

Mobile positioning datasets in mobility studies

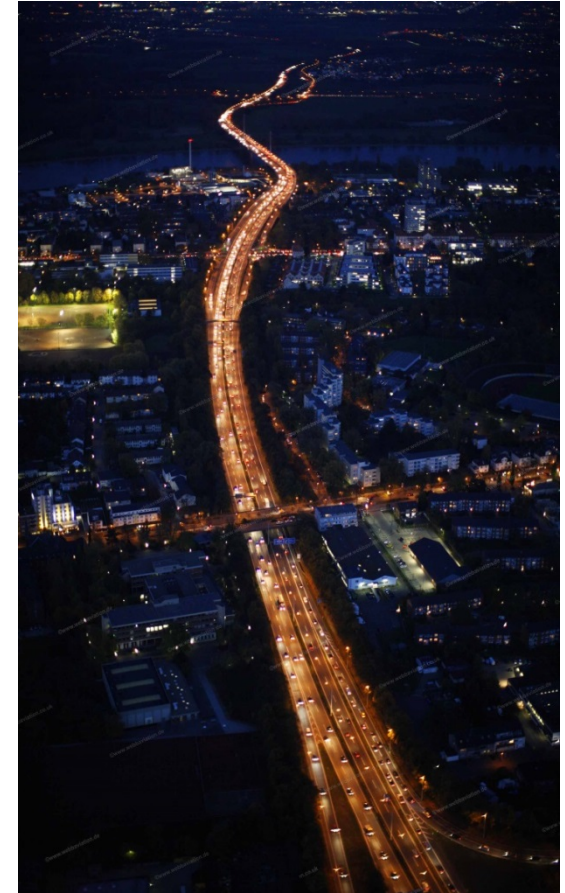
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New mobilities paradigm (Sheller & Urry 2006)

- Growing spatial mobility
- Mobile person have more choices
- Tourism as lifestyle
- Info- and communication technology (ICT), virtual

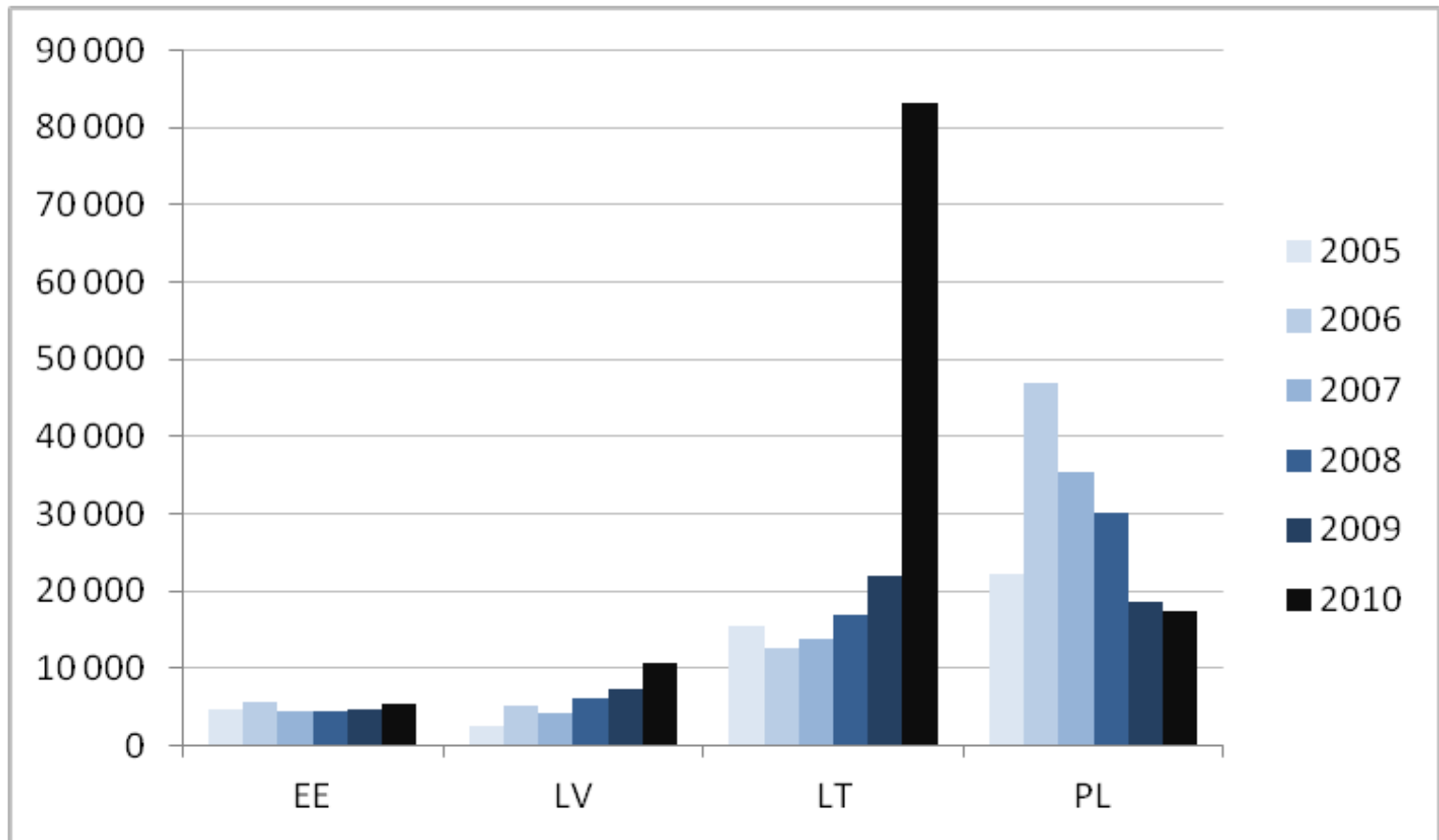


Migration in opened Europe: (Menz & Caviedes 2010)

- Unstable environment and future
- Lower education
- Working abroad with no long plans
- Not decided future, no registration...



