

WP2 - demand and traffic flow modelling

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Introduction



- Objective *WP2 – Demand and traffic flow modelling*: to assist authorities and consultants in using traffic models to produce road traffic data for noise mapping and noise action planning
- WP2 provides:
 - **background information** on noise and on traffic models to help traffic and noise modellers understand each other
 - **guidelines** to improve existing traffic models for noise mapping and noise action planning purposes



Why are traffic models needed?

- In most cases it will be impossible to construct a noise map without any form of traffic modelling
- Usually there is not enough measured traffic data
- In noise action planning, a traffic model is needed to determine the expected effects of measures

- However: traffic models are usually not built for environmental analyses
- They have several weaknesses in the context of noise modelling → improvements needed and possible!



Traffic modelling – the process

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- Steps in the traffic modelling process
 - defining scope
 - choice of model
 - data collection considerations
 - coding considerations (new models)
 - spatial considerations
 - temporal considerations
 - model verification, calibration and validation
 - final documentation
- Choices made depend on:
 - suitability of available model
 - possibilities (and budget!) for improvements



Traffic data needed



parameter	unit
vehicle flow (intensity): <ul style="list-style-type: none">- for passenger cars- for light trucks- for heavy trucks- for powered two-wheelers	<i>veh/h</i>
vehicle speed: <ul style="list-style-type: none">- for passenger cars- for trucks- for powered two-wheelers	<i>km/h</i>
<i>vehicle accel./deceleration:</i> <ul style="list-style-type: none">- <i>for passenger cars</i>- <i>for trucks</i>- <i>for powered two-wheelers</i>	<i>m/s²</i>

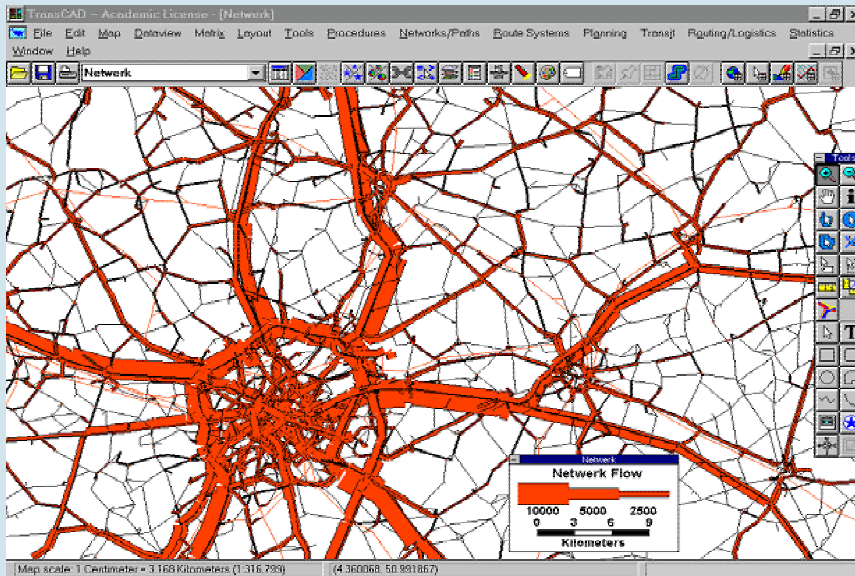
- Order of importance:
 - vehicle speeds & traffic composition
 - vehicle flows
 - acceleration/deceleration
 - speed distributions



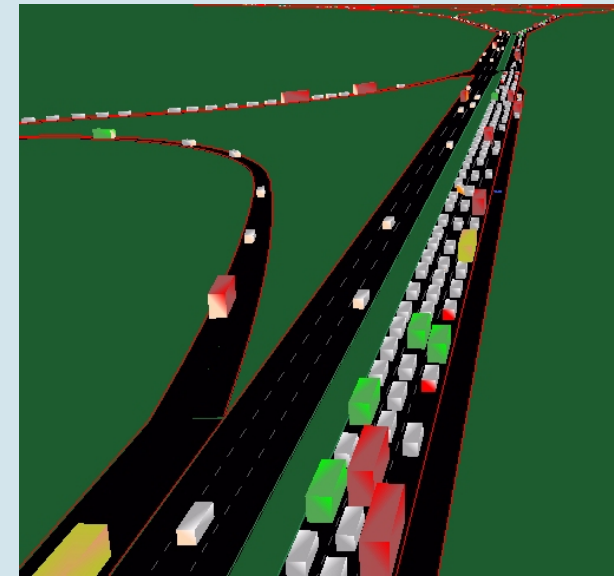
Available traffic models

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- All types of traffic models can provide flows and speeds



