Analysing Traffic Noise Measures using Traffic Models

- Methods used in the EU project QCity

Pia Sundbergh
Div. for Transport and Location Analysis
KTH, Stockholm

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Outline

- ✓ Short introduction to QCity
- ✓ The KTH part of the project
  - Scenarios
  - Method description
  - Method results
- ✓ Ongoing work

Background

- ✓ QCity – An EU founded project in the sixth framework, with 28 partners in 10 countries.
- ✓ QCity – A duration of 4 years, starting February 1th 2005.
- ✓ Supports the EU directive 2002/49/EC regarding noise mapping and action plans.

Aim

A toolbox with different noise mitigation measures

Work Package 2.3

Traffic Measures' Impact on Noise Levels

- ✓ Traffic Control
- ✓ General measures to reduce car traffic
- ✓ Car ownership and car type choice
- ✓ Driver behaviour

Methods:

Traffic models and noise mapping software.

Study areas:

A suburb in Stockholm and a central part of Stockholm

Noise Mapping

Traffic data input:

- ✓ Volume [Vehicles/h]
- ✓ Speed [km/h]
- ✓ Share of heavy vehicles [%]

Periods: Day, Evening, Night → L_{DEN}, L_{Night}

The IMAGINE project

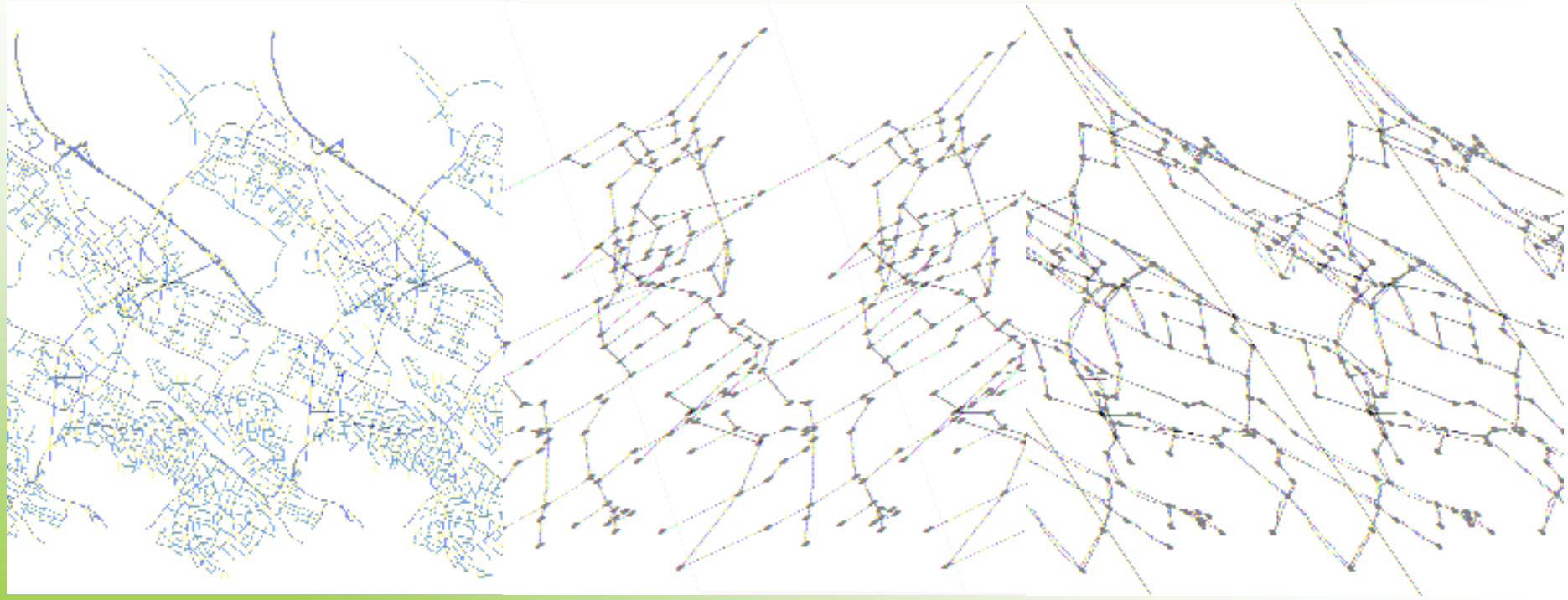
"There is no superior type of traffic model"

Choice of model depends on:

- ✓ Study area (main roads/urban area)
- ✓ Model currently in use
- ✓ Availability of data
- ✓ Measures that have to be assessed

