Using mobile positioning data for mapping space-time behavior and developing LBS:

Experiences from Estonia

Prof. Rein Ahas
Chair of Human Geography
Department of Geography
University of Tartu, Estonia
rein.ahas@ut.ee
Objectives:

- Introduction - Mobile positioning in geographical studies
- Examples from Estonia
- Discussion: strengths and weaknesses of mobile positioning based methods
Mobile positioning is recording digital track of the people.
Geographical database with location coordinates:
Active positioning – tracking, asking locations with special queries

“Trace phone 50xxxxxxxx with 15 min interval 10.03.08-14.03.08”

Network based methods

Handset based methods
www.positium.ee
Real-time positioning environment
Passive positioning – location information from memory files of mobile operator

CELL global identity (CGI)
Research team in Estonia

- Chair of Human Geography University of Tartu – analyses methods
- Positium LBS – data, modelling, web solutions
- Nutiteq – Handset based positioning
Data exchange

- Contracts and online connection to 2 biggest Estonian mobile operators EMT and Elisa
- Active positioning data since 2003
- Passive positioning data since 2004
Experiments with active mobile positioning
Studying suburban commuters space-time behaviour in Tallinn:

- Sampling – 600 families from new settlement areas
- Questionnaire – 60 min questions by polling firm EMOR TNS
- Tracking mobile phones of 277 persons 8 days with 15 min intervals
Location of home and work locations, movement
Passive mobile positioning
900 million locations of 600,000 Estonians (45% of total pop.) during 2 years
Model for determining anchor points:
- home
- work
Mobile positioning versus traffic counter: 1 week

*mobile positioning*
Activity spaces: Daily connections between work and home anchor points

Local community level

Regional level
Traffic analysis: geographical distribution
Tourism studies
Positium Barometer

Web based tourism monitoring tool
www.positium.com/barometer/tourism

Demo password
USER: enter2008
PASSWORD: Wicpyg39
Basic statistics

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<th>Nr</th>
<th>Nation</th>
<th>Visitors</th>
<th>%</th>
<th>* Change</th>
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<td>Latvia</td>
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<td>319 000</td>
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<td>▲ (+17%)</td>
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<td>9</td>
<td>Poland</td>
<td>113 000</td>
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<td>10</td>
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<td>67 900</td>
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<td>▼ (-5%)</td>
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<td>Other Countries</td>
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<td></td>
<td>Total</td>
<td>4 970 000</td>
<td>100%</td>
<td>▼ (-4%)</td>
</tr>
</tbody>
</table>
Winter boom of Latvian visitors in Eastern Estonian "wasteland"
Modelling weather dependence of tourism
99% of cells had statistically significant correlation

67% of cell had medium correlation

12% of cells had strong correlation
Possible to model and forecast places where tourists react to weather

(*change plans...*)
Mapping destination choices in Estonia
Movement of tourists sleeping more than 3 following nights in Pärnu

July

February
Modelling impacts of tourism events
International tourists movement to concert of Metallica

www.positium.ee/map3d
Homes of domestic tourists visited Ecological Festival in Põlva
Strengths of mobile positioning
Strengths of mobile positioning:

- Recording **actual** locations of phones (people)
- Phones are widespread
- Spatial resolution is better than in questionnaires
Mobile phones are everywhere and people like to carry them on.

- Digital data
- Real-time applicability!
Problems with mobile positioning
Criticism about using mobile positioning in human geography

- “quantitative geography” is not mainstream

- developed by GIS-people – no enduser oriented solutions
- **Human geographers** lack often quantitative methods and GIS

- **GIS specialists** lack theories and methods of human geography

- Tracking projects end as “games with moving dots”
Geographers lack knowledge and skills in cartography

Google – solution?
Troubles to get data

- How to reach operators?
- High cost of data?
- How to manage huge GIS databases?
Long chain of value of LBS

**OPERATOR**

- Network hardware
- Positioning server
- Information system
- Data processing
- Secure transmitting channel
- GIS database
- Cell data to point
- Spatial interpolation
- Analyses

**END-USER**
Sampling issues

- Penetration of phones
- Different operators, prices ...
- How and where “they” use phone...
Privacy and surveillance
What is surveillance fear about?

- Mobile positioning fear is connected with transparency and awareness issue!!!
  - Who is watching me?
  - What do they know about me?
  - How do they use it?
Because of surveillance fear:

- There is not personal data linked
- Positioning experiments end-up with "moving dots"
- Need to link movement data with personal profile
Linking movement data and social data:
Social Positioning Method (Ahas and Mark 2005)

Learning about privacy from social positioning experiments as Joint Space  www.positium.ee
Conclusions
Different research perspectives for human geography and GIS?

Real-time geography, “socialization” of maps

Need to avoid similar situation when “conservative” cartography was excluded by end-user oriented “Google maps”
- Is there place for traditional quantitative models?
- Is there need for new approaches using new electronic data?
- Sampling? Qualitative GIS?
Paradigm of mobilities (Sheller & Urry, 2006)

The displacement paradigm: moving to go somewhere to do something

The mobility paradigm: turning mobility, communication and ongoing activities into a creative performance...
Thank you!!!

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