Migration from Baltic States 2005 - 2010



(Eurostat Statistics database 2012; Central Statistical Office of Poland 2012)

Objective:

- To introduce mobile positioning based methodology
- Some examples from commuting studies: Estonia/Finland

Partners:

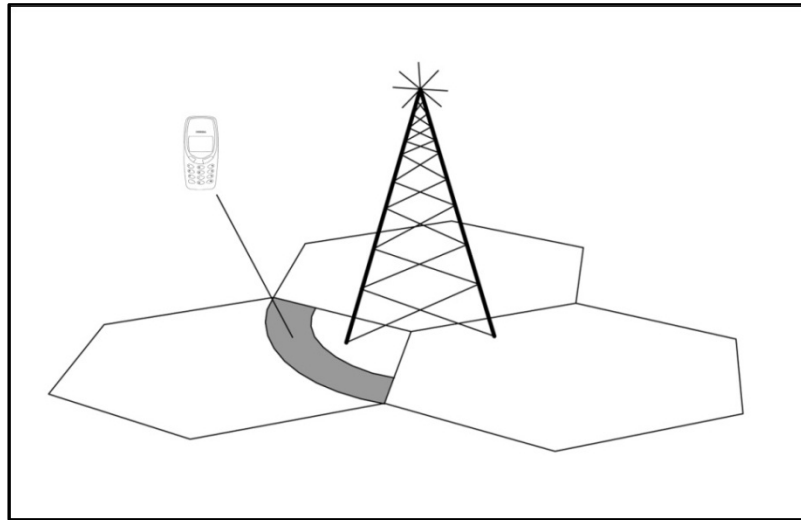


- EMT
- Eesti Pank, Eurostat, Ministry of Internal Affairs
- Positium LBS
- Universities: Gent, Utrecht, Umea, Utah, Kentucky, Peking, MIT, ETH
- Euriegio: Central Baltic Interreg IVA Helsinki-Tallinn Transplan Scenarios

Mobile positioning



Mobile positioning: locating mobile phone by radio waves



Active positioning: locating phone(s) with special query

"Find phone 5035914 for 12:35; 12:45"

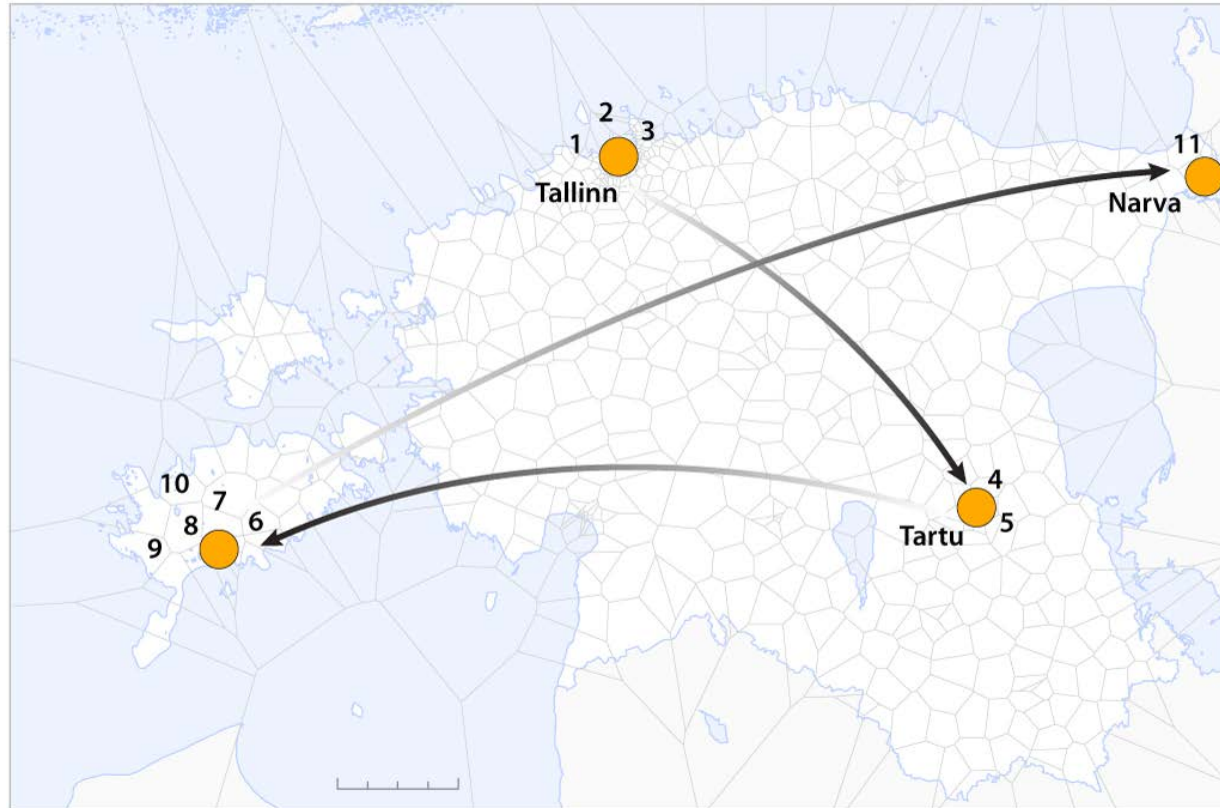
Passive positioning – using location data data from memory files of mobil operator

