



Improving disaster preparedness with the help of Mobile Positioning Data

THE CASE OF ESTONIA

The numbers or area names are hidden from all images for privacy reasons



GENERAL INFORMATION ABOUT THE DASHBOARD

The BuildERS project works on increasing resilience and social capital of European communities. Within the project, the potential of using mobile positioning data (MPD) for disaster management was explored, and as a result, Positium has built a dashboard that:

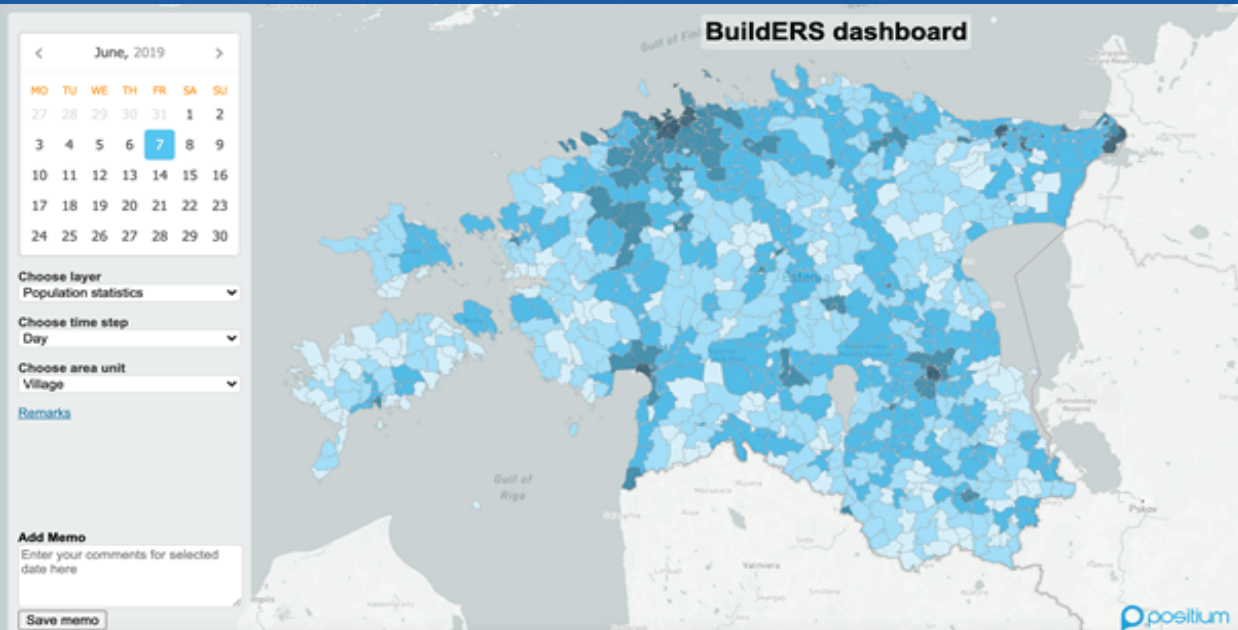
- is based on MPD from people in 2019 (only past data can be used for modeling due to data protection requirements)
- shows different settlement unit sizes (county, municipality, village),
- shows data in daily and hourly view,
- has three layers: population statistics, origin-destination matrices, and secondary homes.

This dashboard makes it possible to see how many people were in different areas at different times, and how the count has changed during disasters. It is also possible to analyse their movements' directions and volumes. With the knowledge of people counts, movements' volumes and directions it is possible to plan more exactly how many technical and human resources are needed and how to hinder movements into the crisis area and how to help people out of there.

All of the data on the dashboard is anonymous. When Positium gets data from the mobile network operator, all user ID-s are already anonymised. The data is cleansed, used in calculations, and the results are aggregated and generalised to the whole population, making sure that individuals cannot be tracked. All results below 10 are hidden from the dashboard.

WHAT CAN THE DASHBOARD DO?

The **population statistics layer** shows how many and what people groups are usually in the area during the chosen time frame. This information can be used to plan human and technical resources more accurately.



