IMO
INFOTECHNOLOGICAL
MOBILITY OBSERVATORY

Managing big data on a national scale: Infotechnological Mobility Observatory

Siiri Silm

UNIVERSITY OF TARTU
Mobility Lab

https://imo.ut.ee
http://mobilitylab.ut.ee

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European Union
European Regional
Development Fund

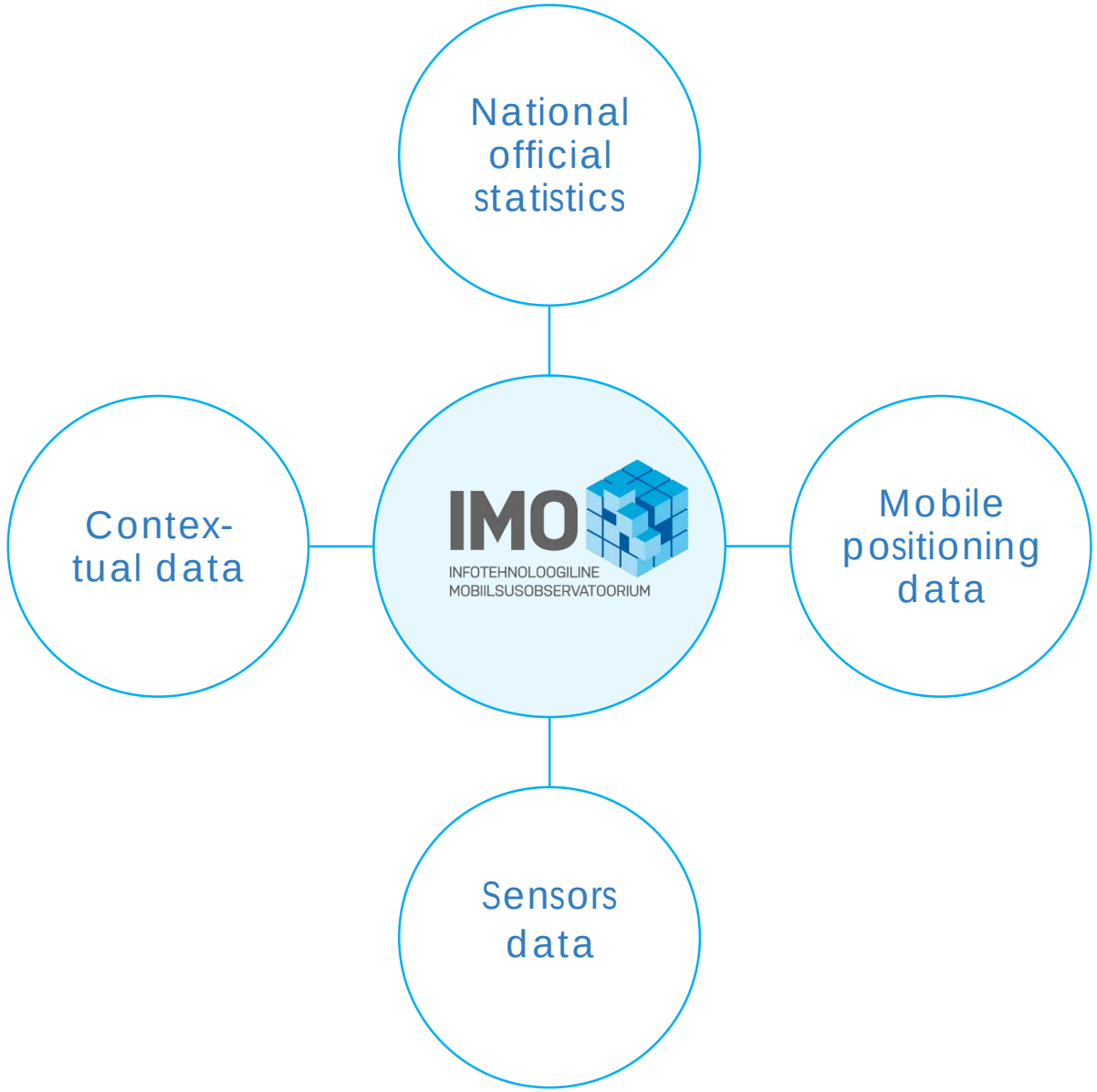
Investing
in your future

Mobility - great potential and challenge

- Mobility as a phenomenon has changed.
- New and ICT based data sources.
- Smart City - smart use of sensor data.
- Data governance – better decision making.

The aim of Infotechnological Mobility Observatory

- **Develop data infrastructure that supports mobility studies.**
- **Integrate different data sources.**
  - National official statistics: censuses and registers.
  - Mobile positioning data (CDR, etc.)
  - Sensors: traffic sensors, urban sensors, etc.
  - Contextual data: environmental information, land use functions, etc.



Partners

- University of Tartu
  - Department of Geography (coordinator)
  - School of Economics and Business Administration
- Tallinn University
- TalTech
  - Institute of Logistics
  - Institute of Cybernetics
  - Department of Computer Control
  - Ragnar Nurkse Department of Innovation and Governance
- Statistics Estonia

National official statistics

Integration, linking, harmonization

ID level

- ID level based linking.
- **Integration of censuses (1989, 2000, 2011), registers and other datasets from Statistics Estonia.**
- Integration of Statistics Estonia datasets and studies.
- Harmonizing data.

Spatial level

- Data integration and binding.
- Methodological harmonization
  - Definitions
  - Classifications (e.g. ISCO)
  - Spatial units (urban, rural areas)
- Comparability in time.
- Comparability between different datasets.

