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Exploring Mobile Big Data for Statistics:

Measuring SDGs with Mobile Location Data

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Positium

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Developing methodology and technological platform for processing mobile big data for human mobility analyses and statistical indicators

A spin-off company of University of Tartu (Estonia)

1/3 Indicator Problem

- Over 300 indicators
- Out of these (UNSC survey)
  - 53 are easily feasible (methodology exists and data is available)
  - 153 are feasible with strong effort
  - **99 are difficult, even with strong effort** for over 40% of statistical offices worldwide
- We cannot measure 1/3
- $1B per year needed for basic upgrades to statistical systems in developing countries (SDSN estimate, 2015)

Examples of difficult indicators:

- 1.5.1 Number of people affected by hazardous events by gender
- 2.1.2 Prevalence of population with moderate or severe food insecurity
- 11.2.1 Percentage of people living within 0.5 km of public transit [running at least every 20 minutes] in cities with more than 500,000 inhabitants
- 11.2.2 Proportion of residents within 0.5 km of accessible green and public space
- 11.3.1 Ratio of land consumption rate to population growth rate at comparable scale


The Big Data solution?

Mapping mobile location data to SDGs

Mapping based on

- Proposed set of indicators
- Positium experience
- Consultations with Estonian stakeholders

Benefits of the use of mobile location data

1. In 2/3 of developing countries 2/3 of the population have mobile phones
2. One data source for several indicators with national coverage and local accuracy
3. Internationally standardized

Existing projects by Positium for the Estonian government

Tourism consumption, population and commuting

1. Tourism Consumption

Inbound travel statistics from mobile location data (travel counts and stays by country)