Interface Macro Simulation

Geographical correspondence

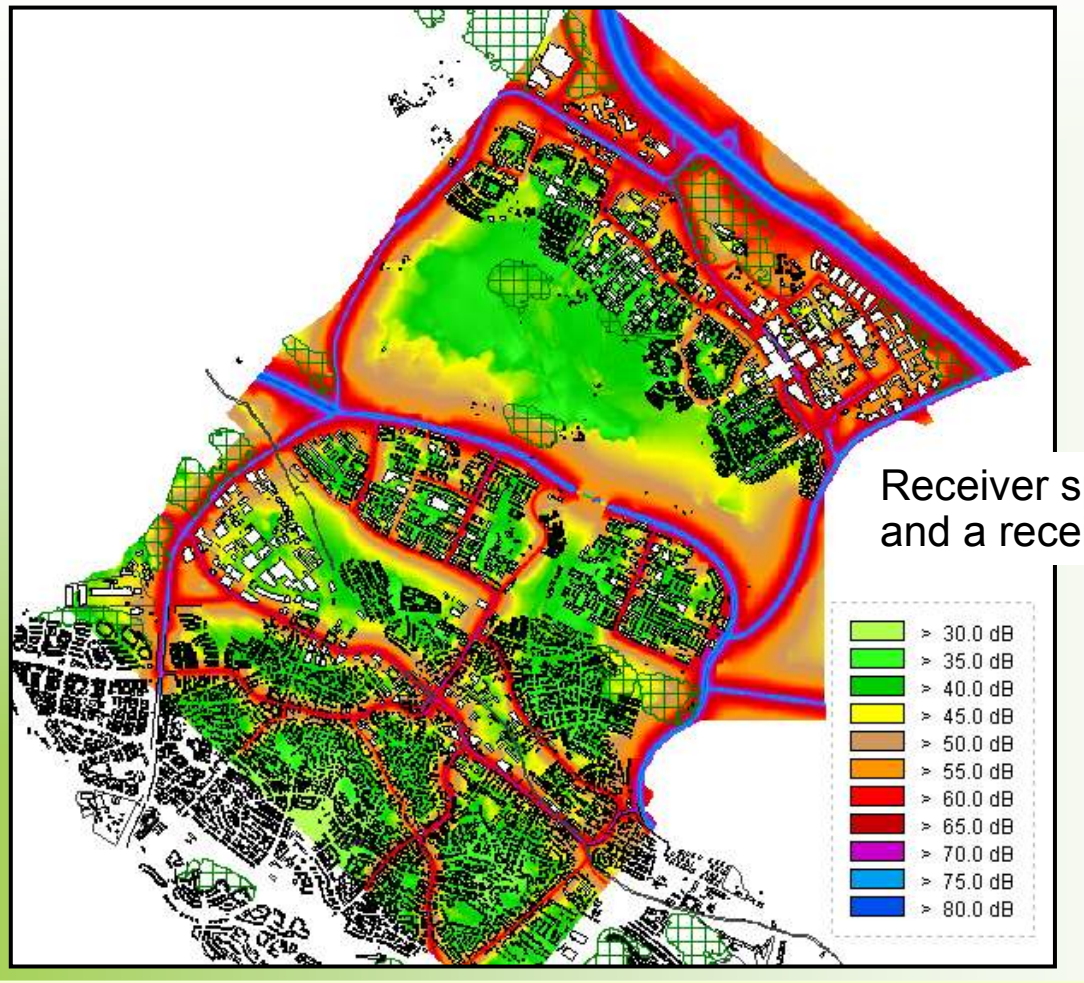


Road network | Model network | Matched road network

Macro Simulation

- Base scenario

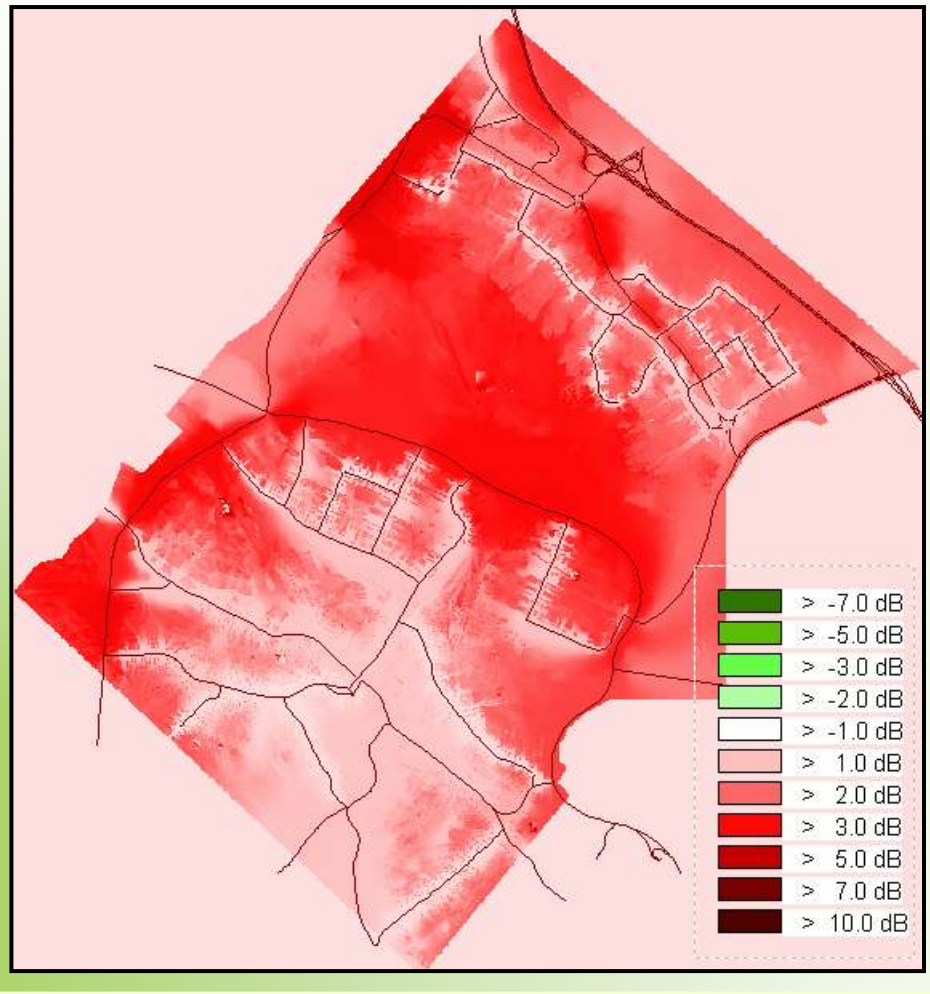