Mobile positioning data

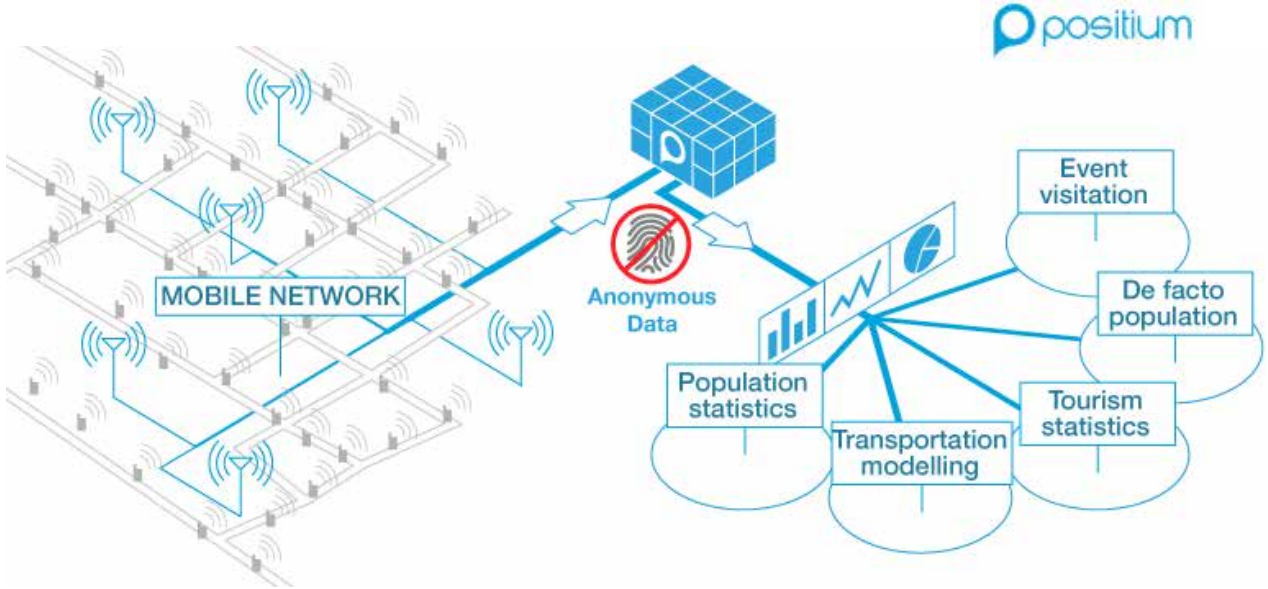
- Integrating mobile positioning data and other ICT data into a scientific database.
- Develop mobile positioning based statistics.
- Make the data more usable for the public.

Passive mobile positioning data

- Location information from memory files of mobile operator.
- Call Detail Records (CDR), Data Communication (DDR), Radio Resource Control, Location Update etc.
- Pseudonymous data (anonymous for researchers)

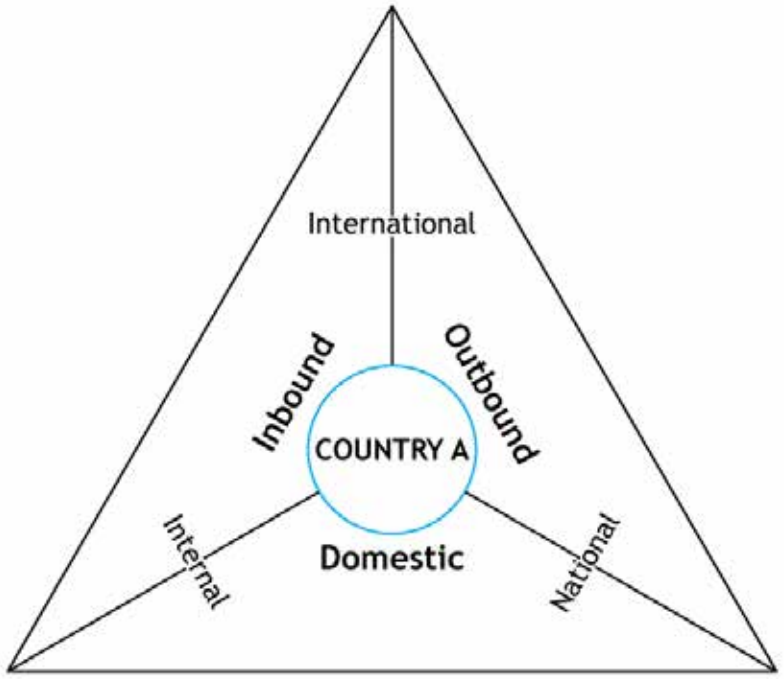
- Call Detail Record (CDR)
  - Time
  - Location

