



SMART CITIES ANALYSIS

City interaction lab, Paris

<https://github.com/Liyubov>

<https://github.com/cityinteractionlab>

January 2021



Program:

10 min - intro and presentation of speakers & mentors/ high school students

30 min - intro into city topics

5 min - break city music

20 min - hacking city with computer (how to use github, how to use API, openstreetmaps)

20 min - challenges discussions and Q&A

Introduction

Which city are you from?



Introduction

Which city are you from?



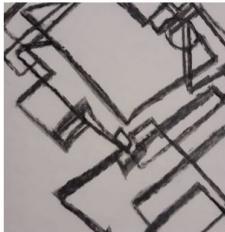


City Interaction lab

<https://sites.google.com/view/liubovkmatematike/city-interaction-lab?authuser=0>



City Interaction lab projects



Project 1

We are currently working together with our partners on analysis of citizen science data from around the globe. If you are happy, join us, fork repository

[https://github.com
/cityinteractionlab/](https://github.com/cityinteractionlab/)

And explore the open data from iNaturalist and citizen science platforms like SciStarter Project is organised thanks to CorrelAid Germany and is lead by CorrelAid France (L.Bauer) together with UCL



Project 2

Project on Researchers mobility with Openhumans and CRI:

Have a look at related publications

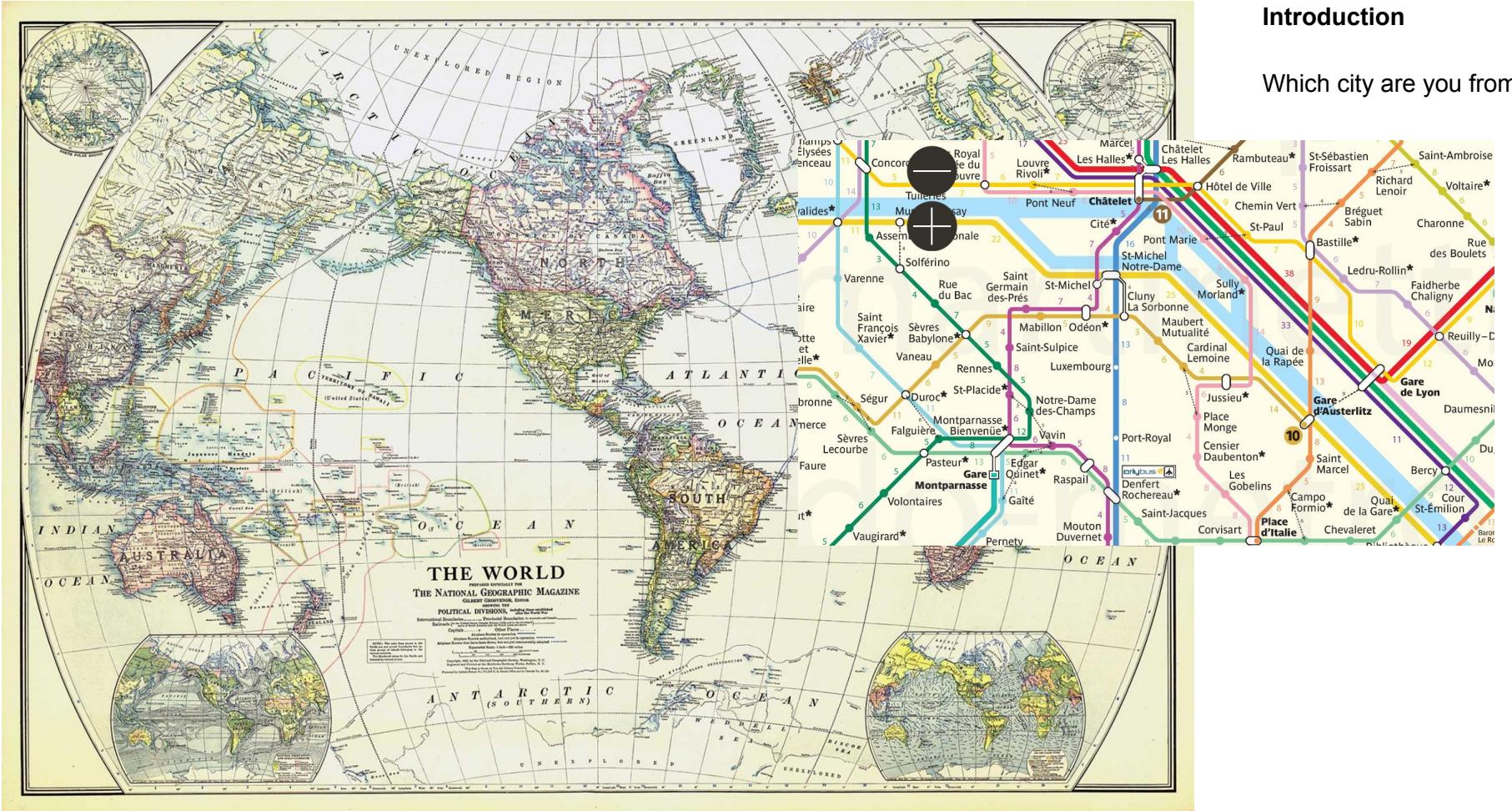
[https://euraxess.ec.europa.eu
/worldwide/australia-nz/survey-covid-19-will-have-huge-impact-researcher-mobility-and](https://euraxess.ec.europa.eu/worldwide/australia-nz/survey-covid-19-will-have-huge-impact-researcher-mobility-and)

