Presentation of the results of the project “Development of Slavu-Krasta Maskavas node simulation model”
LogOn Baltic Workshop meeting
October 25th 2007, Riga

Irina Yatskiv
Elena Yurshevich
Transport and Telecommunications Institute
Problem Definition

• For the past 30 years in the EU states the number of cars has been increasing for three times and is increasing to 3 million cars annually (European Commission work, 2001).
• The congestions and traffic jams are the typical problems of contemporary city
• The poorly designed transportation system is one of the reasons of traffic jams
Dynamics of Motorization Level in Riga

Private Cars

Dynamics of Motorization Level in Riga

Cargo Flow
Reasons of Riga TS Problems

Stare-shaped Type of:
- Public TS
- Private TS
- Cargo TS
- Cargo Traffic
- Transit Traffic

Absence of highways bypass for:
- Fragmentary character of highways and main roads
- Capacity limitation of branch-lines at the centre
- Deficiency of Parking Place

Overloading of:
- Bridges Branch-lines
- Railway Crossings
- Crossroads

Environment Pollution

Accidents
Main Traffic Flows in Riga
(Private Vehicles and Public Transport)
Approaches of Transport System Design Improving

- addition of new streets,
- introduction of the transit system,
- new arterials meant for relieving congestion,
- moving the centers of the population attraction, etc.
Decision Process

Decision makers go through a fairly systematic process.

General steps
- Define problem
- Collect base data
- Develop goals/ objectives
- Model scenarios
- Evaluate outcomes

Intelligence phase
- Define the “Process or Problem”
- Develop Alternative Courses of Action
- Select The “Best” One

Modelling phase
- Review It

Choice phase
- Act on it

Implementation phase
- Act on it
## Three Stages of South Bridge Implementation

<table>
<thead>
<tr>
<th>The Southern Bridge building stages</th>
<th>Length, km</th>
<th>Terms of realization</th>
</tr>
</thead>
<tbody>
<tr>
<td>First stage – from Bauskas street to Slavu railway overpass</td>
<td>2.5</td>
<td>2004-2008</td>
</tr>
<tr>
<td>Second stage – Slavu railway overpass reconstruction and building of the three-level overhead road of the Slavu rotation circle</td>
<td>1</td>
<td>approximately 2008-2010</td>
</tr>
<tr>
<td>Third stage – from Vienibas gatve street to Bauskas street</td>
<td>4.5</td>
<td>approximately 2010-2012</td>
</tr>
</tbody>
</table>
Project Tasks

• The analysis of load on the basic directions of the three-level trestle of Krasta Street - Maskavas Street - Slavu bridge
• Development of the animation film
• Comparing the capacity of the transport node from the point of view of a today's situation (2004 year) and possible increase of the intensity of vehicles travelling in the future (in 2012)
Steps of the Project Implementation

• South bridge transport network model development
• Traffic structure and flow distribution (itinerary) description in the model
• Traffic control rules assignment
• 3D model development and animation video recording
• Experimentation with the model, the data collection and interpretation
The Sources of the Data

• JSC “imink”

• JSC “Tiltprojects”
Project Participants

Riga City Council

Telemātikas un logistikas institūts

Laboratory of Applied Systems
Development Tools

For simulation model creation:

PTV Vision VISSIM 4.30
The tool for the urban and regional traffic analyzes, it’s reengineering and optimization

For 3D model creation:

PTV Vision V3DM
The tool for 3D objects creation and editing
Stages of the Model Implementation (1/6)

The Development of the Transport Network Model

- Dienvidu tilts
- Krasta
- Maskavas (Centrs)
- Slāvu tilts
- Maskavas (Rumbula)
Stages of the Model Implementation (2/6)