  - Caller
  - Calling partner

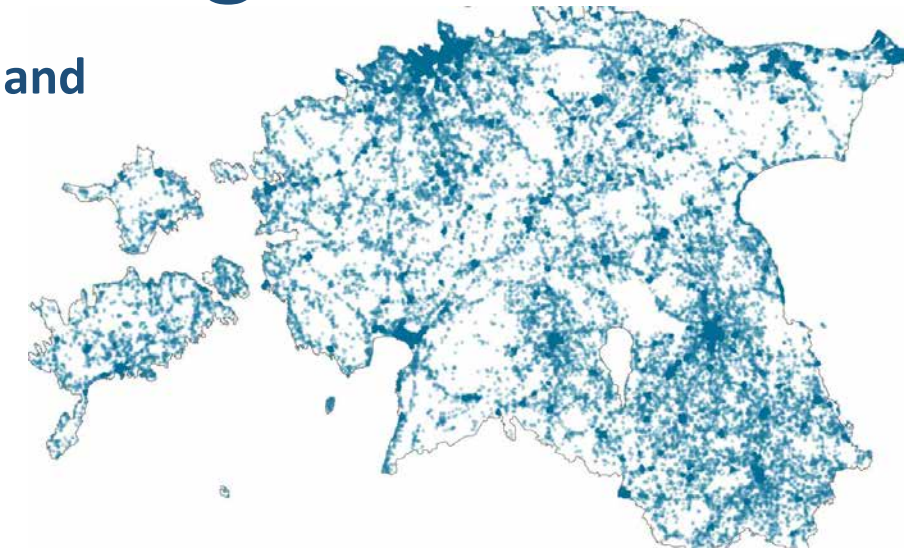


Scope of passive mobile positioning data

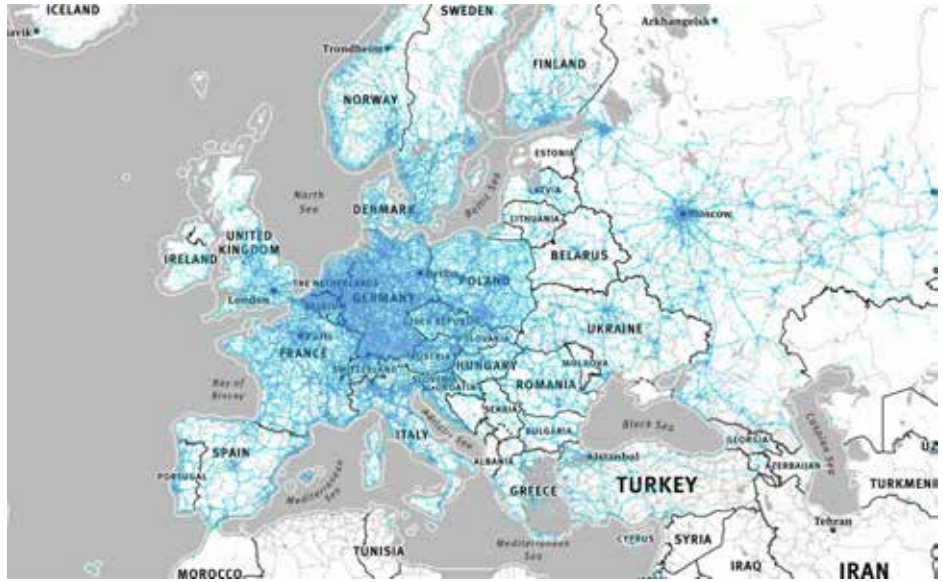
- 94% of the Estonian population have access to mobile phones.
- Mobile network covers 99.9% of the area.



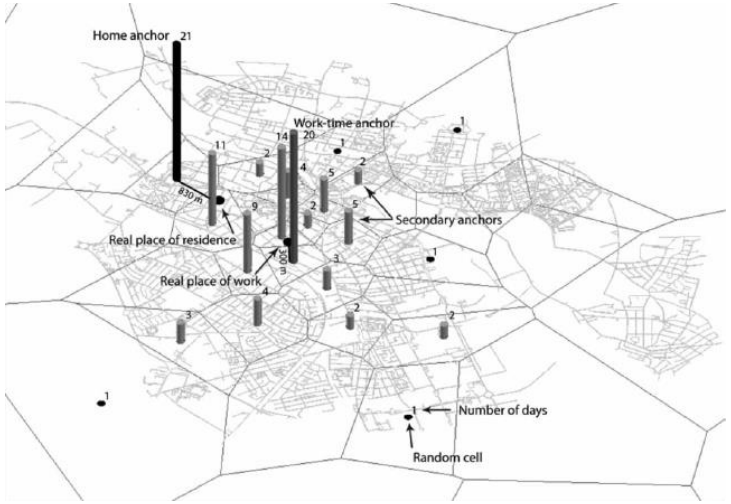
Domestic and Inbound



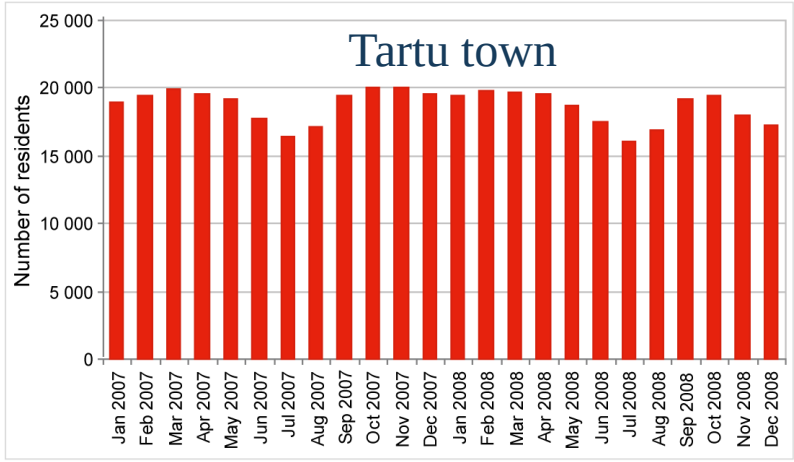
Outbound



Population statistics



Anchor points – home, work, secondary locations.

