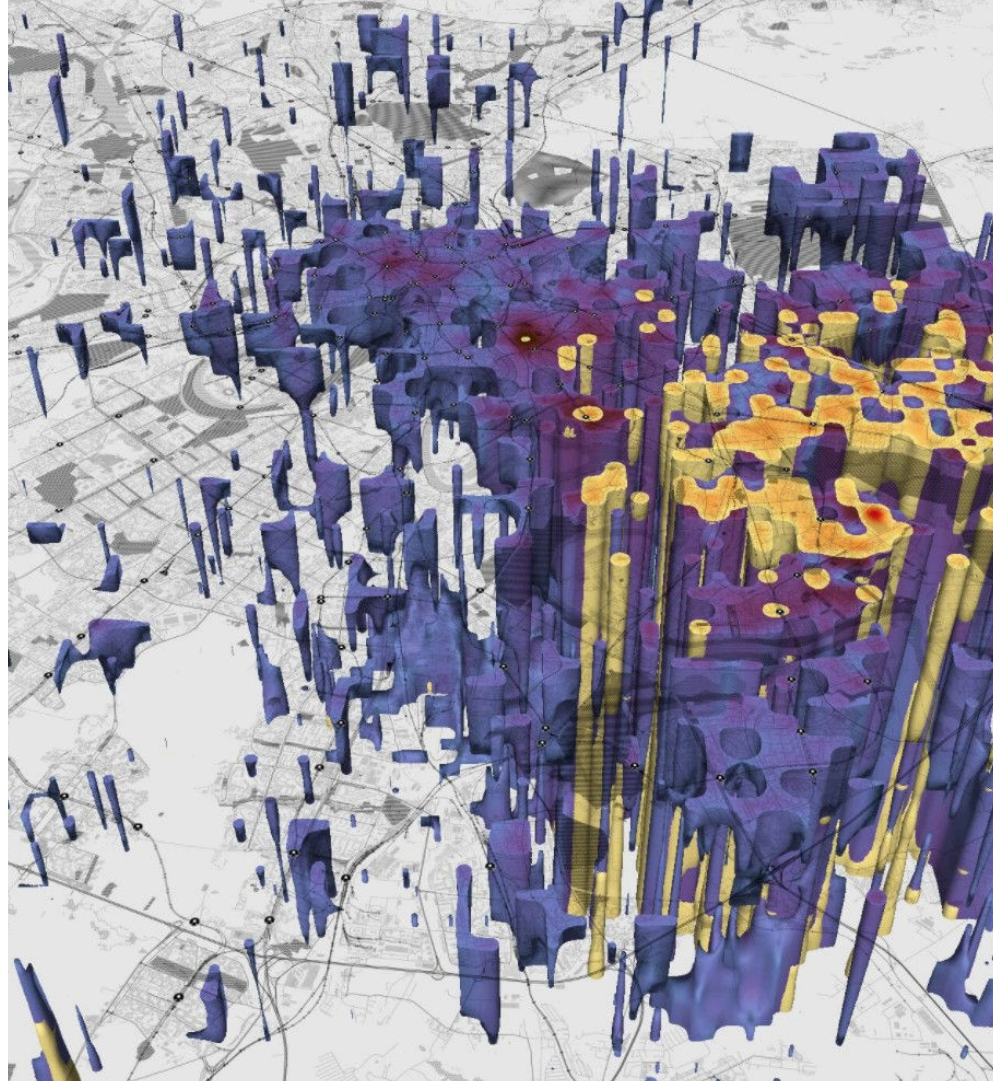


**Big data for urban structure
analysis:**
Centrality inside the city

Ruslan Dokhov
R&D Lead, Habidatum

HABIDATUM



DEMAND from people

depending on their:

- interests
- lifestyle
- types of activity
- perception of the place

MONEY

POSTS

VISITS

SUPPLY of services and infrastructure

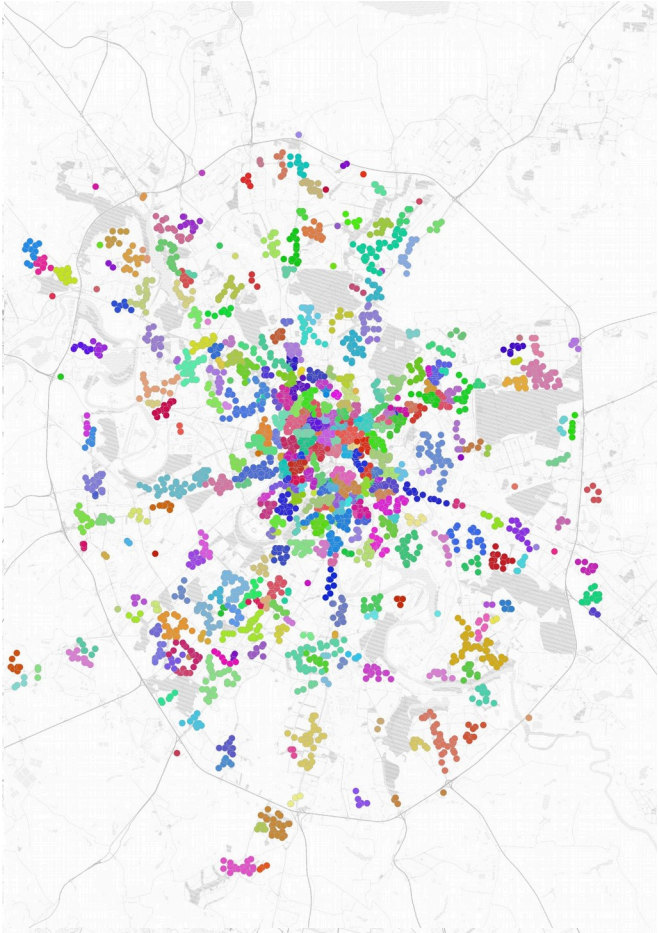
depending on the:

- accessibility and connectivity of places
- the size of catchment area

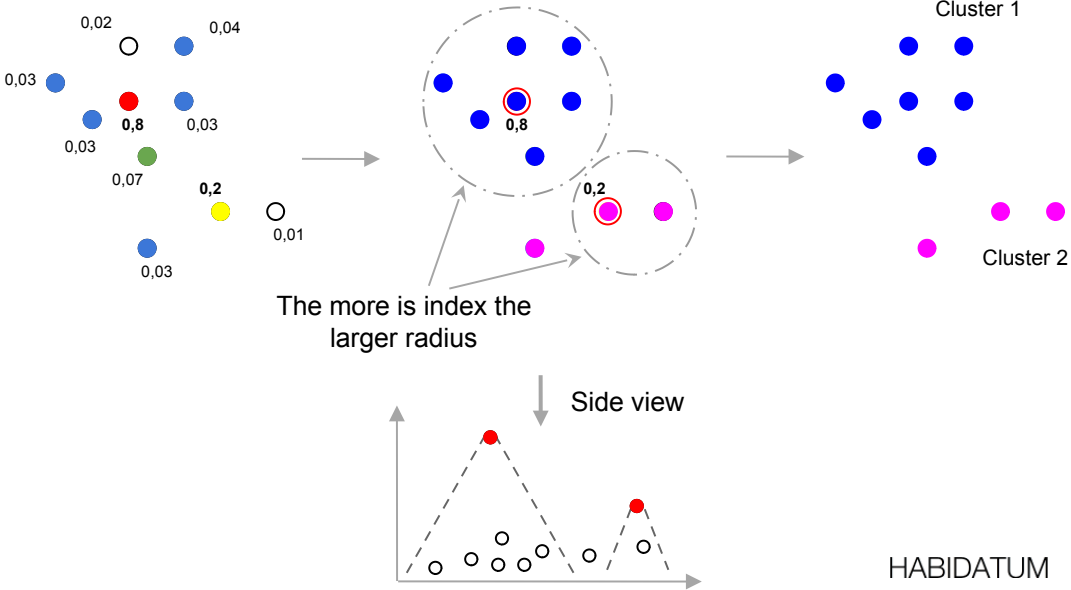


TERRITORY

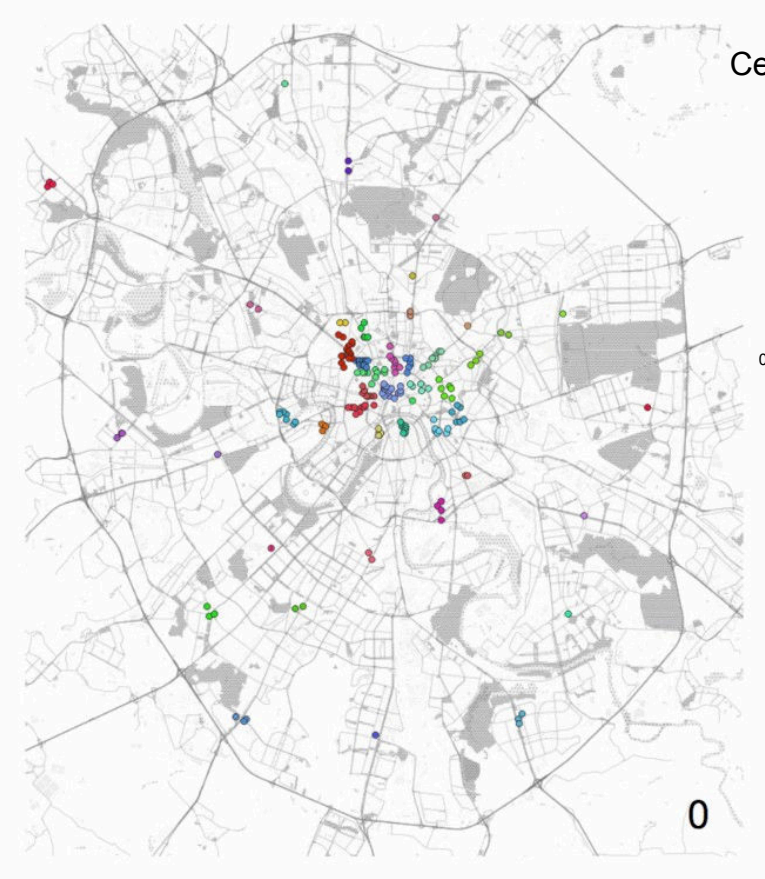
Calculating centrality index



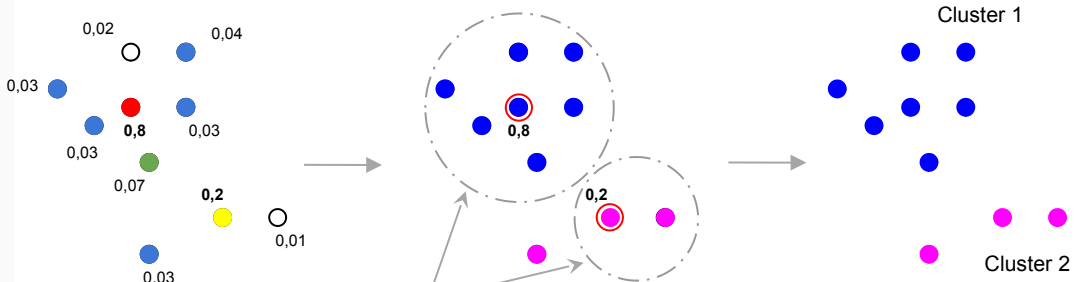
$$\text{Centrality}_i = \sqrt[3]{\text{places} \times \text{people} \times \sqrt[2]{\frac{\text{money} \times \text{transaction}}{s}}}$$



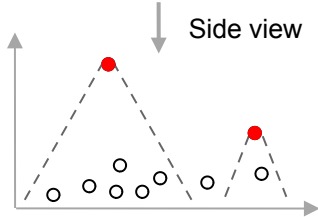
Calculating centrality index



$$\text{Centrality}_i = \sqrt[3]{\text{places} \times \text{people} \times \sqrt[2]{\frac{\text{money} \times \text{transaction}}{s}}}$$