- CDR – Call Detail Record
- ABDR – Anonymous Bulk Location Data
- Erlang – power in netw. antennae



DIRECTIVE 2006/24/EC on the retention of data generated in connection with the provision of publicly available electronic communications services

Phones moving in Estonian network cells (CDR):



Anonymous data, privacy of individuals strictly protected (2002/58/EC; IKS RT I 2007, 24, 127)

International *roaming* databases



Mobile positioning data:

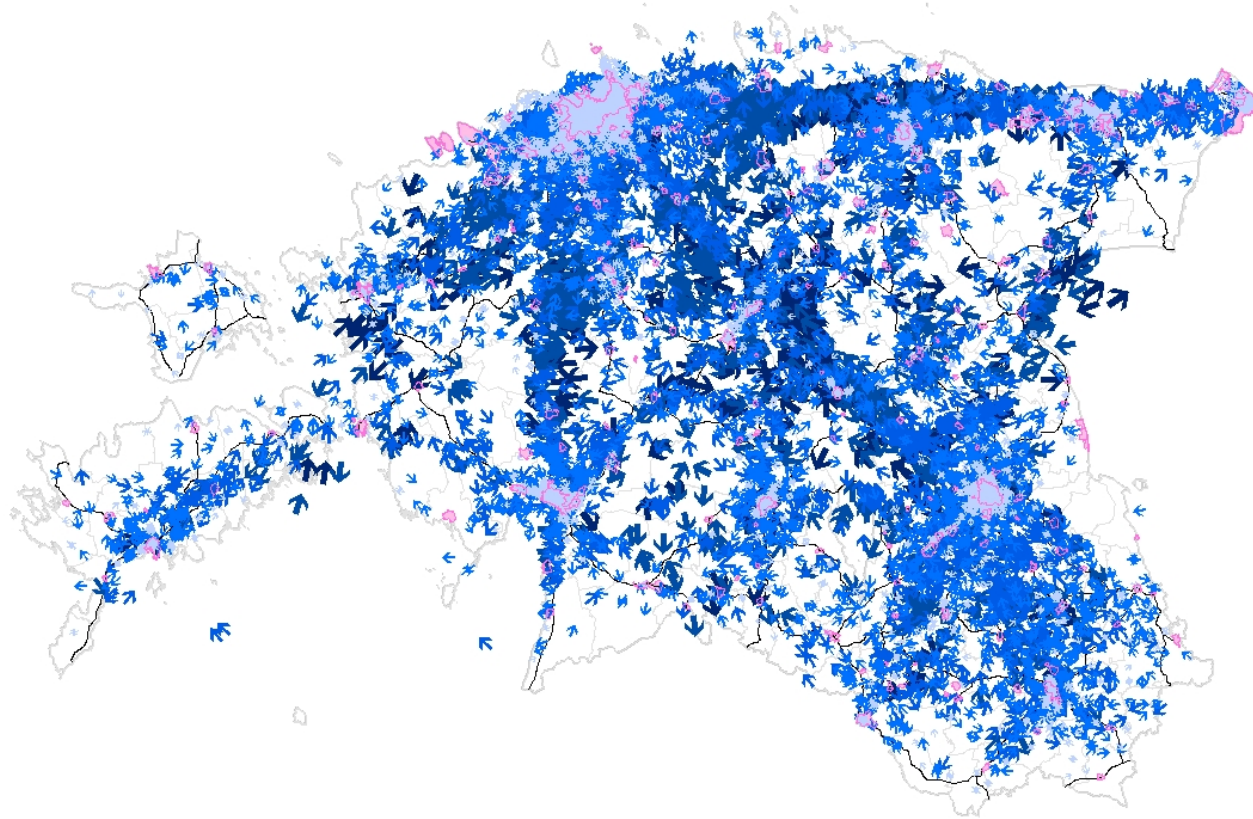
- Coordinates: x,y,z
- Time: *ss:mm:hh:dd:yy*
- Socio-demo features
- Questionnaires

