Moscow Mobility
How movement in cities changed during the pandemic

The pandemic has greatly influenced the lives and daily routine of the city-dwellers. As for the Muscovites, compared to March, in April-May there was a general decrease in the people’s mobility – home office and going out for shopping or walking the dog became the only types of interaction with the environment.

With the use of cell phone data we analyzed the decrease in the people’s mobility during the quarantine, how much time people spent at home and which areas of the city they chose for leisure activities.

Background

Shifts in mobility patterns have been monitored since the early days of the COVID-19 outbreak. Thus, the University of Exeter in the UK reported that in March the mobility levels dropped by about 50-70% compared to before the pandemic, and the Statistics Estonia published the analysis showing that on average people began to spend 20 hours per day at home.

Along with that, mobile apps that collect user geolocation data presented their own mobility indices – Citymapper correlated the number of trips planned with the app (in the ‘Get Me Somewhere’ mode) to the trips taken (in the ‘GO’ mode) during the lockdown in comparison to the typical usage period. Trips include movements by public transport, taxis, bicycles, and walking. The results show that from early March to mid-April the Moscow Mobility Index decreased from 0.98 to 0.16. The calculations are based on Citymapper data alone but nonetheless the change is dramatic.

Under these circumstances, people start paying attention to what surrounds them – street design, commercial diversity and accessibility of green areas make an important part of the new normal life in our residence areas.

More people at home

Home office reality and quarantine measures moved workers to their apartments and subsequently influenced the existing commuting patterns. With the use of cell phone data we measured the decrease in people’s mobility in April (lockdown period) in comparison to the beginning of March before the quarantine.
Figure 1 shows a heavy decline in average people’s concentrations, most notably in the centre of Moscow. By contrast, the general increase in concentrations is observed in districts adjacent to the Moscow Ring Road on the periphery.

Such a distribution is explained by the spatial structure of Moscow – following a monocentric development model, the city experiences the residential density increase from centre to periphery with a corresponding decline in commercial infrastructure and business areas (most offices and street retail are concentrated in the CBD).

Fig. 1. Change in the total number of people by grid cells, % (April is compared to March, the more intense the concentration, the greater the decrease)

A fresh look at the neighbourhood

Despite the overall decline in mobility, people have experienced a growing interest in exploring their neighborhoods in search for safe and peaceful areas for walks and leisure activities. Even though most of the parks were closed for visiting, data shows that the importance of green spaces for Muscovites has increased – high activity levels were observed in and around local squares, public gardens, embankments.
To highlight main green areas we have calculated the **NDVI index** – a graphical indicator used to analyse if a place contains green vegetation. Figure 2 shows its comparison to people’s concentrations: it can be observed that in the vicinity of parks there are far more dwellers outside their home location.

![NDVI Index and People's Concentrations](image)

**Fig. 2. People in their home location by grid cells, % in comparison to the NDVI Index**

Zooming in on large green spaces this trend is more noticeable.

![Sokolniki-Losiny Island Park and Izmailovo Park](image)

**Fig. 3. Sokolniki-Losiny Island Park**  **Fig. 4. Izmailovo Park**

In the end, due to the pandemic we found ourselves in a situation when it is the quality of the surrounding us environment that determines our wellbeing and gives the sense of
stability. Urban diversity expressed in the variety of pedestrian routes, access to parks and green boulevards forms the feeling of freedom and the comfort of habitat.

**Transit hubs and transport infrastructure**

The loads of transportation hubs have also changed, but the lockdown has influenced city districts unevenly. Hubs in the city centre that are usually focused on everyday business activity and have a lot of transit passengers have shown the overall decrease in mobility, while metro stations on the periphery became the main attractors for the local population.

As for **mono-transit** stations, when the mobility levels have dropped, all other activity has vanished subsequently. In contrast, hubs with **well-developed street retail** remained to play an important role in the everyday life of the local community.

Figure 5 shows people’s activity in one of the peripheral neighbourhoods before and during the quarantine – there is a slight decline by the metro station but not in the neighborhood itself. Figure 6 shows an example of a mono-transit hub – in this case, people stopped commuting and the activity has dramatically dropped.

**Fig. 5. Activity in a peripheral neighbourhood before and during the quarantine**

**Fig. 6. Activity around mono-functional transit hub before and during the quarantine**
Conclusion

Monitoring people’s activity with the use of cell phone data has the advantage of spatial granularity: it is possible to explore not only the generalized activity by administrative districts, but also search for the irregularities within them – with the use of grid cells it is possible to zoom into road sections, separate groups of buildings or transit stops.

Analysing activity within various neighbourhoods helps us find the existing differences between them: in some cases, activity is related to the increased popularity of a local park, sometimes it is caused by traffic jams on major interchanges; some metro stations have just a transit function, while others are thriving local hotspots and diverse commercial centers.