The more is index the larger radius

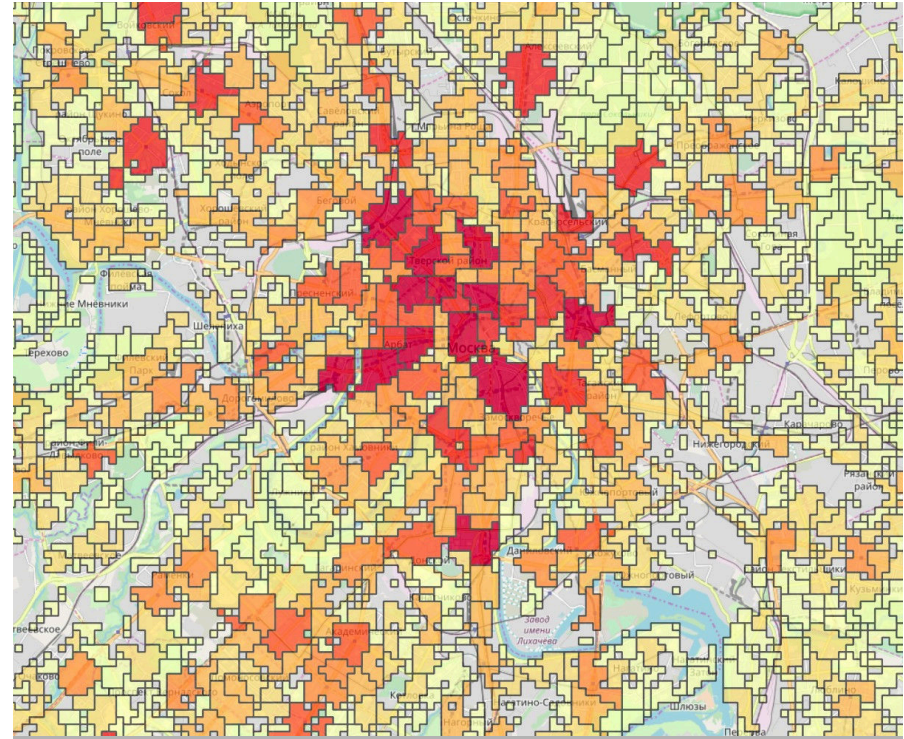


Urban centers hierarchy analysis

Various centrality levels influence their vicinities in various spatial scale — local, borough or city-wide.

Centrality level of the particular center is calculated based on the analysis of:

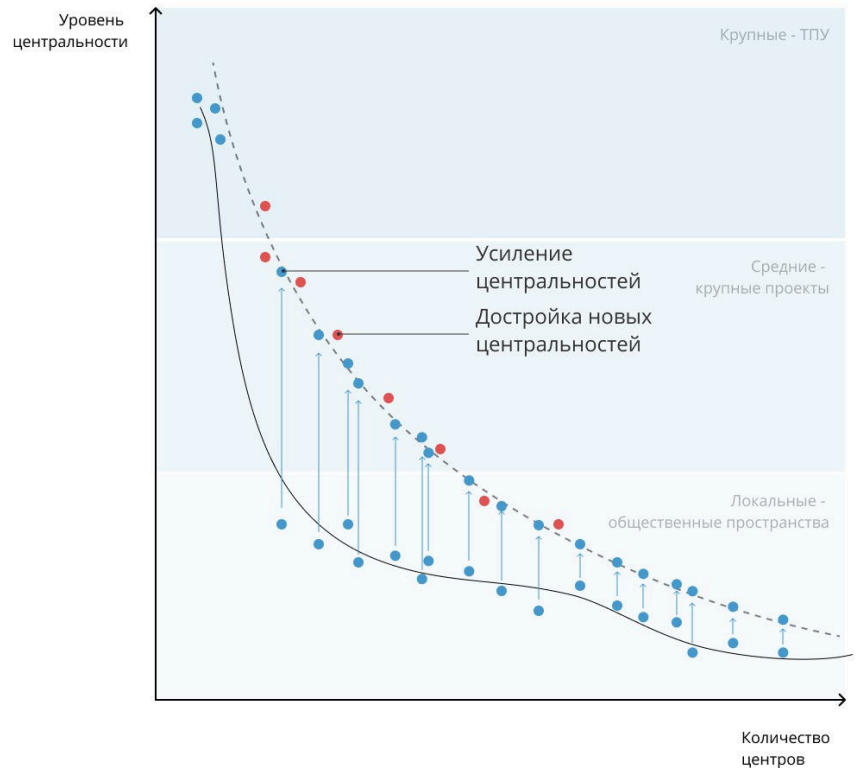
- People's density (cell-phone operator's data);
- Transactions count and spend dynamics (fiscal data);
- Functions diversity (open data).