MyTable : Select Query								
	id	pos_usr_id	date_stamp	x	y	sek	kell_aeg	aeg_piv
▶	17236	6748321	4.04.2006 21:31:17	546259	6585054	17	21,071388888889	04 21:31
	17237	6442077	4.04.2006 21:31:23	552184	6589618	23	21,073055555556	04 21:31
	17238	4468383	4.04.2006 21:31:32	521182	6591719	32	21,075555555556	04 21:31
	17239	7324279	4.04.2006 21:31:46	548568	6595529	46	21,079444444444	04 21:31
	17240	4955902	4.04.2006 21:31:53	548879	6595505	53	21,081388888889	04 21:31
	17241	2037109	4.04.2006 21:31:59	523666	6574430	59	21,083055555556	04 21:31
	17242	3477966	4.04.2006 21:32:13	659610	6473719	13	21,070277777778	04 21:32
	17243	2877838	4.04.2006 21:32:33	531464	6587794	33	21,075833333333	04 21:32
	17244	4746887	4.04.2006 21:32:40	540462	6588749	40	21,077777777778	04 21:32
	17245	8645111	4.04.2006 21:32:48	541829	6597702	48	21,08	04 21:32
	17246	9285888	4.04.2006 21:32:54	525401	6591443	54	21,081666666667	04 21:32
	17247	4177520	4.04.2006 21:33:02	525401	6591443	02	21,067222222222	04 21:33
	17248	2799285	4.04.2006 21:33:16	545738	6598697	16	21,071111111111	04 21:33
	17249	2653442	4.04.2006 21:33:27	529517	6471793	27	21,074166666667	04 21:33
	17331	6748321	5.04.2006 9:45:30	546105	6581920	30	9,075	05 09:45
	17332	6442077	5.04.2006 9:45:37	537506	6583274	37	9,076944444444	05 09:45
	17333	4468383	5.04.2006 9:45:40	532388	6588742	40	9,077777777778	05 09:45
	17334	6131988	5.04.2006 9:45:48	546141	6598513	48	9,08	05 09:45
	17335	4955902	5.04.2006 9:46:03	543079	6589033	03	9,0675	05 09:46
	17336	2037109	5.04.2006 9:46:10	523574	6574245	10	9,069444444444	05 09:46
	17337	9435577	5.04.2006 9:46:17	543623	6588384	17	9,071388888889	05 09:46
	17338	3477966	5.04.2006 9:46:25	657606	6472836	25	9,073611111111	05 09:46
	17339	2520233	5.04.2006 9:46:32	551749	6581222	32	9,075555555556	05 09:46

Record: 1 of 140754

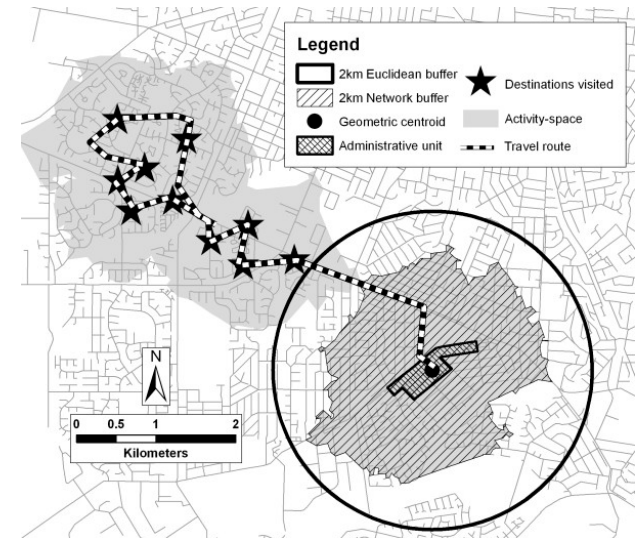
Passive positioning in Estonia 1 h 8 April 2011

„BIG DATA“



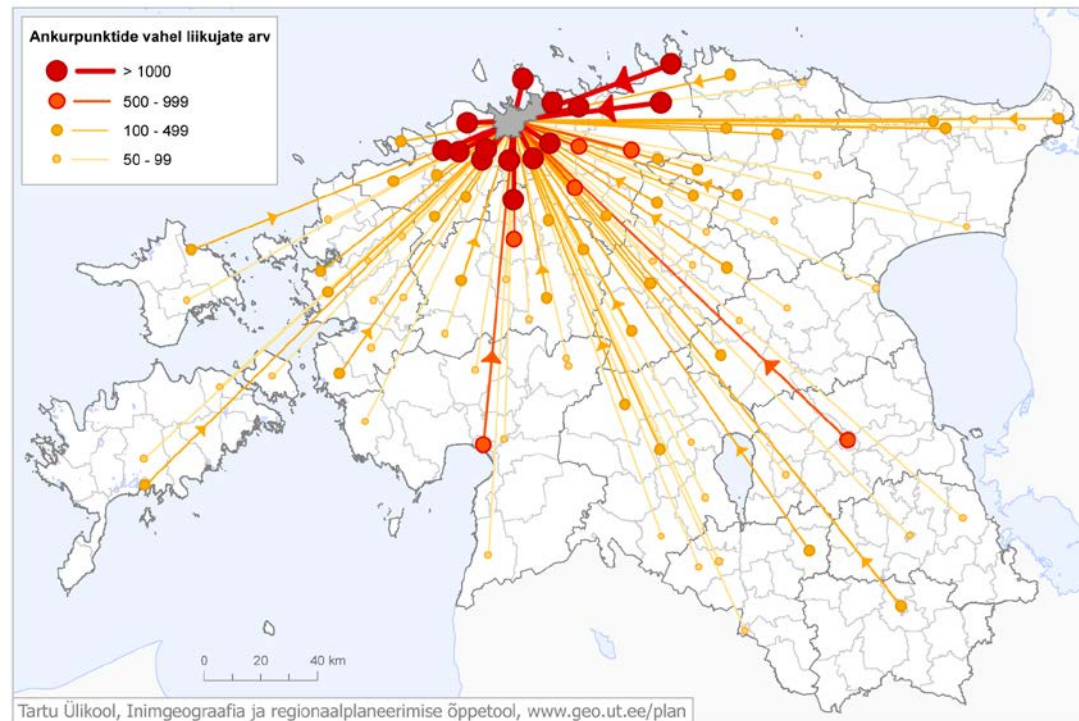
Profiling algorithms:


- Anchor points:
 - Most probable home location
 - Work place
 - School
 - Second home...
- Activity space:
 - Regularly visited area...
- Border crossing:
 - Entering /leaving points



Segmenting: find commuters with

- Work anchor: Tallinn city
- Home anchor: out of Tallinn city
- Visiting Tallinn 3 x per week or 15< x month



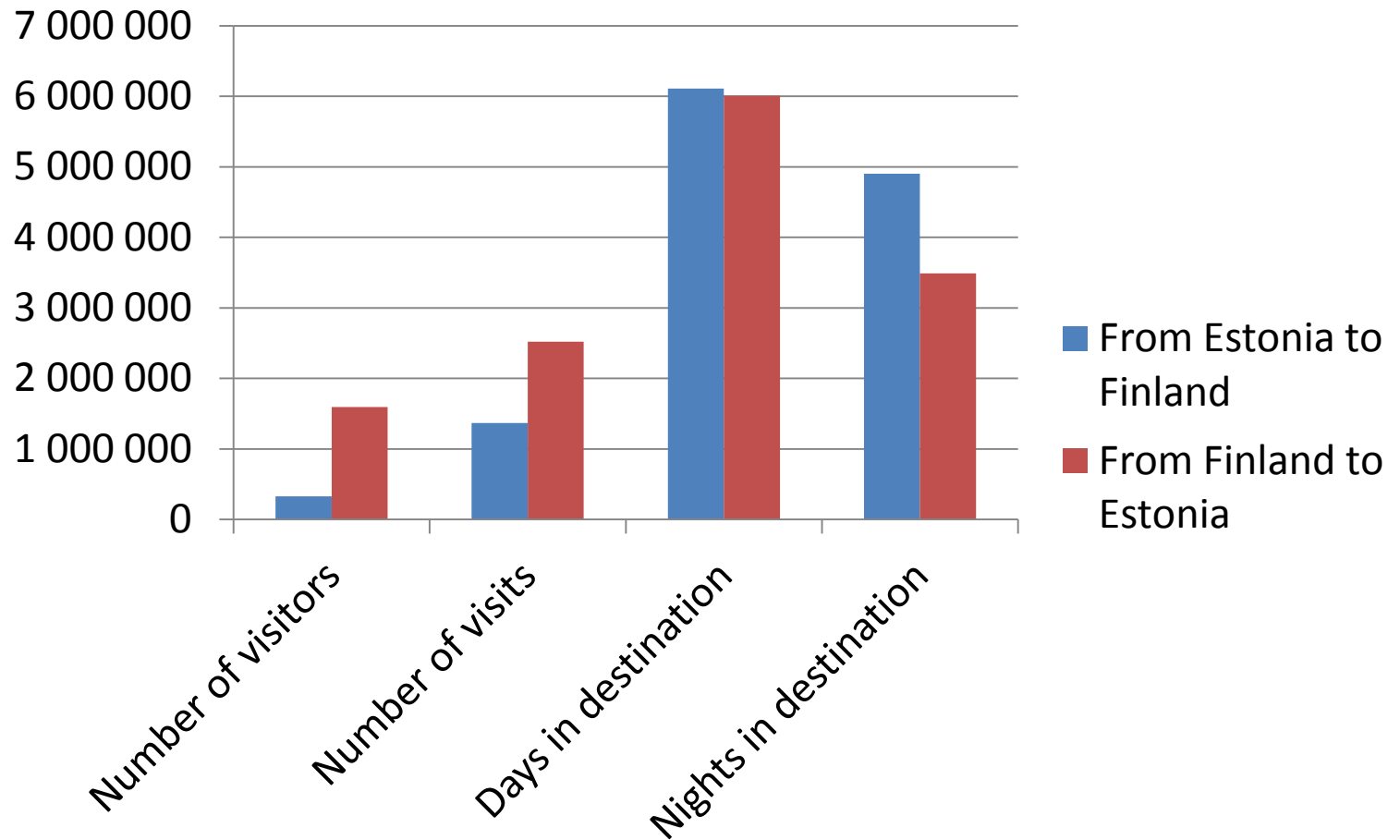


Mapping cross-border commuting between Estonia and Finland

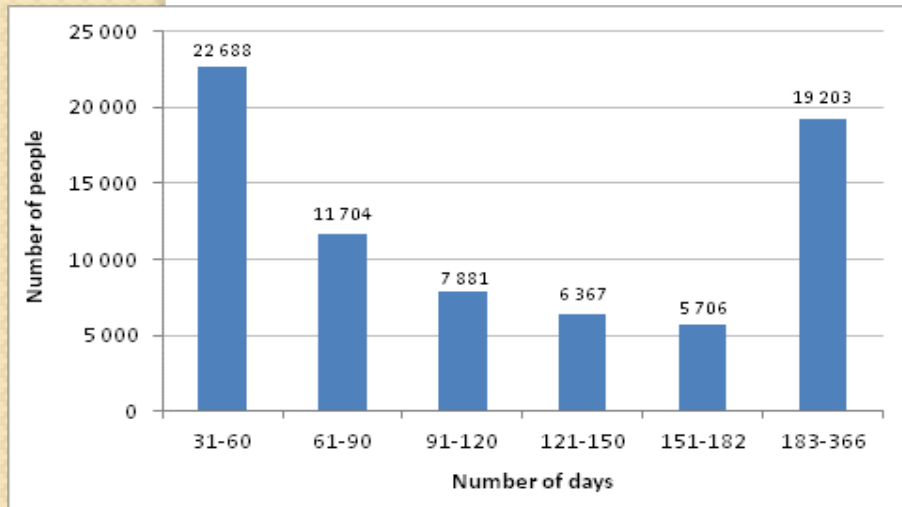
Segmenting individuals/trips:

- Number of visits
- Length of visits
- Geography of visits
- Timing of visits
- ...

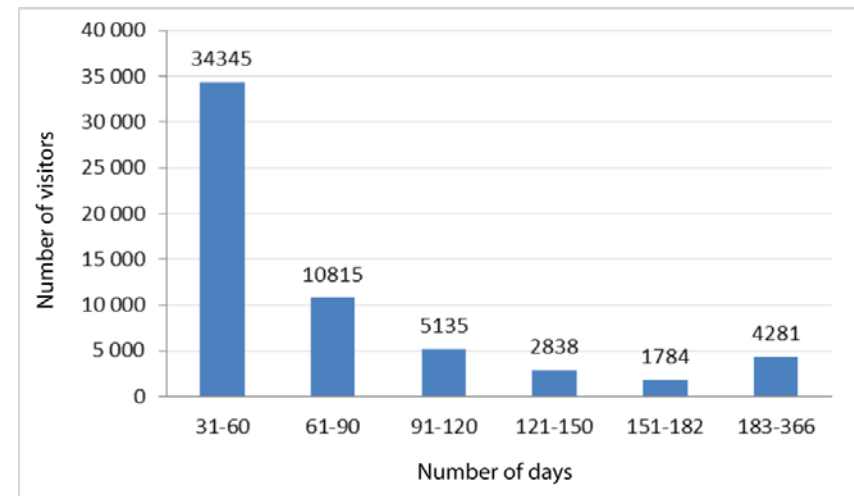
Mobility of roaming phones between Estonia and Finland (annual mean for 2009-2011)



Days spent in destination (+30 d)