Description of the traffic structure and the traffic flow distribution

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Traffic Flow 1</th>
<th>Traffic Flow 2</th>
<th>Traffic Flow 3</th>
<th>Traffic Flow 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>0.670</td>
<td>50 (48.0, 58.0)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HGV</td>
<td>0.110</td>
<td>50 (48.0, 58.0)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bus</td>
<td>0.060</td>
<td>50 (43.0, 59.0)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bridge</th>
<th>Maskavas (68.8%)</th>
<th>Dienvidu tilts (31%)</th>
<th>Slavu tilts (4%)</th>
<th>Krasta (31.2%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Krasta Krasta</td>
<td>-</td>
<td>31%</td>
<td>7%</td>
<td>63%</td>
</tr>
<tr>
<td>Dienvidu bridge</td>
<td>4%</td>
<td>-</td>
<td>85%</td>
<td>11%</td>
</tr>
<tr>
<td>Slavu bridge</td>
<td>0.1%</td>
<td>31.2%</td>
<td>-</td>
<td>68.8%</td>
</tr>
<tr>
<td>Krasta</td>
<td>73%</td>
<td>3%</td>
<td>24%</td>
<td>-</td>
</tr>
</tbody>
</table>
Stages of the Model Implementation (3/6)

Description of the priority rules and the traffic light cycles
Stages of the Model Implementation (4/6)

Implementation of the trams route schedule
Stages of the Model Implementation (5/6)

3D Model creation and the animation video recording
Stages of the Model Implementation (6/6)

Description of the data collection scenarios

Collected data:
- Delay time and level of service
- Queue length and time
- Travel time
- Total Characteristics of the network
Results of Simulation (1/3)

The vehicles delay time on the parts of the transport node

Maskavas - Krasta

Transporta mezgla posmi

The vehicles delay time on the parts of the transport node

Results of Simulation (1/3)
Results of Simulation (2/3)

The vehicles travel time on the main routes
Results of Simulation (3/3)

The queue length

Maskavas - Krasta

The diagram shows the queue length at Maskavas - Krasta. The x-axis represents the queue numbers, while the y-axis shows the queue length in meters. The line graph indicates the median queue length and the 95% confidence interval. The maximum and minimum queue lengths are also displayed.
Analysis of the Transport Node Capacity (2004 and 2012 years)

The average of the delay time

The upper limit of the 95% conf.int. for the mean of the delay time

The maximum of the delay time
Analysis of the Transport Node Capacity (2004 and 2012 years)

- Mean of the travel time, s
- Upper limit of the 95% confidence interval for the mean of the travel time, s
- Maximum of the travel time, s
- Minimum of the travel time, s
Analysis of the Transport Node Capacity (2004 and 2012 years)

Mean of the queue length, m

Upper limit of the 95% confidence interval for the mean of the queue length, m

Maximum queue length, m

Minimum queue length, m

Project part-financed by the European Union (European Regional Development Fund) within the BSR INTERREG III B Neighbourhood Programme
Conclusions (1/2)

• The simulation approach allows designing the model of the transport network, reproducing its structures, the organization of crossroads, characteristics of transport traffic with a high degree of the detailed elaboration

• The simulation approach makes it possible to analyse the efficiency of the system's functioning on its model, to collect the data about its functioning and to experiment not destroying the real system
Conclusions (2/2)

- An analysis of loading on basic directions of three-level trestle of Krasta street - Maskavas street - Slavu bridge is fulfilled
- Animation film in 3D dimension is developed
Thank you for your attention!
Contact

Irina Yatskiv
Transport and Telecommunication Institute
E-mail: ivl@tsi.lv
Tel. 371-7100594
Fax. 371-7100660
www.tsi.lv

LogOn Baltic Project Office
Turku School of Economics
Rehtorinpellonkatu 3
FI–20500 TURKU
FINLAND

www.logonbaltic.info

DISCLAIMER
This publication has been produced with the assistance of the European Union. The contents of this publication is the sole responsibility of the presenter and can under no circumstances be regarded as reflecting the position of the European Union.

The content of this publication reflects the author’s views. The Investitionsbank Schleswig Holstein is not liable for any use that may be made of the information contained herein.