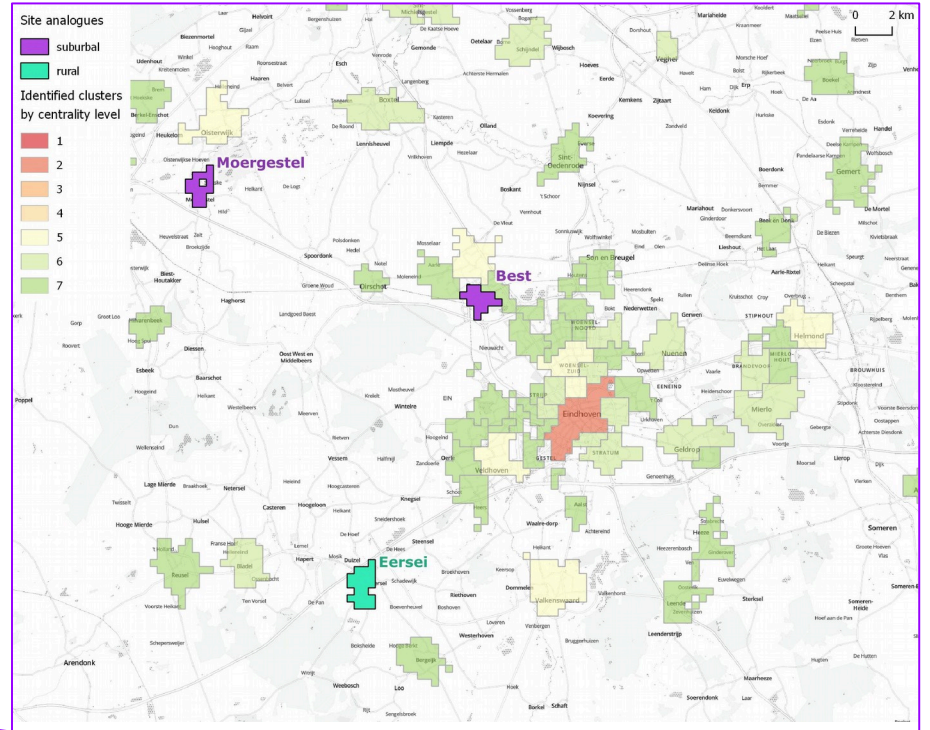
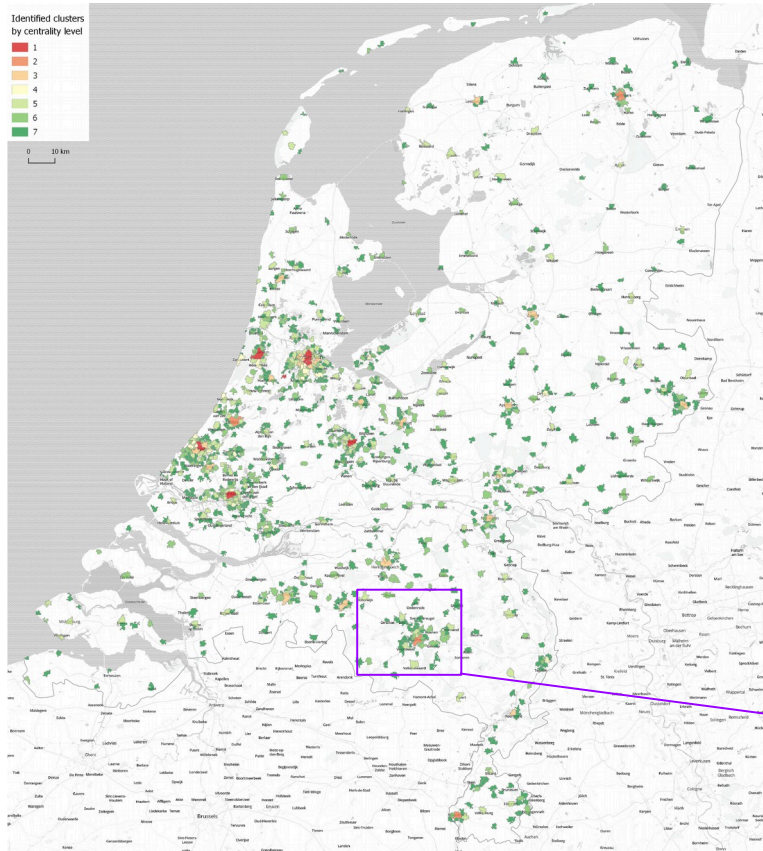
Analysis of the hierarchy of centers: development conceptions