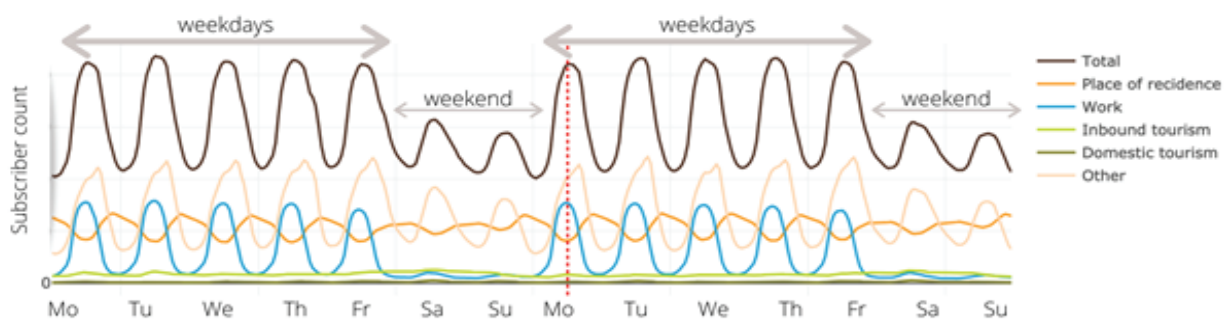
Dashboard's population statistics layer on a daily view and on village level. The darker the color on the map, the more people were present there on the chosen day.

The dashboard can distinguish between 6 different population groups based on their usual mobility patterns and whereabouts (see the graph below):

The population layer of the dashboard shows the following:

- **'Place of residence'** – people living in the area
- **'Work'** – people working in the area
- **'Regular visitors'** – people visiting the area often, e.g for going to the gym or to the shops
- **Transit travellers** (drive-through)
- **Foreign tourists** in Estonia (inbound tourists)
- **Local people** in Estonia (domestic tourists)
- **Subscriber count by time**, breakdown by hour, day, week, season

It makes a big difference in resources needs during different times of day. The image below shows fluctuations in the number of different types of people present in Estonia depending on the day of the week – there are much more people present during the day compared to the night, and the counts drop for the weekend.

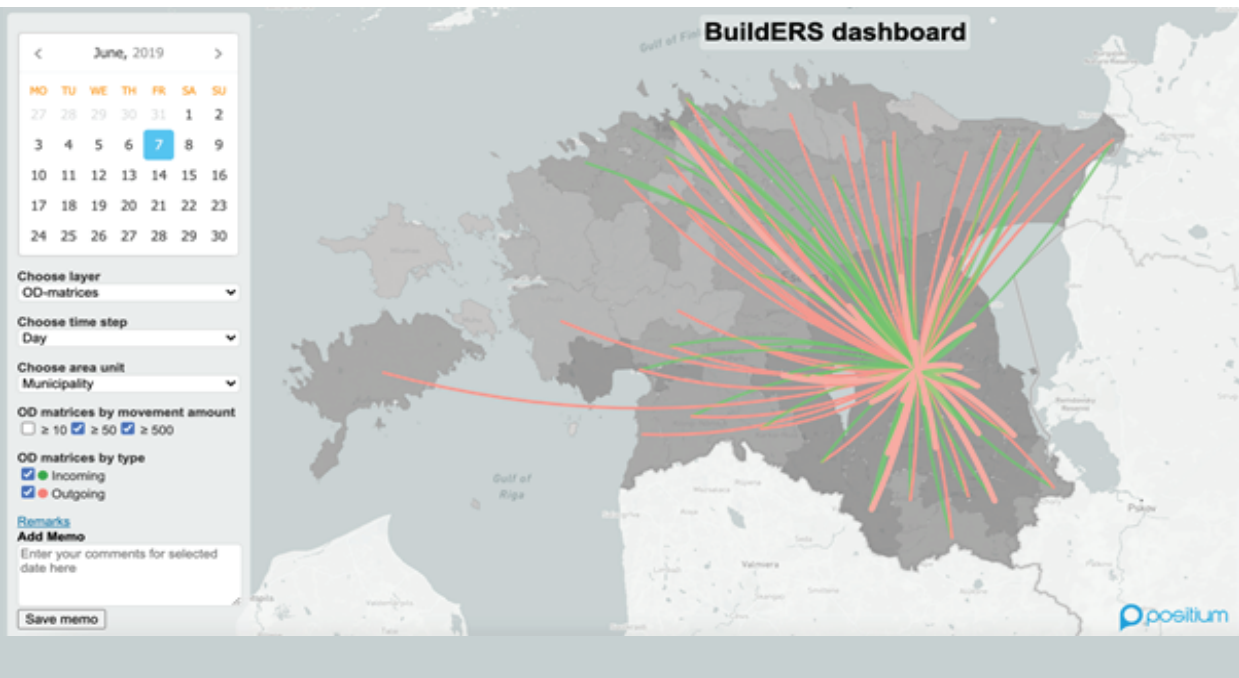


Dashboard's population statistics layer when user clicks on an area. It shows people counts on vertical axis and changes in time on horizontal axis.