macroscopic models
(static and dynamic)



microscopic models

Weak points in traffic models

in the context of noise mapping and noise action planning

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- Problems may occur with:
 - the distinction between vehicle types (as needed for noise model?);
 - the periods modelled (day-evening-night?);
 - non-main roads (are they included in the traffic model?);
 - gradients;
 - output: speeds (accurate?), speed distributions and/or accelerations (available?).



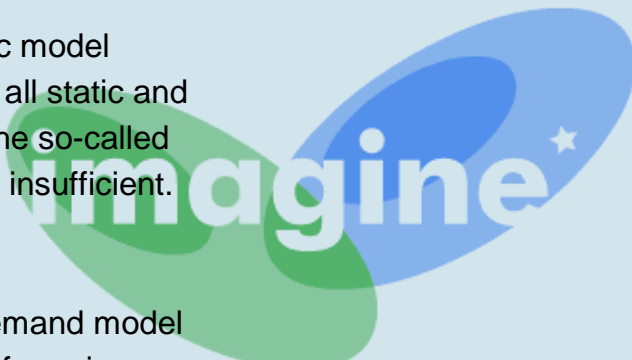
Guidelines for the use of traffic models for noise mapping



- Main roads
 - using static/dynamic macroscopic models
 - using micro-simulation
- Agglomerations
 - using static/dynamic macroscopic models
 - using micro-simulation

- Subjects
 - Speed
 - Acceleration
 - Traffic composition
 - Diurnal and long-time patterns
 - Low flow roads
 - Intersections
 - Gradients





Explanation

For a good noise prediction, it is necessary to quantify different vehicle types in traffic model results: passenger cars, medium and heavy trucks and motorised two-wheelers. Not all static and dynamic traffic models provide multi vehicle class information. And even if they do (the so-called multi user class models: MUC), the traffic data that is used to build the model can be insufficient.

Recommendation

If it is possible, use a multi user class assignment model. This is only possible if a demand model with these user classes is available, and distinguishes vehicle categories as needed for noise modelling. Then the assignment can be carried out using a MUC-origin-destination matrix containing trips from the demand model. The result of the MUC-assignment procedure consists of loads per link per vehicle type (user class). Check whether the quality of base data for the MUC-model is sufficient. See for further details on measuring data for different vehicle classes the IMAGINE WP2.4 report [IMAGINE, 2006a].

If it is not possible to use a MUC-model, see the GPG [WG-AEN, 2004] and section 3.2 of the IMAGINE WP2.3 report [IMAGINE, 2006b] for further information on possible strategies.

Guideline for traffic composition in static/dynamic macroscopic models (main roads)			
Method	Complexity	Accuracy	Cost
No multi user class assignment – use single user class assignment provided by model			
Use multi user class static assignment (see section 3.2 of the IMAGINE WP2.3 report for MUC-assignment, and the IMAGINE WP2.4 report for advice on data collection)			
Use multi user class dynamic assignment (see section 3.2 of the IMAGINE WP2.3 report for MUC-assignment, and the IMAGINE WP2.4 report for advice on data collection)			

Example of a guideline



Guidelines for noise action planning

- What to consider when using a traffic model to assess the effect of measures:
 - in general (main + side effects)
 - when expecting
 - effect on link level
 - effect on network level
 - effect on departure time
 - effect on destination & mode choice



Benefits of using the guidelines and background information

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- The guidelines help to make traffic model output more accurate
- Recommendations from environmental point of view
- The background information helps traffic and noise modellers to understand each other
 - needs of noise models vs. possibilities of traffic model
 - recommendations to invest in improvements in traffic models that have the most effect on the accuracy of noise calculations
 - checklists to choose/review traffic models
- The overview of data collection possibilities helps to invest in data collection where it matters most



Conclusions

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- Traffic models will be used in noise mapping and noise action planning
- They can be improved to provide more accurate traffic data, as needed for environmental analyses
 - more accurate data on speeds, per vehicle category and for the periods needed
- Guidelines provide assistance, but continuous dialogue between noise and traffic modeller is needed