The webpage of participative project

[https://www.openhumans.org
/activity/mobility-data-of-researchers/](https://www.openhumans.org/activity/mobility-data-of-researchers/)

Introduction

Which city are you from?





Introduction

Which city are you from?

(insert data from Cluj and other cities in Romania here from www.openstreetmap.org)

Cities in Romania:

Buharest

Cluj-Napoca

How to find data from your cities?

<http://ro-city.census.okfn.org/place/cluj-napoca>

<https://datasetsearch.research.google.com/>

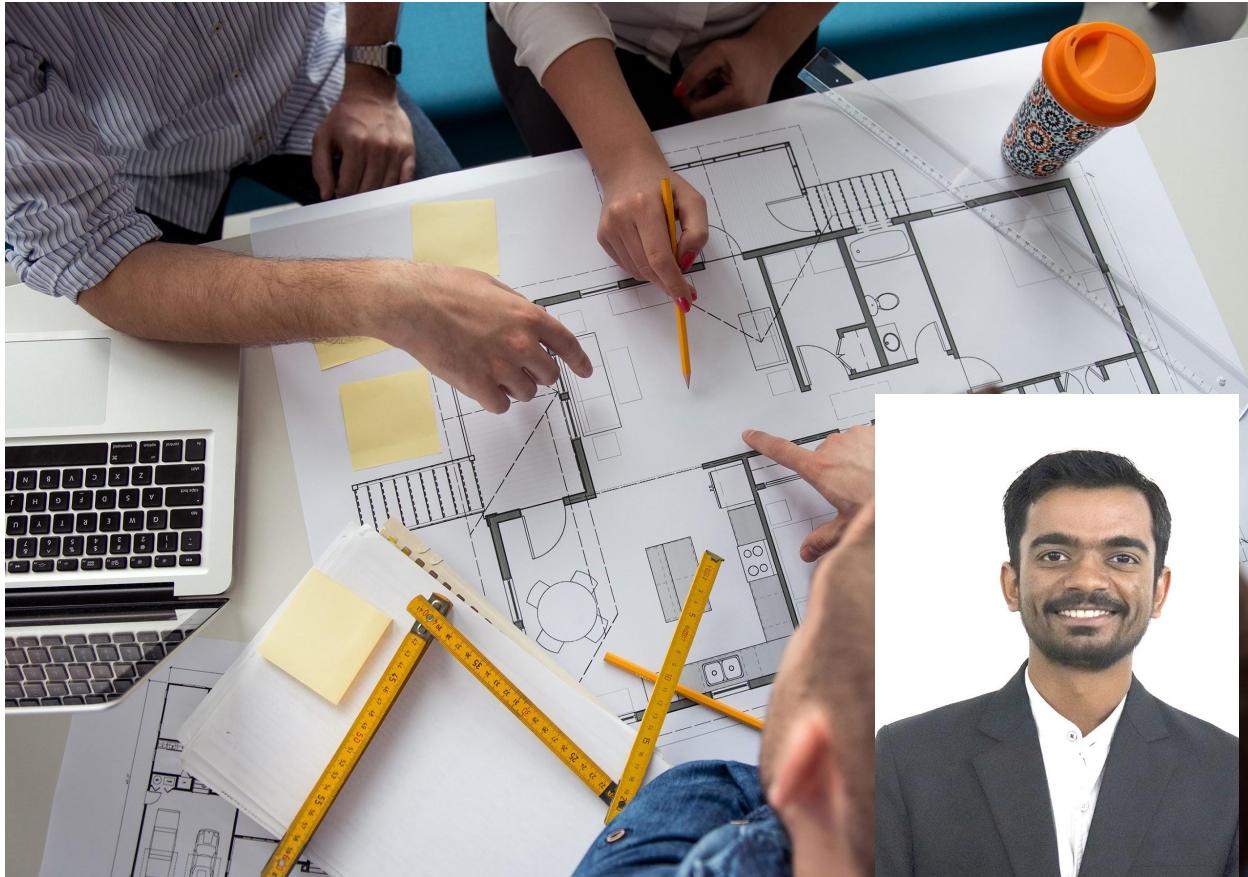
Air pollution in Romania

<https://www.statista.com/statistics/1101663/romania-pollution-index-of-largest-cities/>

Who are **architects**?
What is the profession of
urban designer?



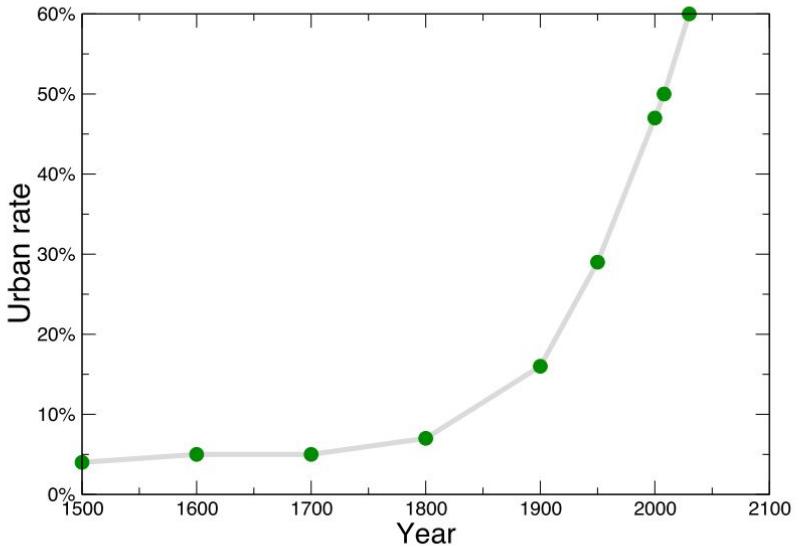
Who are architects?
What is the profession of
urban designer?



Meet Gaurav Thapak
MCP, B.Arch., Research
AssociateNational Institute
of Urban AffairsIndia
Habitat CentreLodhi Road,
New Delhi

