TARTU SMART MOBILITY REVOLUTION - NEW REALITY WITH MOBILE BIG DATA

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Short Description
Tartu introduced two large scale changes in mobility in summer 2019 " a totally redesigned bus line network and a new e-bike sharing system, interconnected. Both designed using mobile big data. The presentations are about very promising initial impacts of both projects.

Main part
Tartu (100 000 inhabitants) introduced an e-bike sharing system in June and a new bus line network in July 2019. The networks were designed using a combination of mobile positioning data, e-ticketing data, and various traditional registry data. Passive mobile positioning data (MPD) makes it possible to get an overview and understanding of population stays and movements for large population samples - all clients of one or several mobile network operators. The methodology reveals an aggregated overview of home, work, study, and free time locations and movements between them, while protecting the privacy of mobile users.

The initial impact of the projects has been clearly visible on the streets. Tartu did not have any public bike-sharing systems before, with the new 750 bikes on streets one can always see several bikes in motion almost at any time in any place. The bike-sharing system dock network was designed to cover most of the city, in accordance with main population movements and the dock locations were chosen in accordance with high usage bus stops. By the end of 2019 over 700000 trips were made and 2 million km-s covered with the bikes. As the bikes have GPStracking, it is easy to analyze the bike usage and preferred routes of users.

The previous bus line network was over 20 years old and consisted of 29 circulars bus lines with low frequencies. The modal share of public transport was declining slowly. The new system has 14 fast and straight lines with higher frequencies, up to 10 minutes. All within the 10% increase in expenses to public transport and bus km-s. As a result, in the center of Tartu, one can similarly to the e-bikes see buses moving almost at any time. The initial results show that in September 2019, the no of bus trips compared to September 2018 was up by 14%, 1-month period card sales were up by 10% and 3-month period card sales were up by 20%. For public transport period card owners, the bike-sharing system is free to use for up to 60 minutes rides.

The presentations are about design processes and methodology of both systems, the inclusion of citizens to the bus line network process, using public feedback to improve bus line network and cross-analysis of both systems use and impact. The presenters are from Positium and Tartu city government.

What is new?
Mobile positioning data was the new element in designing the systems. MPD enabled to get very fast overview of population home/work/free time locations and movements over one year of data with minimal effort to analysis planning and setup. In the Estonian context, the full-scale inclusion of citizens for bus line network design and the e-bike sharing systems were also new.

What is transferable to other cities and regions?
Most from the projects is transferable: the design process is universal, along with the inclusion of citizens, MPD is gathered in all countries and used in many for various purposes. MPD has especially gained value in analysing population mobility in the COVID-19 pandemic context. Countries all over the world are

analysing the spread of the virus and population behaviour during restrictions with MPD. All of this is transferable to cities, regions and countries.

What are outcomes and conclusions?
The initial outcomes were efficient processes and methodologies for designing new sustainable mobility systems, the secondary outcomes were promising impacts from the both projects. The main conclusions are: *mobile positioning data enables efficient mobility planning and service design *interconnected public transport and bike share network design delivers promising results *large scale inclusion of citizens improves the public transport service design results

Who are the main target groups?
Cities, regions, researchers, consulting companies.

And what now? - what will change? - what is the relevance for the future?
There is a new reality in mobility in 2020. COVID-19 pandemic has changed public transport in Tartu as everywhere else. The usage has dropped by 80% and several bus lines have been closed, while bike sharing network is opened and still in active use.

In such situation it becomes critical to be able to start the recovery of the public transport system as efficiently as possible as the society recovers from the pandemic. The situation is very dynamic and travel needs have changed dramatically with large numbers of unemployment and transfer of jobs to new sectors. As it is not possible to make reliable prognoses, it is critical to be able to monitor the population mobility very frequently in detail and make quick changes to public transport in accordance with the actual travel needs of people.

All this means the data supply supporting the recovery of public transport has to have certain properties: 1) containing the critical information about population travel needs 2) being based on a large sample to provide reliable results in a very dynamic situation 3) gathering data without the need of physical field work 4) having high update rate (monthly or even weekly for public transport) without high accumulating cost in case of frequent updating. Traditional methods and ticketing data won't work the way they have worked in stable situations, as traffic counting does not give information on trip origins and destinations and ticketing only covers the trips of the people who are still using public transport, surveys cover only small sample of population and have too high cost for frequent updates. MPD meets the needs and as there are fresh examples of using the MPD daily for mobility analysis of the whole countries, the successful experience of Tartu of using the MPD for public transport planning should be useful and applicable for cities.

Link to the project
ratas.tartu.ee; https://positium.com/blog/smart-city-data-driven-solutions-innovation-in-tartu