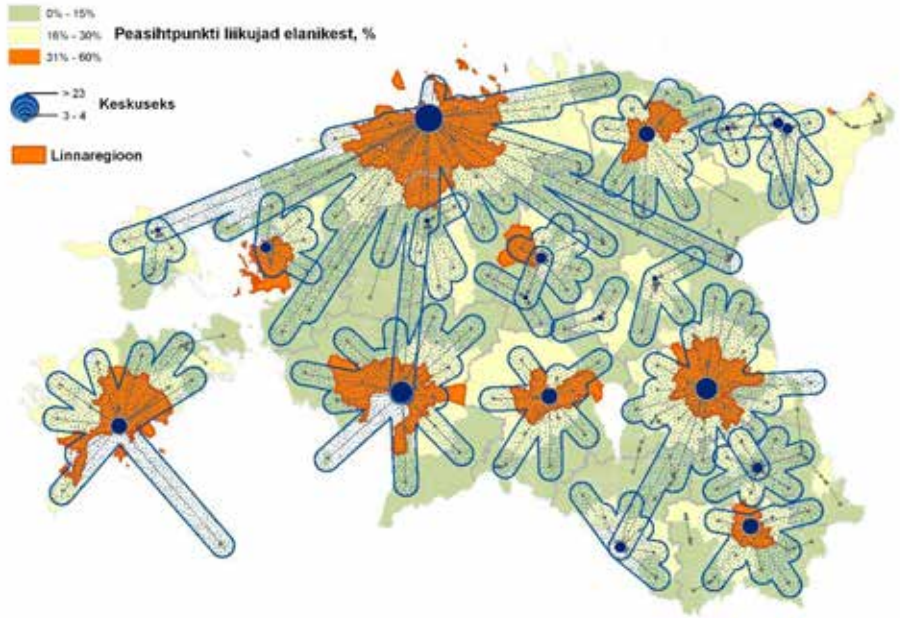


Number of residents
Number of workplaces

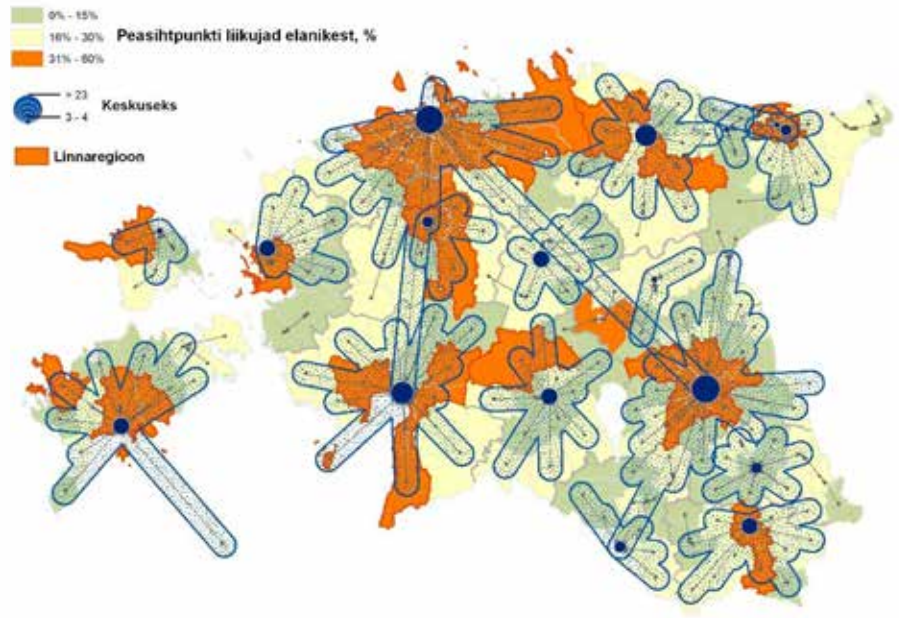
Number of commuters

Central places and urban regions

Home – work

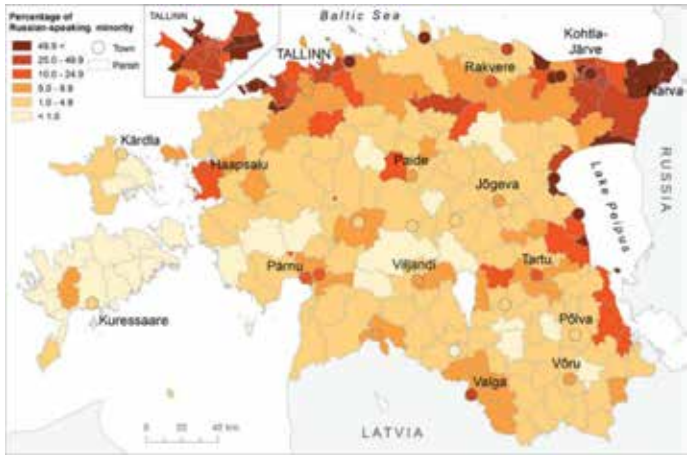