The distribution of centrality clusters in the hierarchy curve allows to understand the lack of centers of particular levels to evolve the whole urban structure in a quasi-natural way in the context of the existing urban development programs.

- Detect the exiting centers and the ones that can be produced by the ongoing programs;
- Localization of the areas of the highest centrality deficit or imbalance;
- Development of a scheme of the centers to densify the urban environment for urban economy, produce spaces for different urban lifestyles.



A system of central places in a country-wide scale



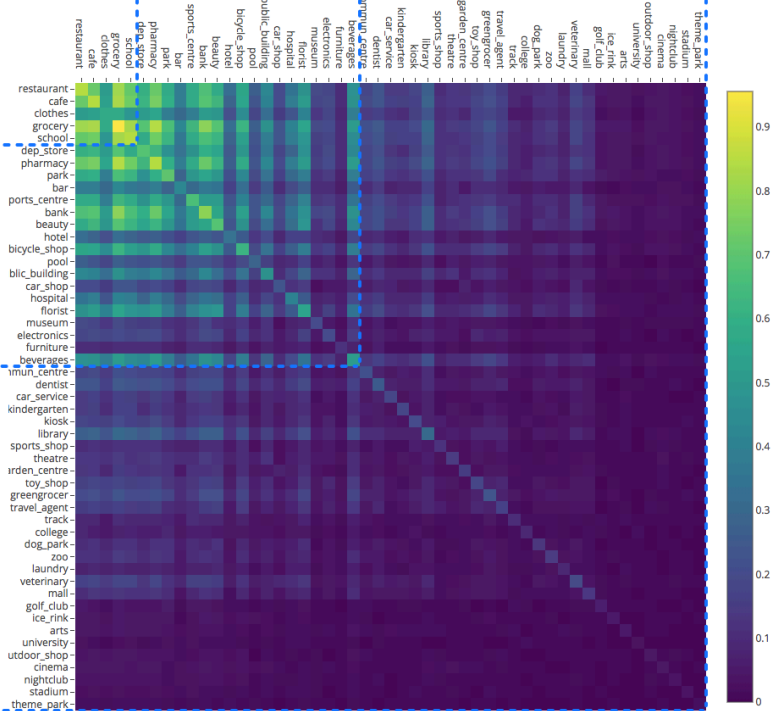
Colocations matrix and the centrality structure

Functional groups by its main location factor

Functional mix related
location is determined by functional mix in the area

Density related
location is defined by the optimal/normative service area

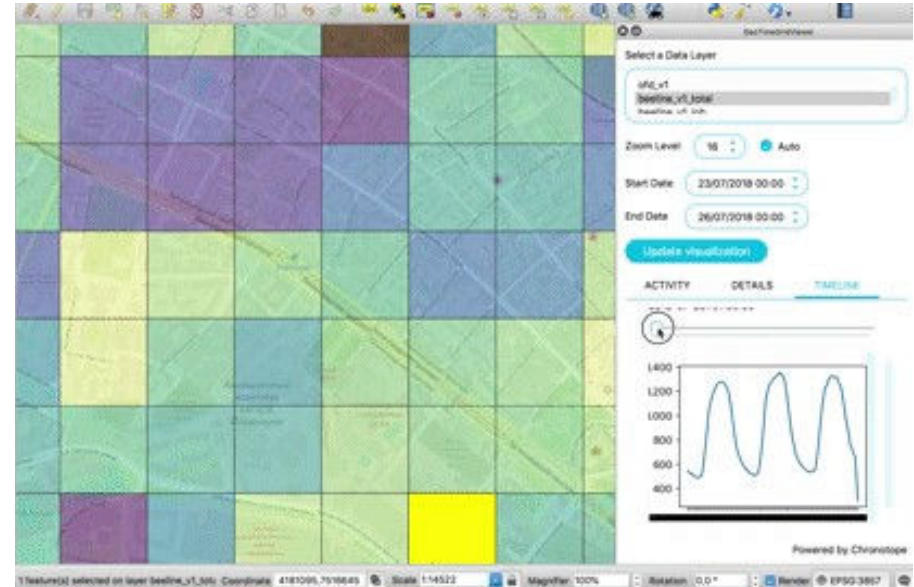
Footloose
can locate pretty much everywhere within city scale