L_{DAY}



Receiver spacing of 10 by 10 m and a receiver height of 4 m

Macro Simulation

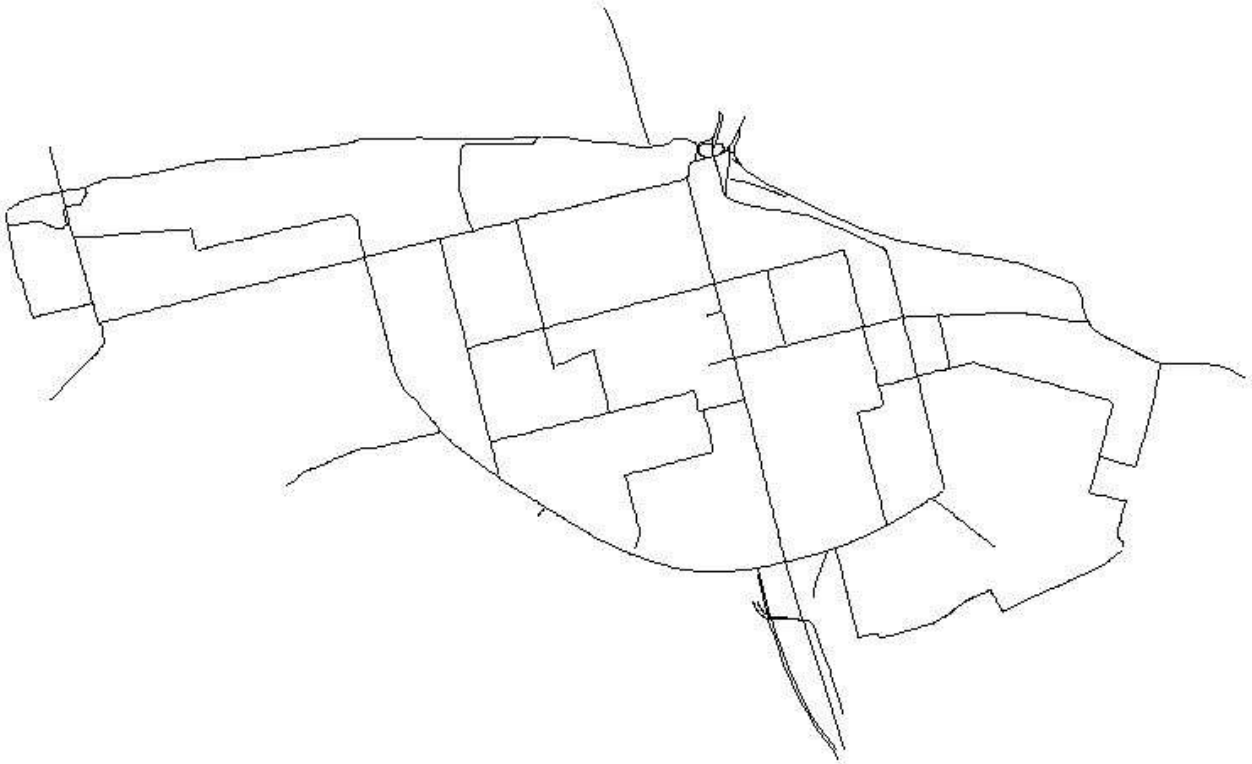
-Difference using speed limit instead of modelled speed