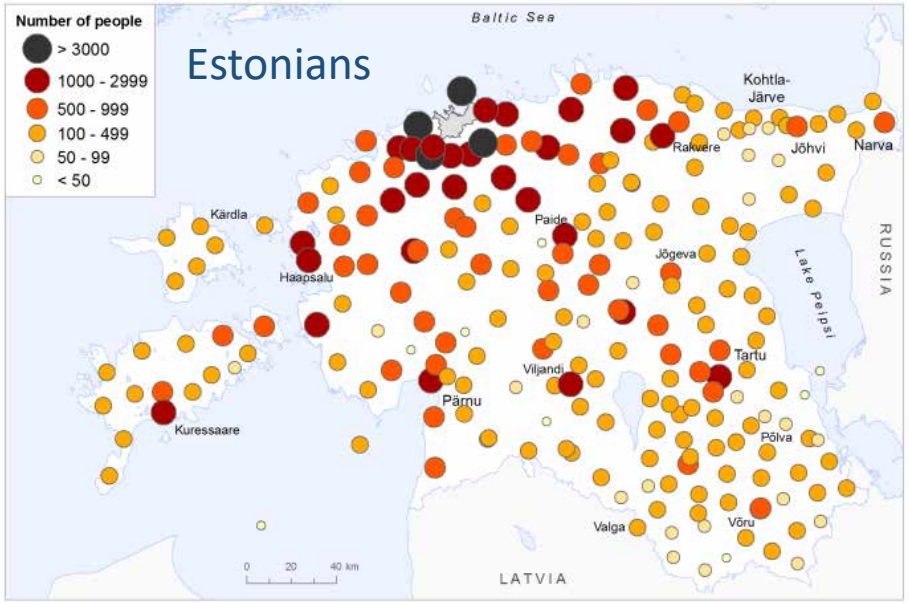
Home – other regularly visited places



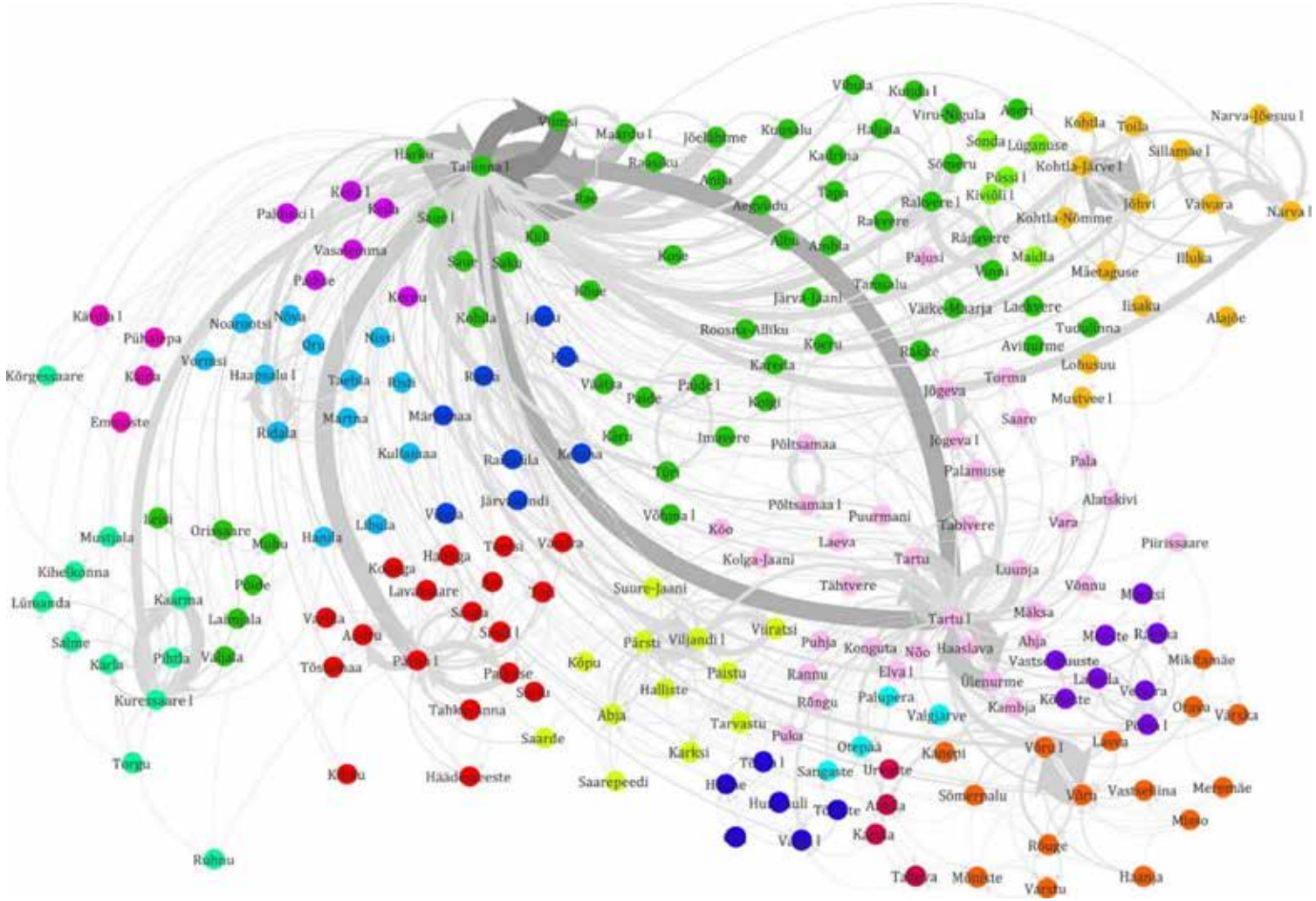
Differences in social groups

Different social groups have different service needs and vulnerabilities in case of risk.