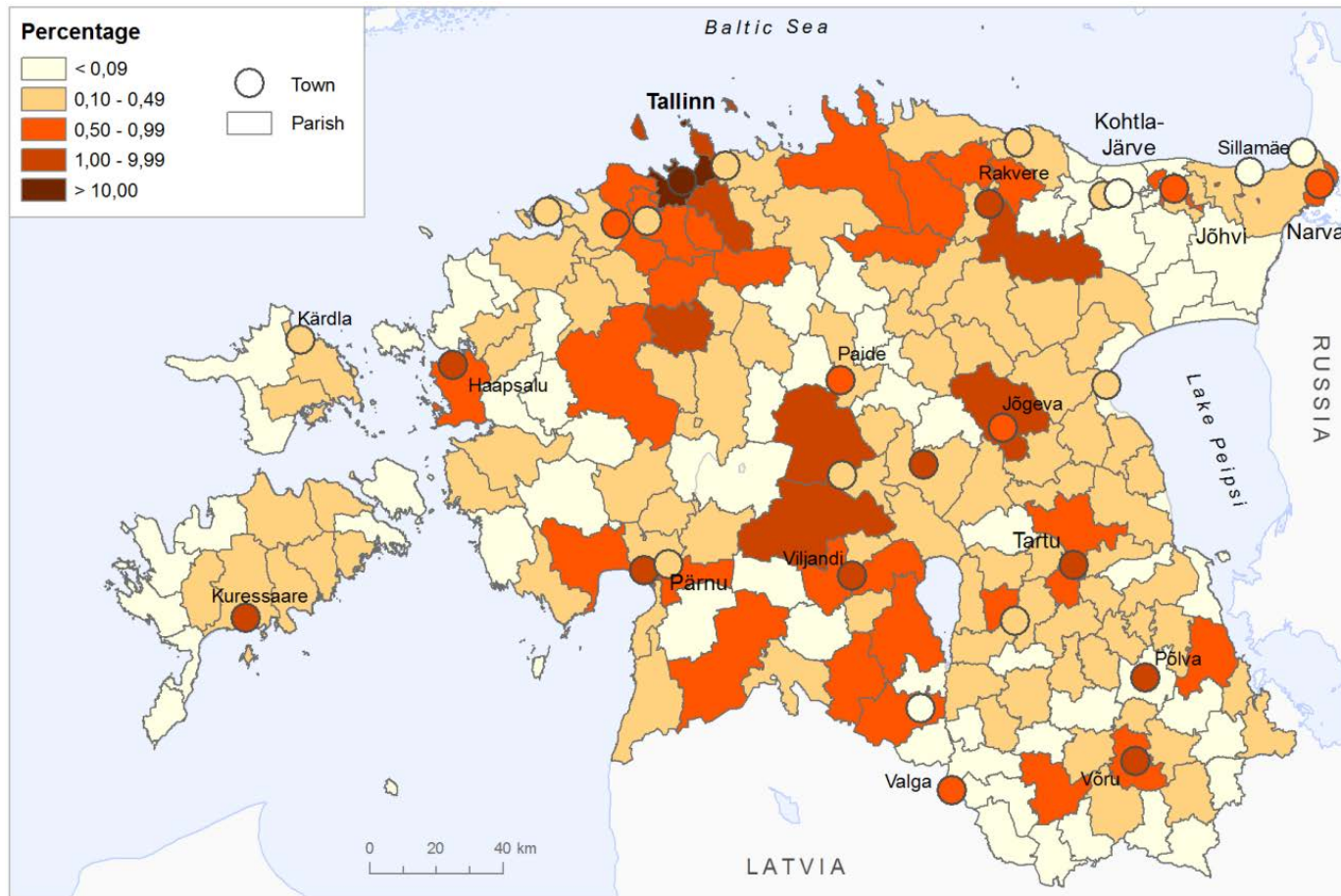


Estonians in Finland

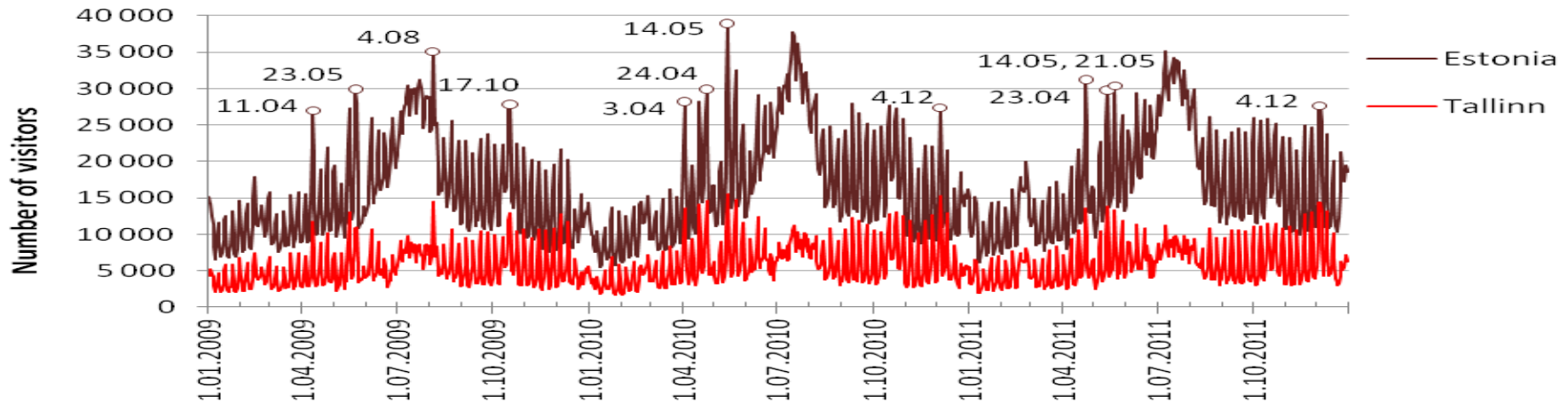