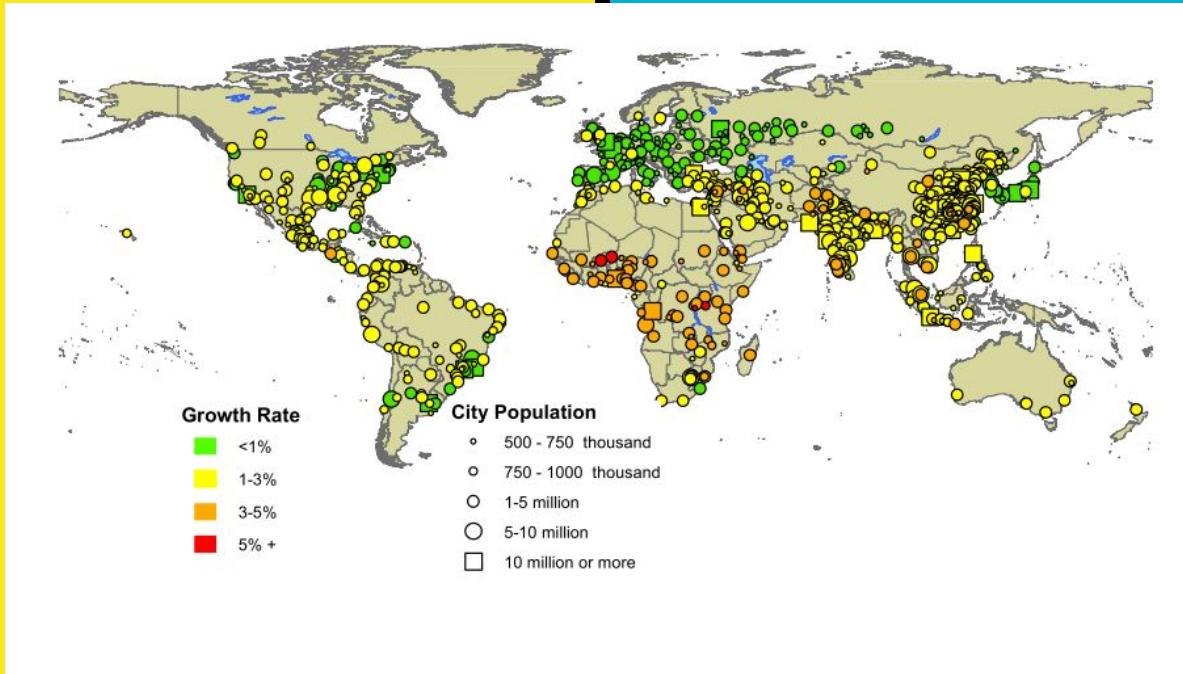
Why cities?

Importance of cities: urbanization rate



Projection: in 2050: 70% of the world population lives in cities

Why city science?

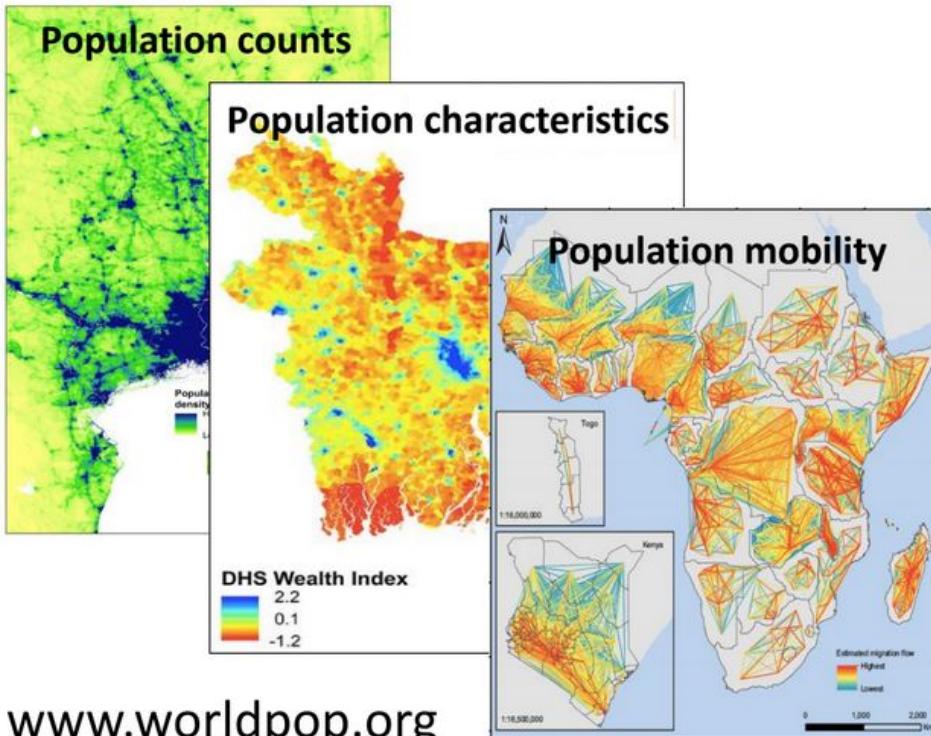


Why spatial analysis?