Coverage: All foreign countries

Geo: Municipality

Time: Daily

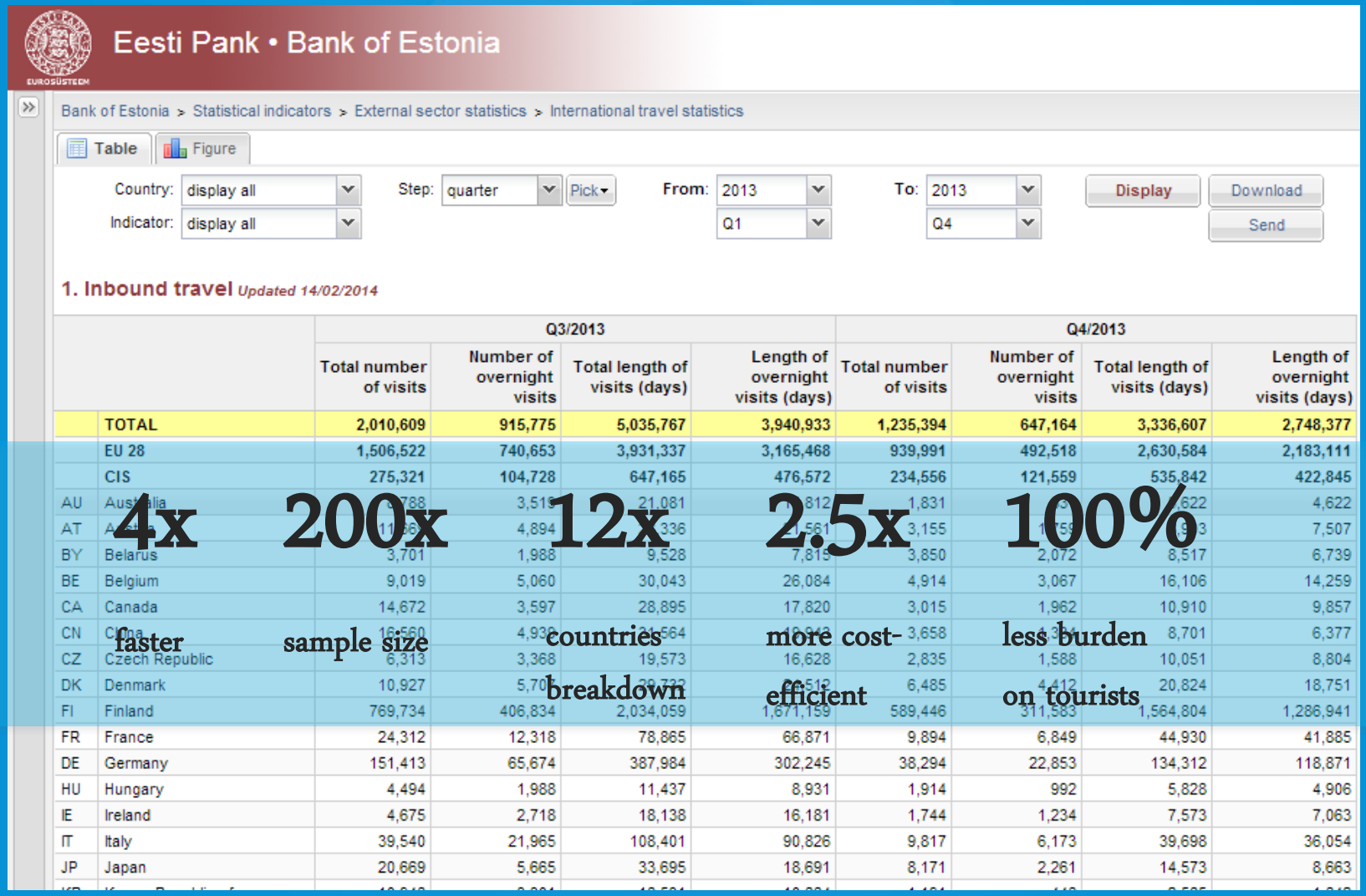
+

Tourist expenditure survey (once every 3 years)

+

Credit card spending data (to calibrate)

In production since 2011



Eesti Pank • Bank of Estonia

Bank of Estonia > Statistical indicators > External sector statistics > International travel statistics

Table | Figure

Country: display all | Step: quarter | Pick | From: 2013 Q1 | To: 2013 Q4 | Display | Download | Send

1. Inbound travel *Updated 14/02/2014*

		Q3/2013				Q4/2013			
		Total number of visits	Number of overnight visits	Total length of visits (days)	Length of overnight visits (days)	Total number of visits	Number of overnight visits	Total length of visits (days)	Length of overnight visits (days)
	TOTAL	2,010,609	915,775	5,035,767	3,940,933	1,235,394	647,164	3,336,607	2,748,377
	EU 28	1,506,522	740,653	3,931,337	3,165,468	939,991	492,518	2,630,584	2,183,111
	CIS	275,321	104,728	647,165	476,572	234,556	121,559	535,842	422,845
AU	Australia	788	3,519	21,081	812	1,831		622	4,622
AT	A	11	4,894	336	561	3,155	1	3	7,507
BY	Belarus	3,701	1,988	9,528	7,815	3,850	2,072	8,517	6,739
BE	Belgium	9,019	5,060	30,043	26,084	4,914	3,067	16,106	14,259
CA	Canada	14,672	3,597	28,895	17,820	3,015	1,962	10,910	9,857
CN	China	16,560	4,93	31,564		3,658	1,3	8,701	6,377
CZ	Czech Republic	6,313	3,368	19,573	16,628	2,835	1,588	10,051	8,804
DK	Denmark	10,927	5,70	38,732	6,512	6,485	4,412	20,824	18,751
FI	Finland	769,734	406,834	2,034,059	1,671,159	589,446	311,583	1,564,804	1,286,941
FR	France	24,312	12,318	78,865	66,871	9,894	6,849	44,930	41,885
DE	Germany	151,413	65,674	387,984	302,245	38,294	22,853	134,312	118,871
HU	Hungary	4,494	1,988	11,437	8,931	1,914	992	5,828	4,906
IE	Ireland	4,675	2,718	18,138	16,181	1,744	1,234	7,573	7,063
IT	Italy	39,540	21,965	108,401	90,826	9,817	6,173	39,698	36,054
JP	Japan	20,669	5,665	33,695	18,691	8,171	2,261	14,573	8,663