Macro Simulation

- Create quiet areas

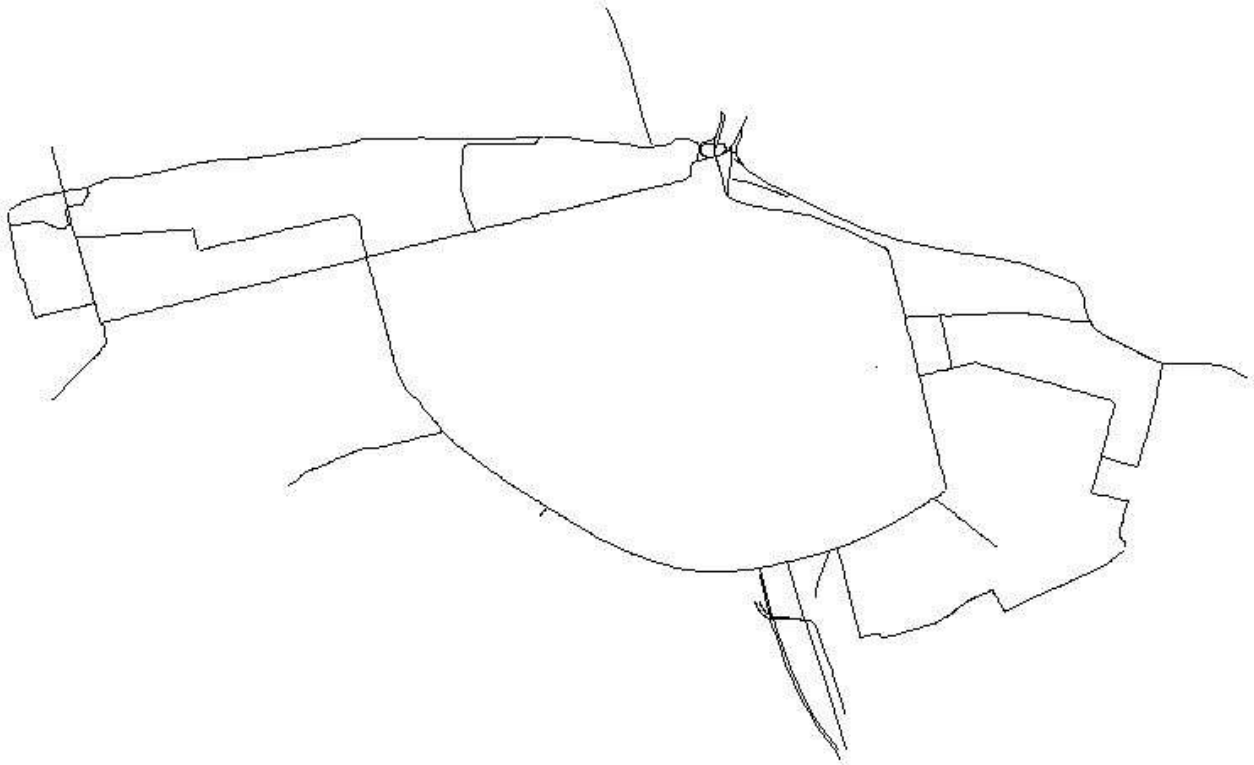
Modelled streets of Södermalm



Macro Simulation

- Create quiet areas

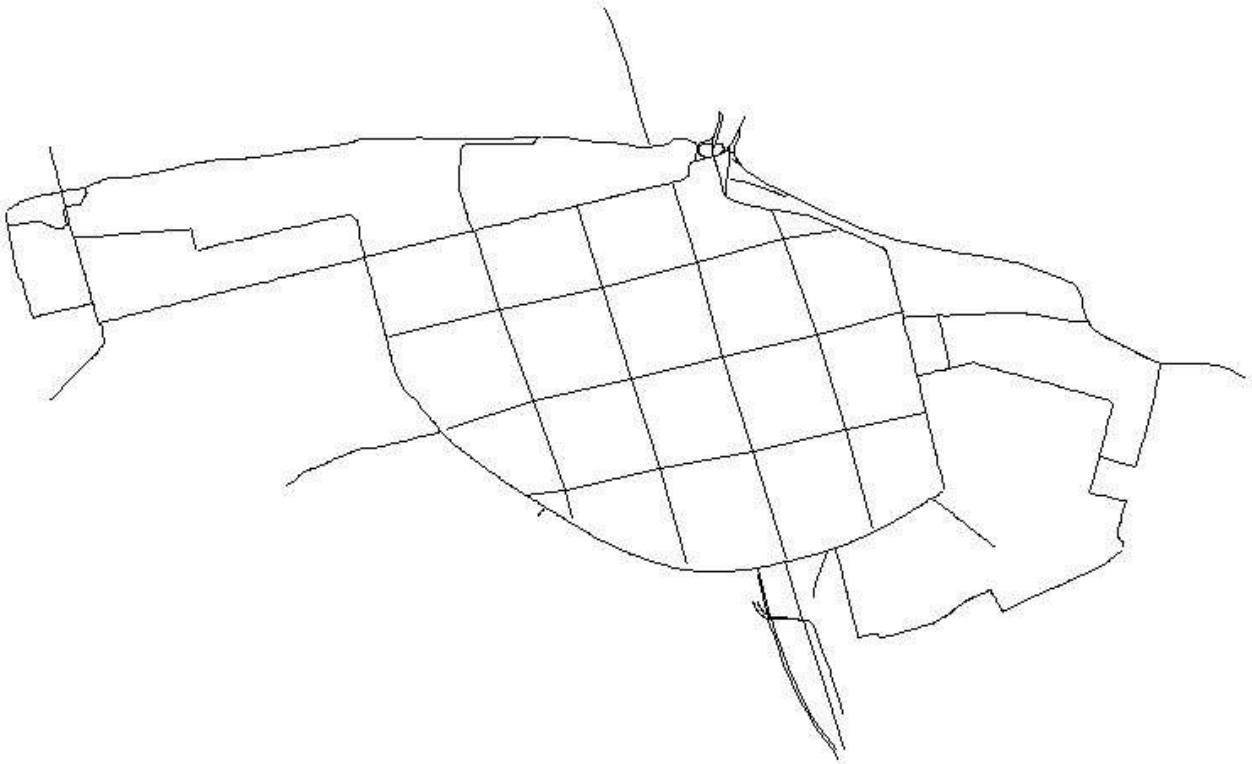
Modelled streets of Södermalm



Macro Simulation

- Create quiet areas

New fictive network



Macro Simulation

- Create quiet areas

Selection of modelled scenarios