ML-analogues of a place search in Chronotope QGIS

Chronotope QGIS-plugin allows to study the area in traditional GIS visualization tools but with time dynamics to select various places and compare the activity patterns throughout the day.

On the basis of some characteristics of the area and of the area's position in the hierarchy some analogues can be found.



Cities for analogues search



Tsukuba
(Japan)



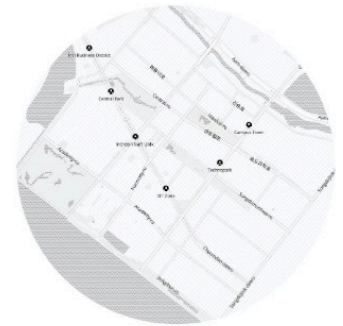
Binhai New City
(Tianjin, China)



Zhangjiang New City
(Shanghai, China)



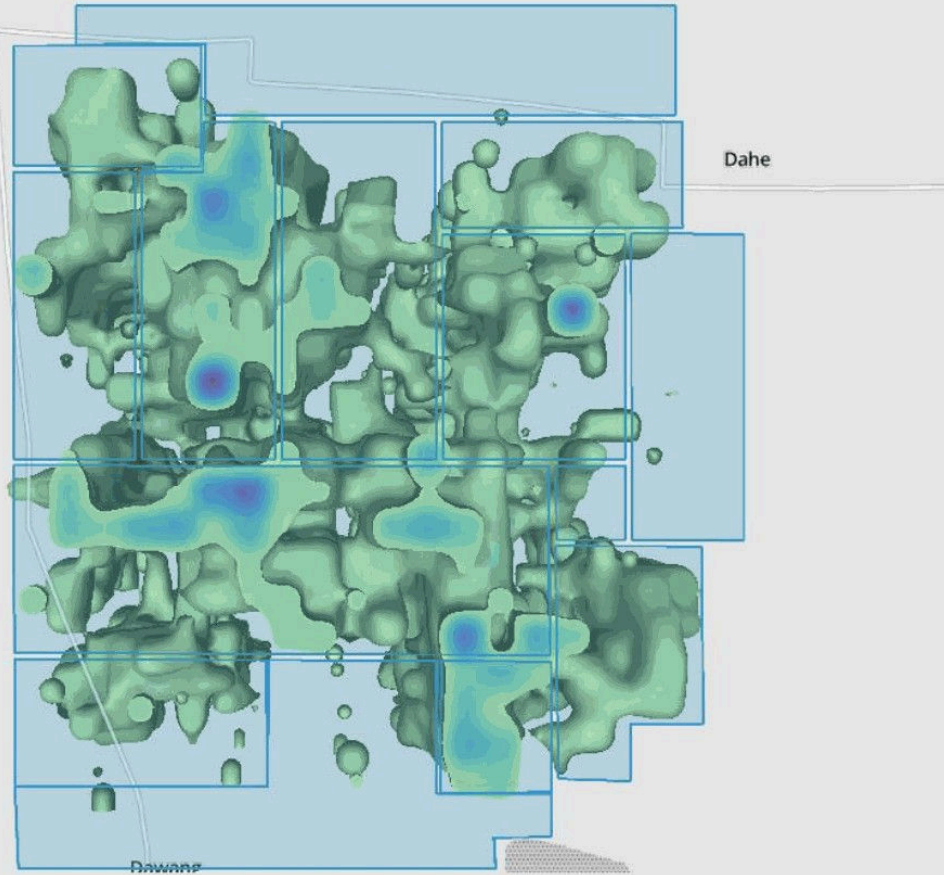
Seattle
(USA)