4x faster

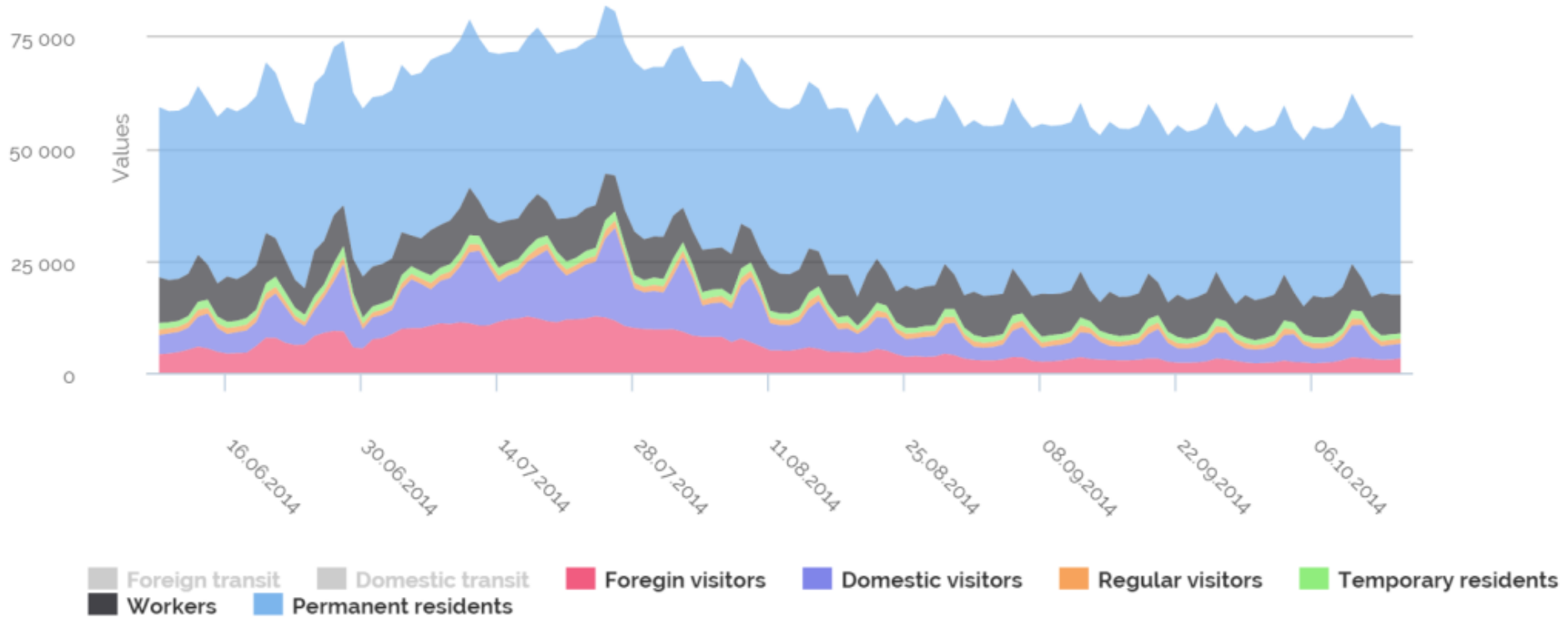
200x sample size

12x countries breakdown

2.5x more cost-efficient

100% less burden on tourists

2. De Facto Population counts



Police and Border Guard Board

Day-by-day data since 2013

- Coverage: Entire country
- Geo: Local municipality level
- Time: Daily
- Relevance to several targets

Population data as input to several indicators yet difficult

- Number of people affected by hazardous events by gender (compare to impact areas)
- Population in urban areas exposed to outdoor air pollution levels above WHO guideline values (compare to pollution map)
- Population in areas of electricity blackouts (compare to outages map)
- Population density measured over continuous urban footprint (compare to satellite imagery)
- Percentage of people living within 0.5 km of public transit [running at least every 20 minutes] in cities with more than 500,000 inhabitants (compare to public transport map)
- Proportion of residents within 0.5 km of accessible green and public space (compare to satellite imagery)

+ Possible new indicators

New proposed indicators

- Tourism (targets 8.9 and 15.1)
  - Tourism density (per day per km^2) - tourism pressure on places
  - Tourism intensity (per day per 100 inhabitants) - tourism pressure on inhabitants
  - Tourism intensity to protected areas (per day) - tourism pressure on the environment
- Mobility and migration (10.2, 11.2)
  - Migratory patterns
  - Seasonal work movement
  - Commuting origin-destination matrices
  - Total km travelled by people in the country

Next

1. Pilot to develop several SDG indicators in Estonia as a test
2. Expand pilot to select countries in Africa/Asia/Latin America

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Questions?

Thank You!

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