Share of quiet vehicles owners inside area	Share of quiet vehicles owners outside area	Restriction for non-silent vehicle owners
5%	5%	None
100%	5%	Road barrier
20%	5%	2 €

Possible choices for owners of none-silent vehicles:

Pay the charge

Use parking garage and walk

Change route

Change travel mode

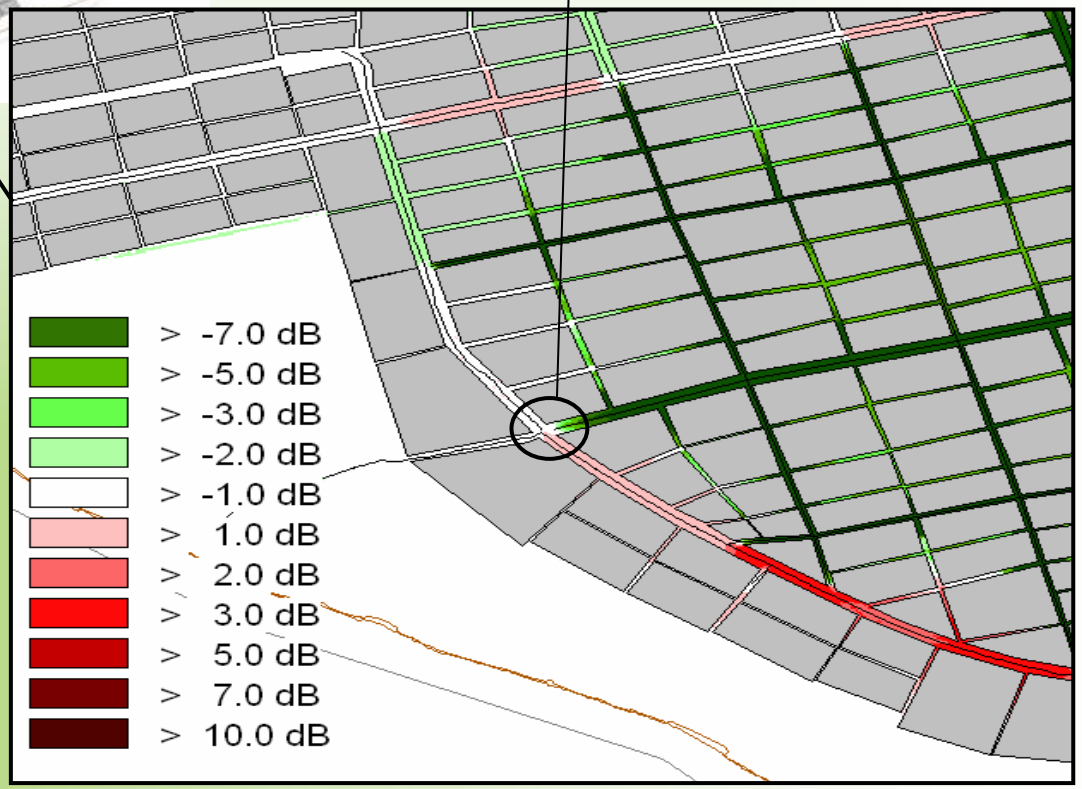
Change destination

Macro Simulation

- Create quiet areas

No leakage effects by the barriers.