The origin-destination matrices layer demonstrates how many movements and in which directions usually occur.

The origin-destination matrices layer can be used to:

- Prioritise roads to direct traffic away from the disaster area,
- Estimate the amount of resources needed for response,
- Show a spatial breakdown by county, municipality and village,
- Show a time breakdown by day or hour.

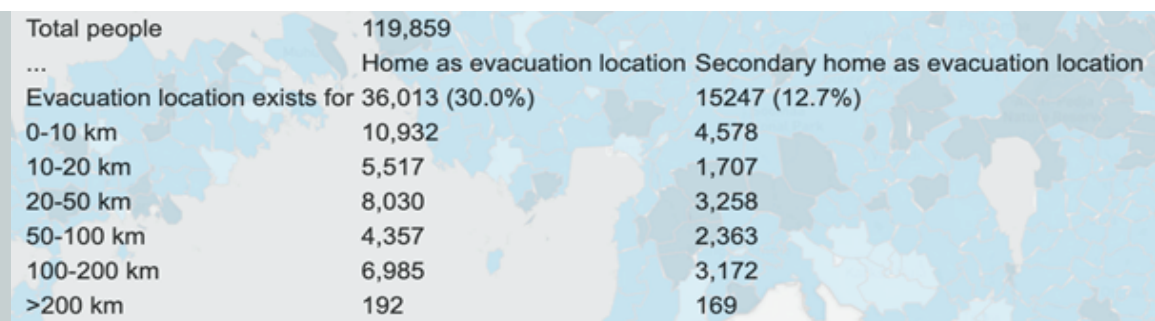


Dashboard's 'Origin-destination matrices' layer showing from where (incoming) and to where (outgoing) people have moved to on the chosen day from the chosen area.

The 'secondary homes' layer is meant for evacuation planning purposes. This layer shows:


- How many people have a secondary home to go to outside the chosen area, with a breakdown by county, municipality, or village level;
- How many people were in the chosen area during the chosen day;
- How many of the people in the chosen area can evacuate to their secondary home;
- How many of the people in the chosen area are visitors who can evacuate to their primary home;
- How far from the chosen area's border is the potential evacuation location.

The image below illustrates the described capabilities. There are almost 120,000 people in the chosen area and 30% of them can evacuate to their primary home and 12.7% can go to their secondary home. This means that out of 120,000 people, almost 43% **would not need accommodation provided by the state as they have a primary/secondary home to go to.**



Total people	119,859	
...	Home as evacuation location	Secondary home as evacuation location
Evacuation location exists for	36,013 (30.0%)	15247 (12.7%)
0-10 km	10,932	4,578
10-20 km	5,517	1,707
20-50 km	8,030	3,258
50-100 km	4,357	2,363
100-200 km	6,985	3,172
>200 km	192	169

Dashboard's secondary homes layer showing the total amount of people, how many of them have a primary or a secondary home to evacuate to and how far away the home is from the border of the chosen area.



HOW CAN THE POSITIUM DASHBOARD HELP LOCAL STAKEHOLDERS TO ENHANCE DISASTER PREPAREDNESS? RESULTS OF THE TABLE TOP EXERCISE

After rigorous testing, the stakeholders and end-users found the biggest value of the dashboard to be the following:

- The dashboard is useful for analysing events in retrospect – the behaviour patterns before, during and after disaster scenarios can help plan communication, traffic flows, and resources.
- The reliability of the dashboard has been verified by end-users – hourly view from mobile positioning data timely matched real events during a storm.
- The dashboard is useful for making risk assessments and more accurate plans – it gives more accurate input to shelter and evacuation route planning.
- The dashboard can be used to plan transport corridors of hazardous materials or military training routes to eliminate contact with large population volumes.
- The dashboard is useful for both high-level planning and regional planning.
- The dashboard displays *de facto* data that is more exact and accurate than static databases and registries – registry data does not include the commuting between different places and only has information about registered addresses, not actual addresses. MPD provides more accurate insights in this case.