Finns in Estonia

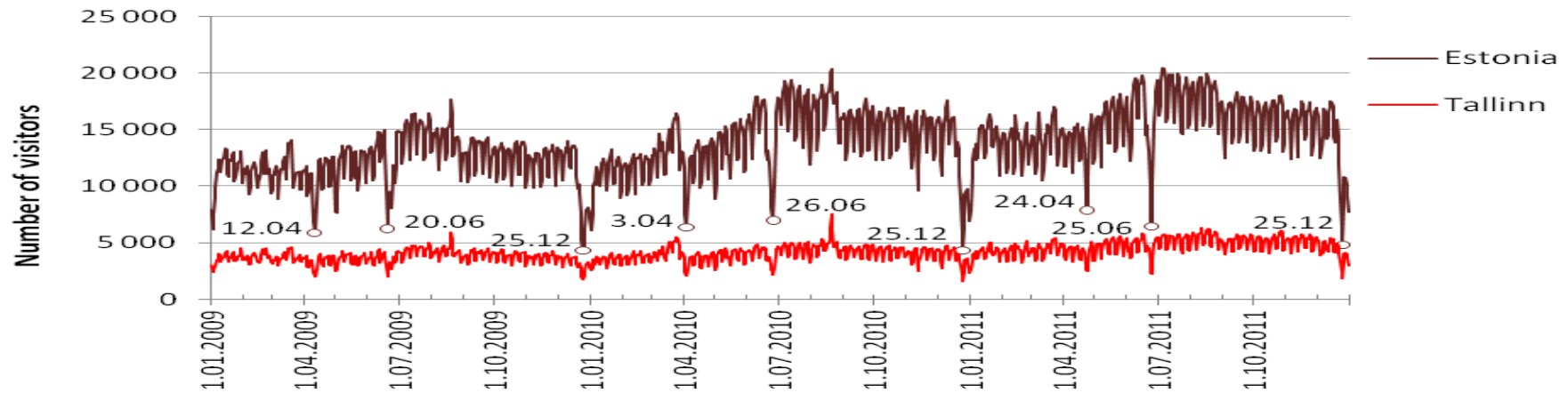
Home anchors of Estonians staying 60+ days in Finland