(The noise level reduction due to decrease in traffic is greater than the noise level increase due to increased traffic outside the area)

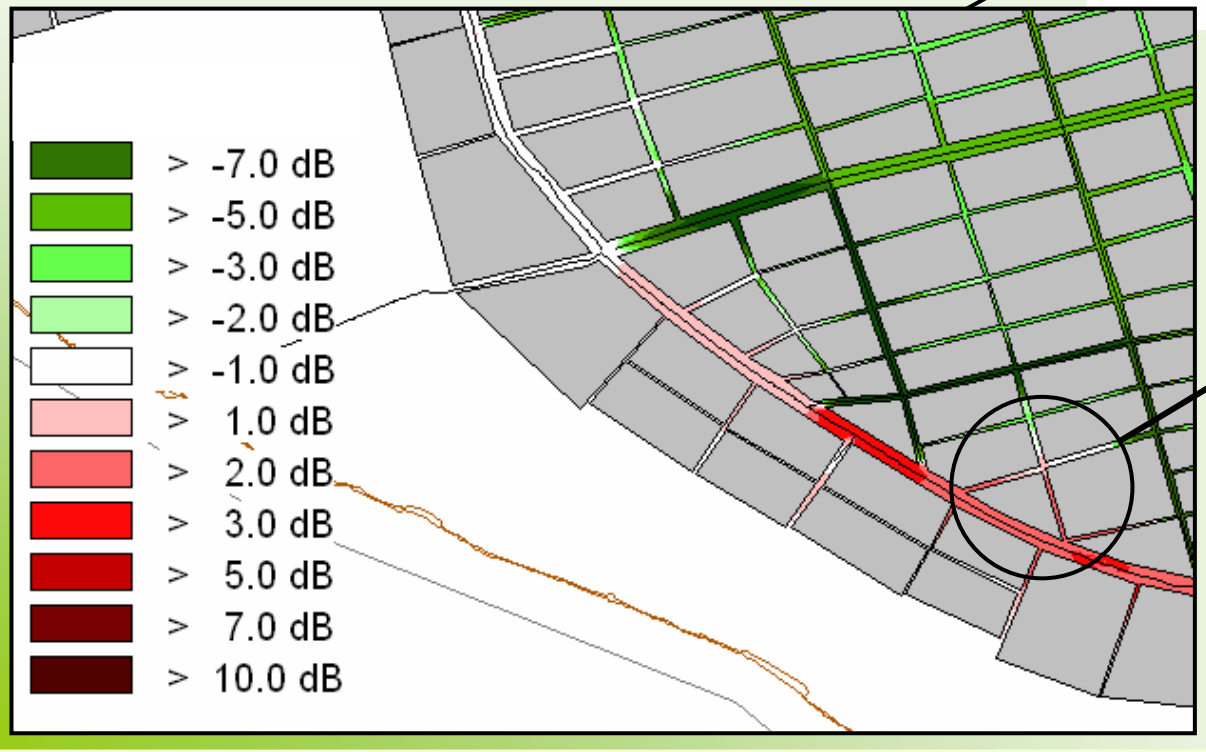


Quiet areas have been created within the "ring road" by prohibition against noisy cars

Macro Simulation

- Create quiet areas

Quiet areas have been created within the "ring road" by charging noisy cars 2 €.



Leakage 1-3 dB(A) on pedestrian streets approx: 150 m

(Due to increased traffic on the ring road)

Micro Simulation

At studies of:

- ✓ Driver behaviour impact on noise level
- ✓ ISA, Intelligent Speed Adaptation

Method:

- ✓ Model different driver types e.g. “Speeder” and calm drivers
- ✓ Vary “Speed Acceptance”

Noise calculation:

- ✓ Use model developed in the Rotranomo project

Micro Simulation

The Rotranomo model

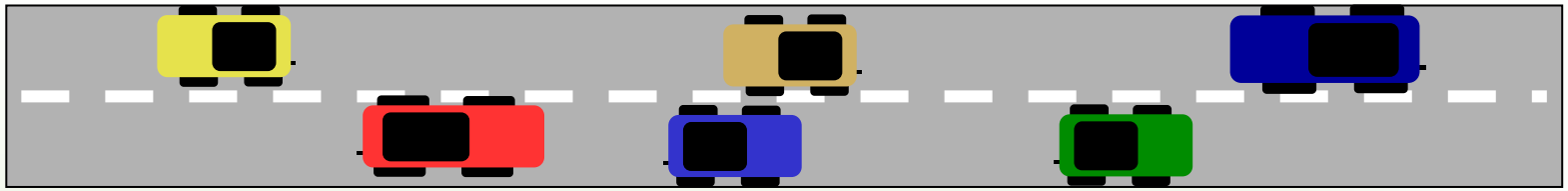
- ✓ Dynamic model, use traffic data per vehicle and simulation step
- ✓ Considers gear shift, car type, road surface etc.
- ✓ Output: L_eq for reference point(s) per second or average