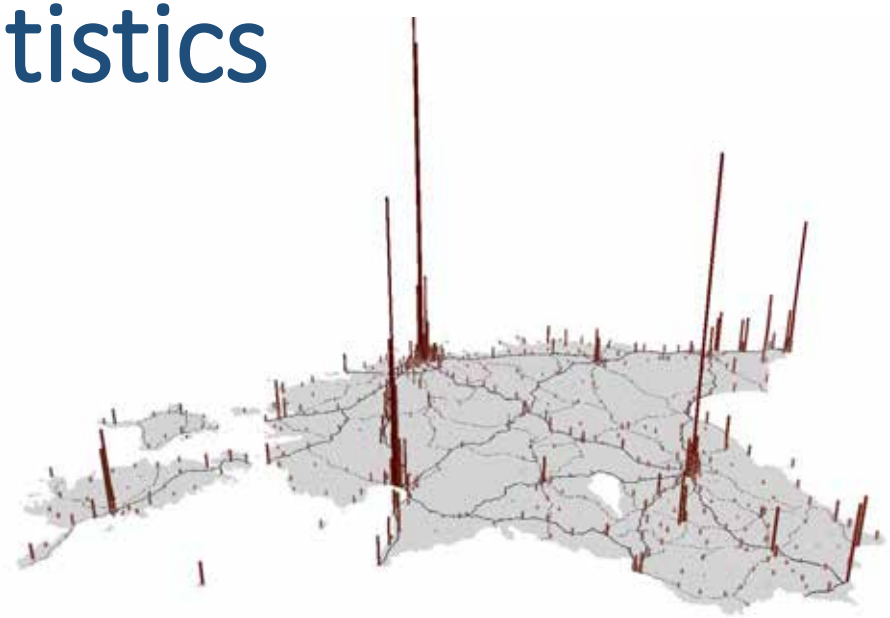


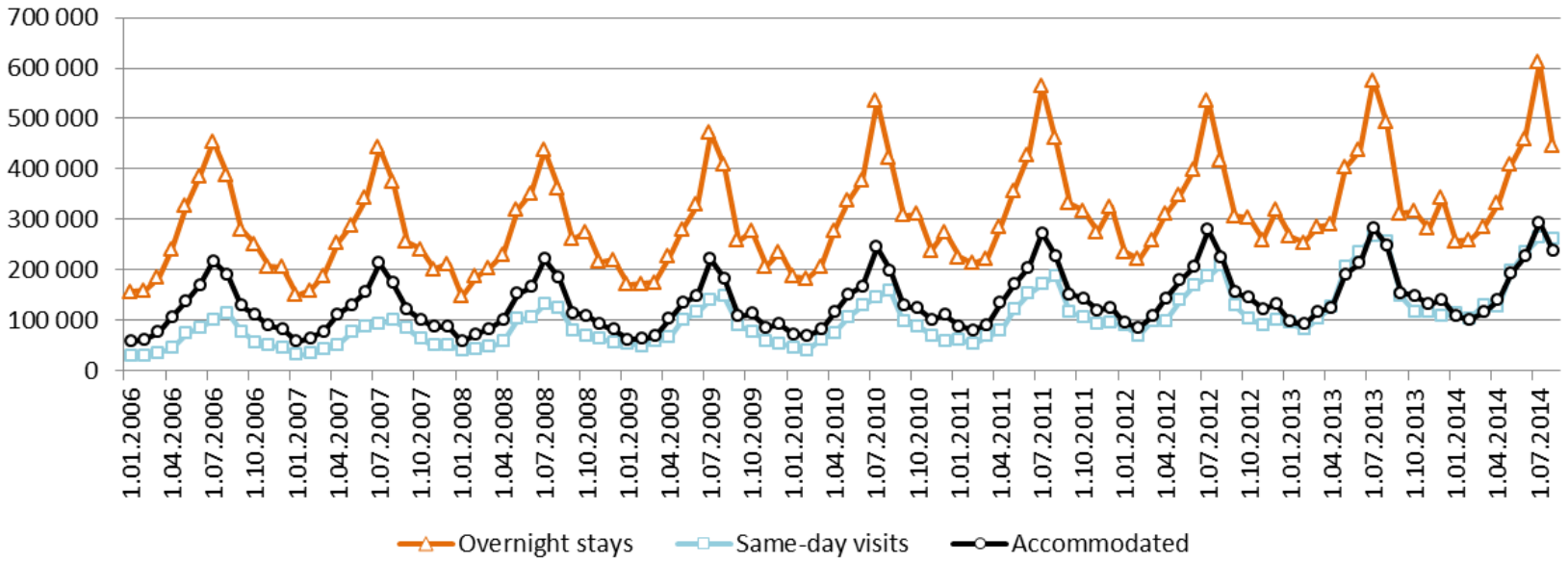


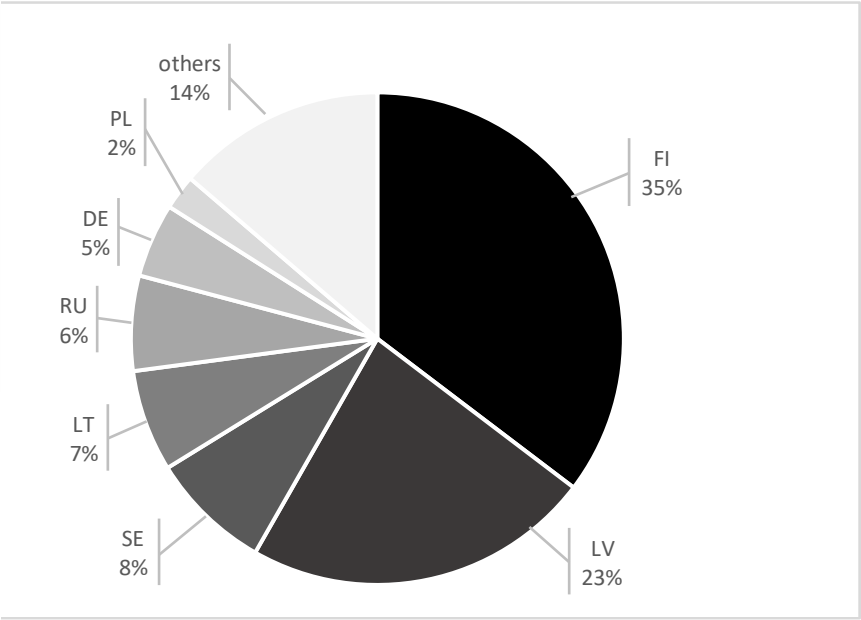
Social Network between places



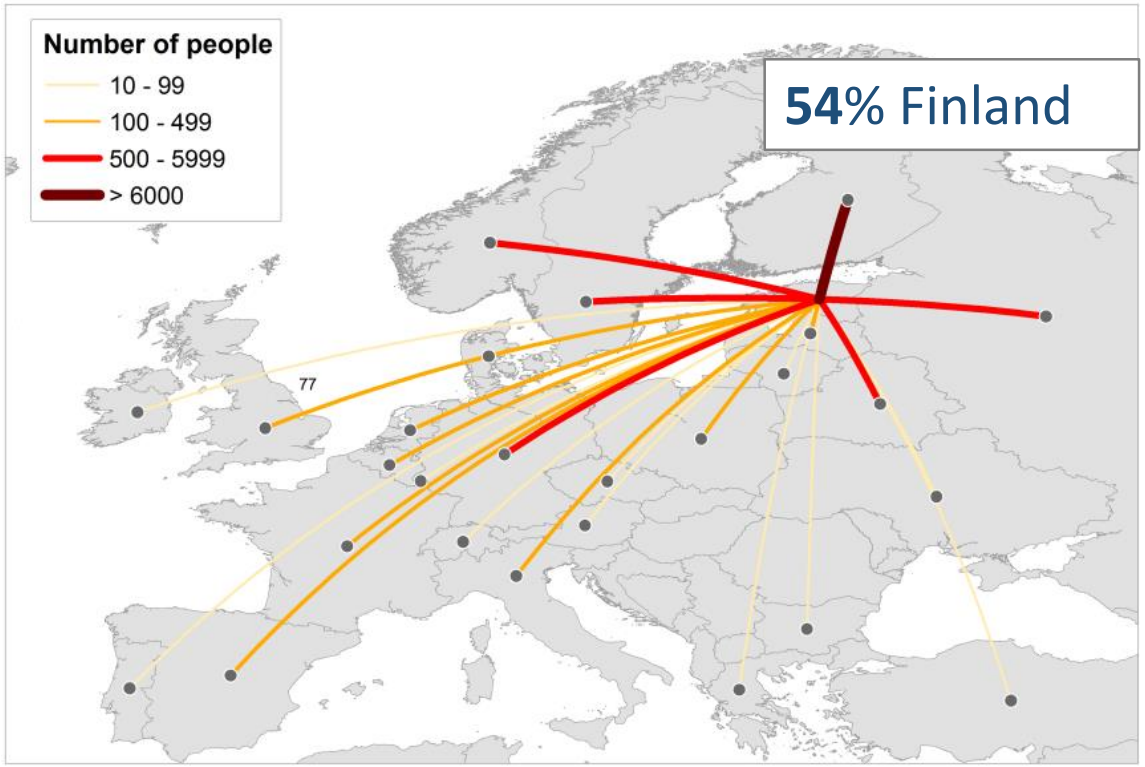
Tourism statistics

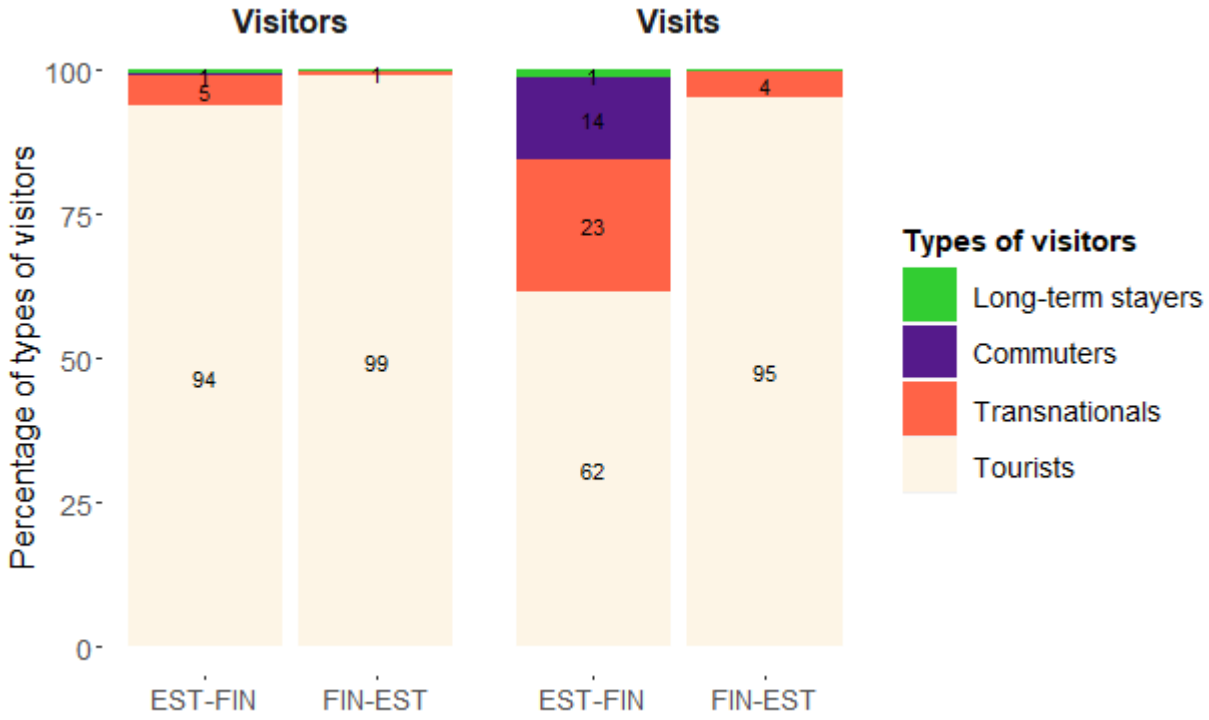






Cross-border mobility





Positive aspect of mobile positioning data

- Sample size: almost full population
- Accuracy in time: months, days
- Longitudinal: long time periods
- Social groups: gender, ethnic, age etc.
- Mobility groups: permanent residence, temporary residence, tourists, transnationals etc.
- Physical movements and social networks
- Cross-border areas

