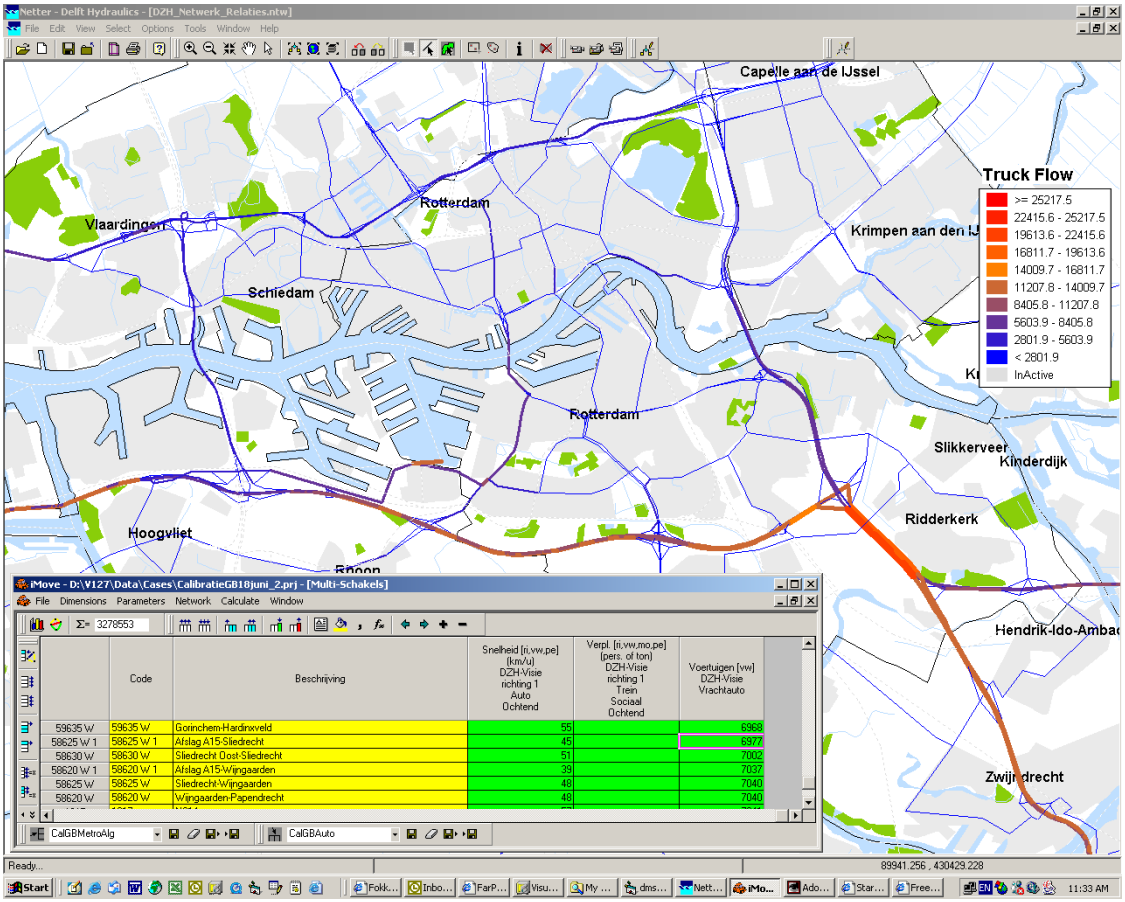


Figure 6 Calculated truck flow in the rush hour

The options for presenting input and output data of iMove are as follows:

- Standardized tables where detailed information can be visualized for zones, nodes, links and OD trips, including basically all input parameters and output variables of the model, for any number of calculations.
- The user may define any number of specific tables at any level of the model, combining any number of variables and calculations. The definitions can easily be stored and reused in presentations.
- All information in standardized or user defined tables can also be shown as charts and as thematic data on the geographic map of the study area

Some examples of the visualization are given in the figures 1, 4, 5 and 6.

For more information:
Michiel Benjamins michielb@demis.nl
Poul Grashoff poulg@demis.nl

Demis bv
Kluyverweg 2a
2629HT Delft
The Netherlands
Phone: +31-15-2682510