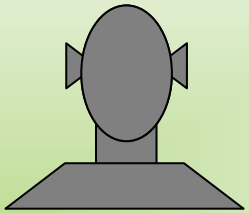
Auralisation tool

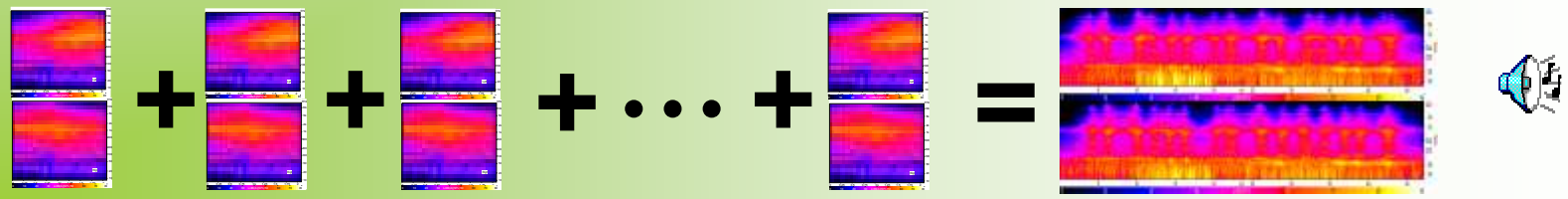
- ✓ Developed by Head Acoustics (Germany) in Qcity
- ✓ To auralise and evaluate different traffic noise scenarios