Songdo
(Seoul, South Korea)

Xiongan lifestyle

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TALLER DE ARQUITECTURA

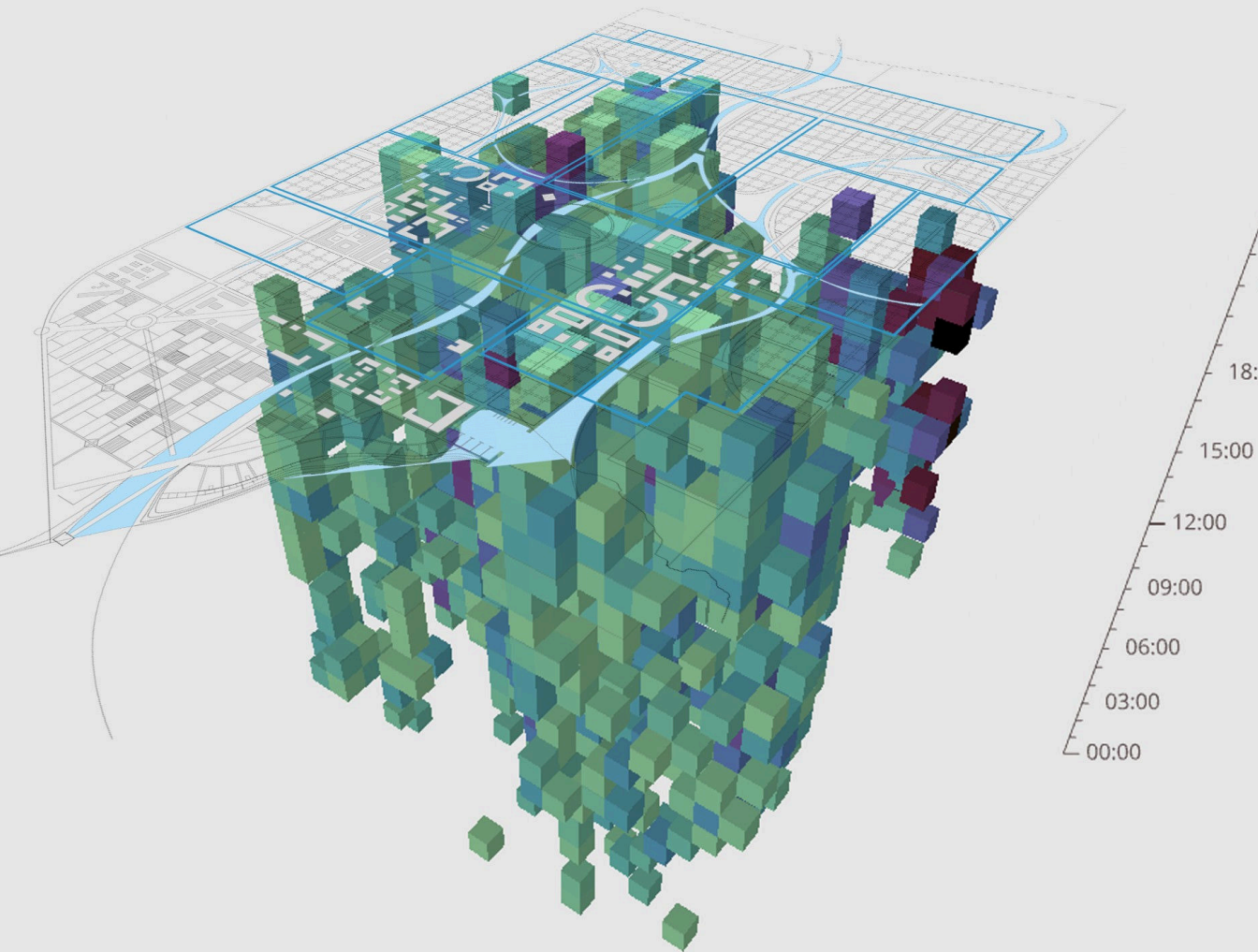


00:00

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Xiongan lifestyle

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ruslan.dokhov@habidatum.com

20:00

16:00

12:00

8:00