Sensors data

- Developing sensor networks.
- City sensors

- Smart City monitoring

City sensors

- Traffic density sensors
  - Number of vehicles
  - Speed of passing vehicles
  - Direction of passing vehicles

- Acoustic array sensors
  - Classification of sound source type
  - Identification of sound source direction (and location if more sensors involved)
  - Ambient noise level
  - Movement detection
  - Movement duration

- Environment sensors
  - Temperature, Relative humidity, Pressure
  - Particulates (PM1.0; PM2.5; PM10)
  - Light intensity (via solar panel voltage)
  - Vibration (acceleration)
  - CO, NO2, NH3

Making data more available

- **Website**: https://imo.ut.ee/ (under development)
  - Description of the databases
  - Access to data – levels, rules.

- **Workstations** with central databases in University of Tartu and Statistics Estonia
- Internationally accessible **open data portal**
- IMO partners` **datasets**

Access to data

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Workstations

- Researchers
- Registered users, contracts
- Database (postgre)
- Individual data
- Possibility to develop indicators
- Anchor points, visited places, visited countries etc.

Open data portal

- Public authorities
- Publicly available
- Map interface, machine readable data (tables, shape files)
- Aggregated data
- Predefined indicators
- Population and tourism statistics, transportation flows

Interested authorities

REPUBLIC OF ESTONIA
GOVERNMENT OFFICE

REPUBLIC OF ESTONIA
MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS

REPUBLIC OF ESTONIA
MINISTRY OF SOCIAL AFFAIRS

REPUBLIC OF ESTONIA
MINISTRY OF THE INTERIOR

REPUBLIC OF ESTONIA
MINISTRY OF CULTURE

REPUBLIC OF ESTONIA
MINISTRY OF EDUCATION AND RESEARCH

Tallinn

eurostat
EUROPEAN COMMISSION

EESTI PANK

entk
20 aastat
noorte heaks

PÄÄSTEAMET
Estonian Rescue Board

Authorities needs

- Transport planning
- Assessment of mobility needs
- Regional development planning
- Tourism
- Assessment of tax policy changes
- Organizing economic activities
- Defining risk and vulnerable groups

Bank of Estonia – Tourism statistics

Eesti Pank

Statistical indicators

Eesti **English** Help Print

Estonian Bank › Statistical indicators › External sector statistics › **International travel statistics**

STEP: quarter | pick

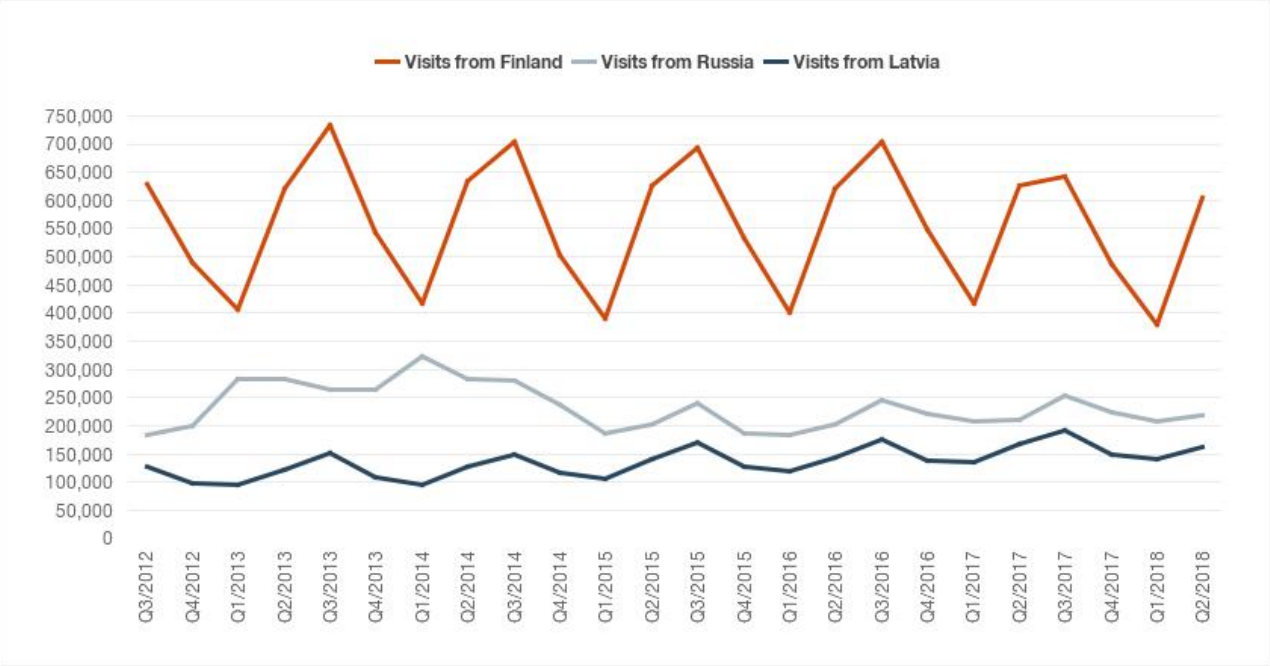
FROM: 2012 | Q3

TO: 2018 | Q2

DISPLAY | DOWNLOAD | SEND

Inbound travel

updated 08/08/2018



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Siiri Silm

siiri.silm@ut.ee

Dedicated to the memory of Rein Ahas (1966-2018) - founder of the Mobility Lab, University of Tartu.

UNIVERSITY OF TARTU
Mobility Lab
1632

http://mobilitylab.ut.ee