WP2.2.3 - Traffic noise synthesizer

Development of a tool for the auralisation of time signals and propagation paths



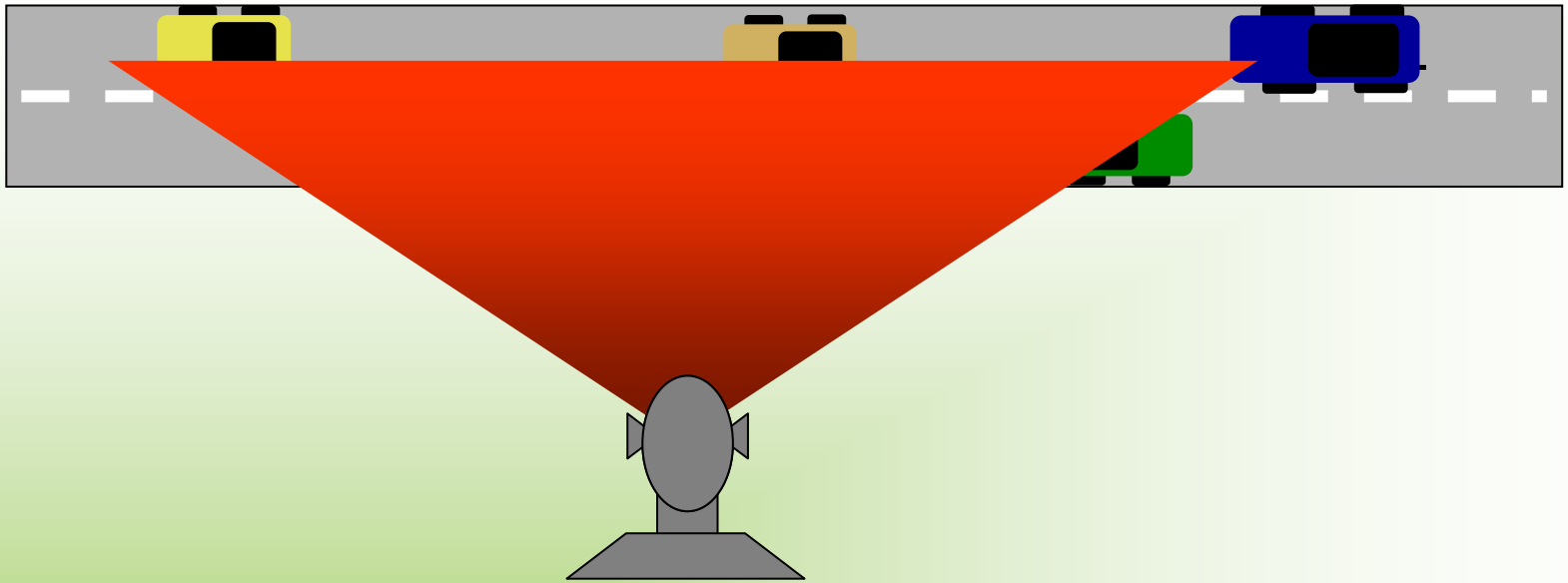


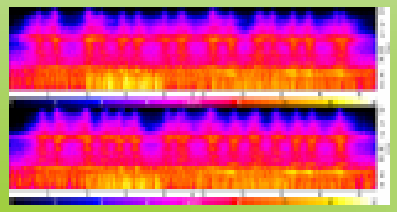


Synthesis of traffic noise

WP2.2.3 - Traffic noise synthesizer

Development of a tool for the auralisation of time signals and propagation paths





Filtering

WP2.2.3 - Traffic noise synthesizer

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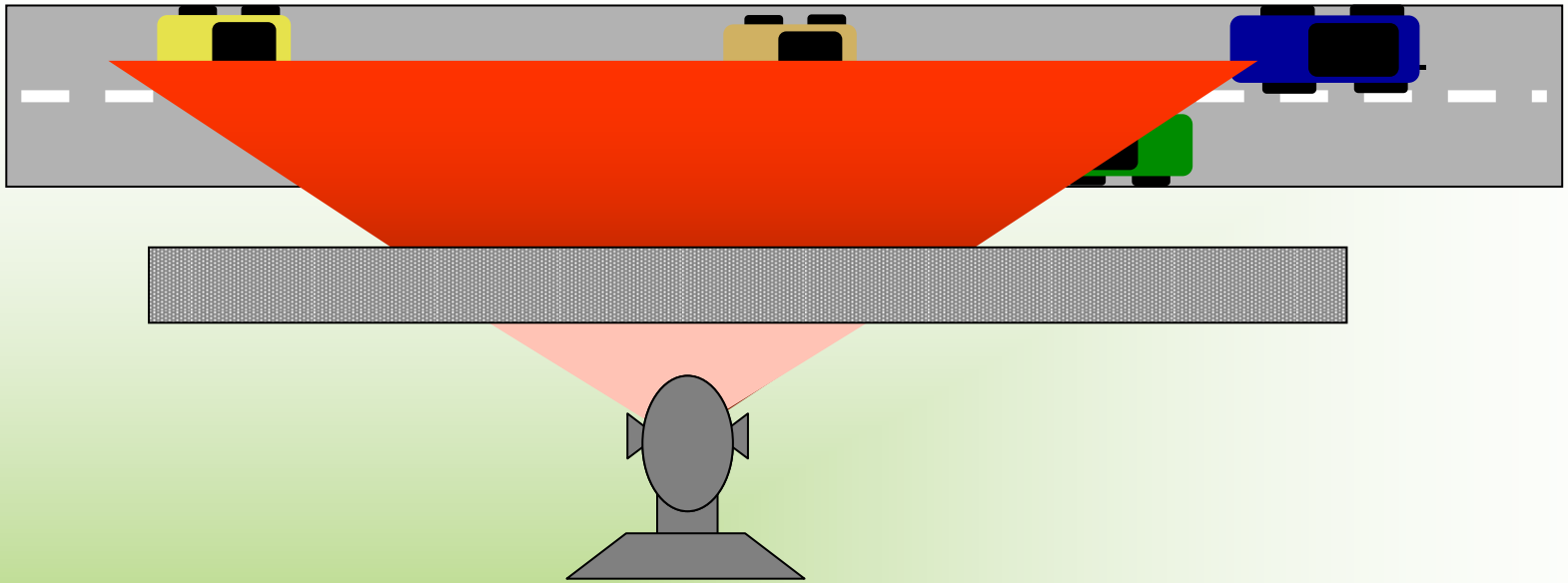

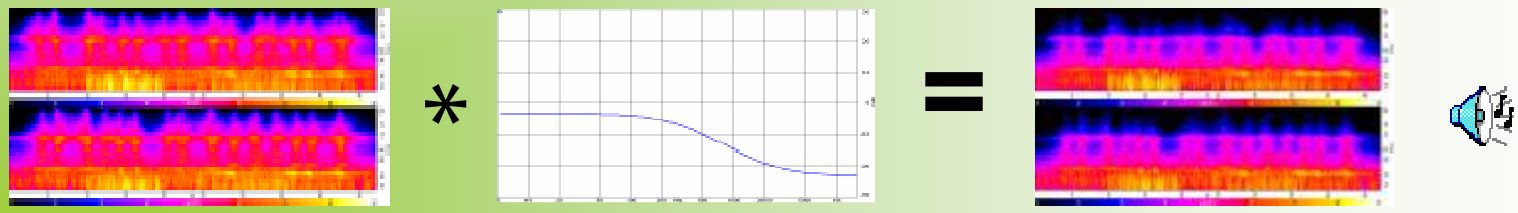

Filtering