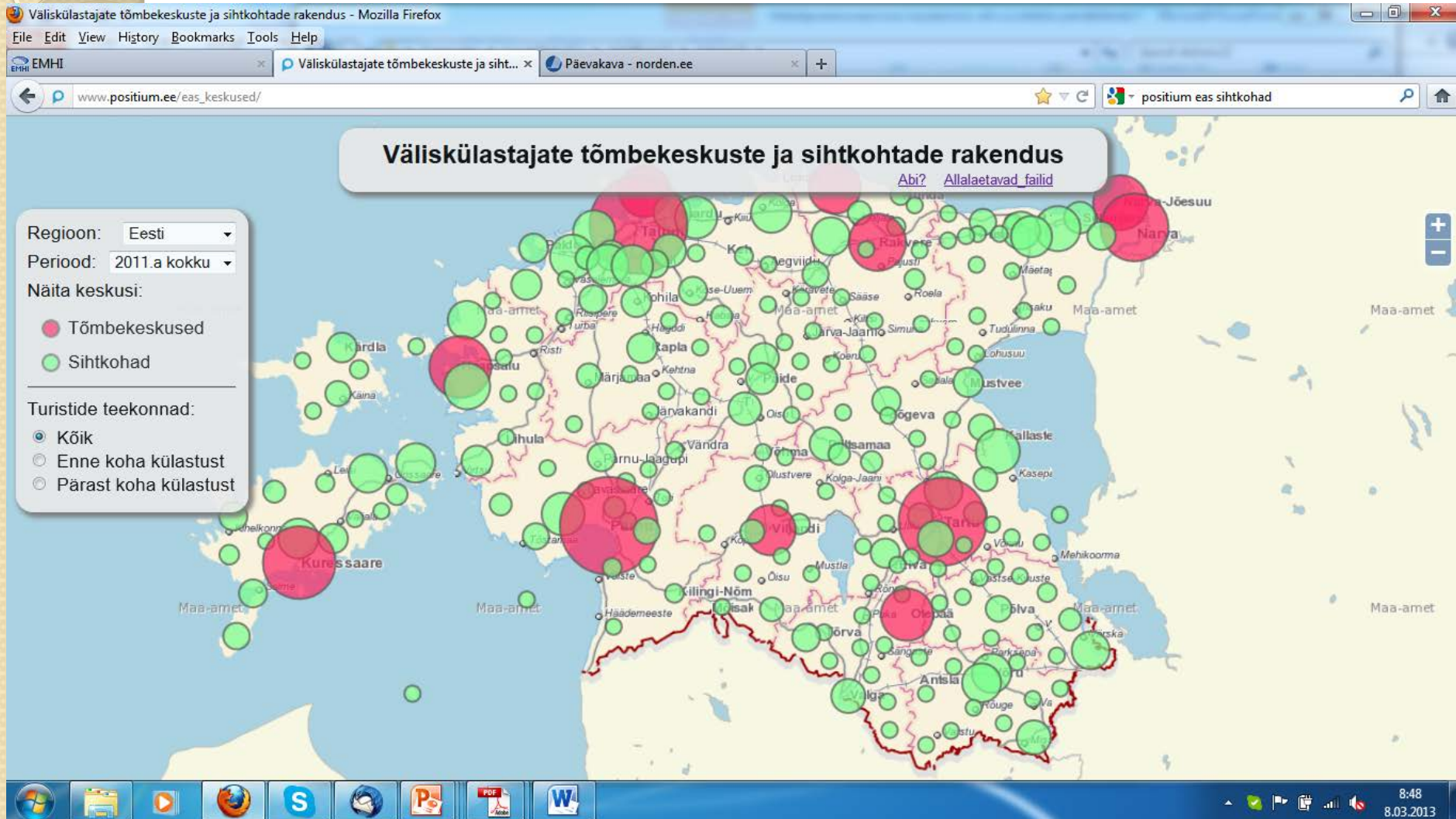
Number of Finns in Estonia



Number of Estonians in Finland



Monitoring & decision support systems:





Conclusions

Conclusions I:

- Growing cross-border and long-distance commuting
- Need for additional data sources
- Mobile positioning is attractive method:
 - Data collection speed
 - Low cost
 - Can measure „complicated populations“
- Sampling - phone use, switching phones
- Potential for monitoring systems

Eurostat feasibility study

(1.02.2013)

2012/S 84-137069

*on the use of mobile positioning data for
tourism statistics*

- Coordinated by Positium LBS, Est
 - Statistics Finland
 - Statistics Estonia
 - University of Tartu
 - IFSTTAR
 - ...

Conclusions II: Growing cross-border commuting

- Daily activity space covers both metropolitan regions



- What is good definition for this connection?
- Functional region? Twin city?

Thank you!

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