world
pop



UNIVERSITY OF
Southampton



Applied research and implementation group

Mapping small area population distributions, demographics and dynamics

Open data, open peer-reviewed statistical methods, user engagement

Application in epidemiology, maternal/newborn health, childhood vaccination

Human mobility

Human mobility

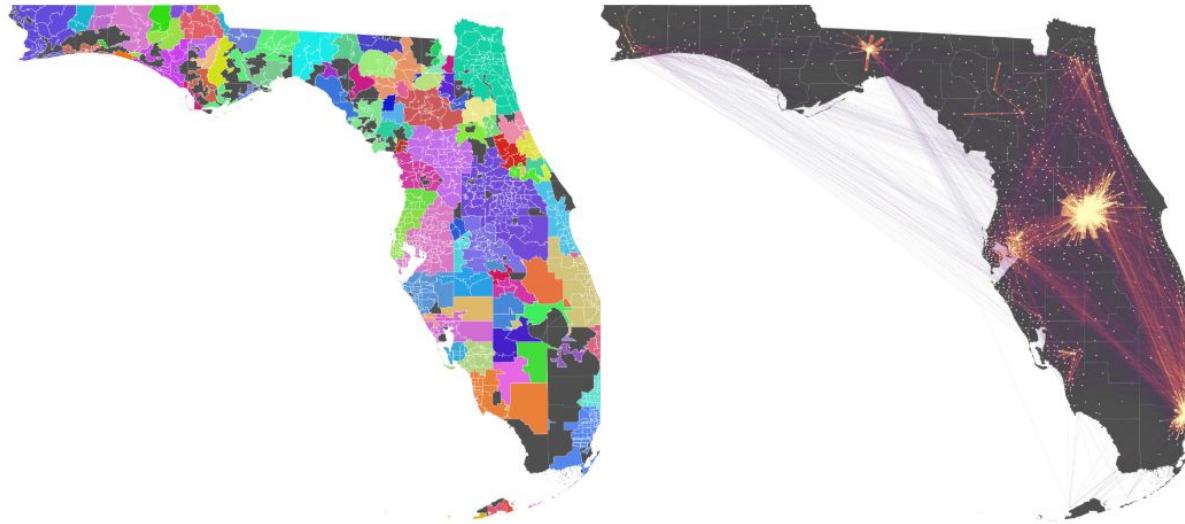


Fig. 3: Commuting flows compiled from census data. Left panel: The state of Florida partitioned according to its counties. Right panel: Commuting flows between counties, where thickness of lines correspond to volume of flow. Data compiled from the United States Census Bureau.

How do people move in real life? Human Mobility: Models and Applications - Hugo Barbosa-Filho et al.



What are smart cities?





What is smart cities?

Smart cities are those that integrate information communications technology across three or more functional areas.

(...)

Smart city combines traditional infrastructure (roads, buildings, and so on) with technology to enrich the lives of its citizens.

“The future of cities “, J.Chambers, (2014)

Smart cities benefits and drawbacks:

+

+

-



Pictures:

Places journal and L.Tupikina Bauer

Smart cities benefits and drawbacks:

- + we know all the information about traffic around us
- + we are aware of what happen anywhere in the city
- data protection problem

Picture places journal and L.Tupikina Bauer





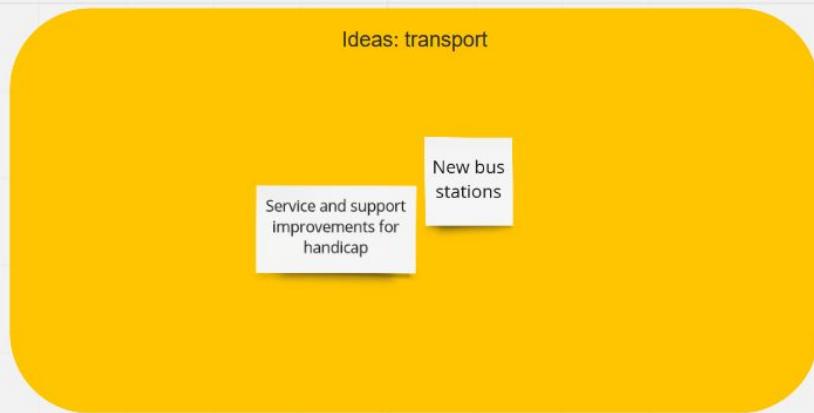
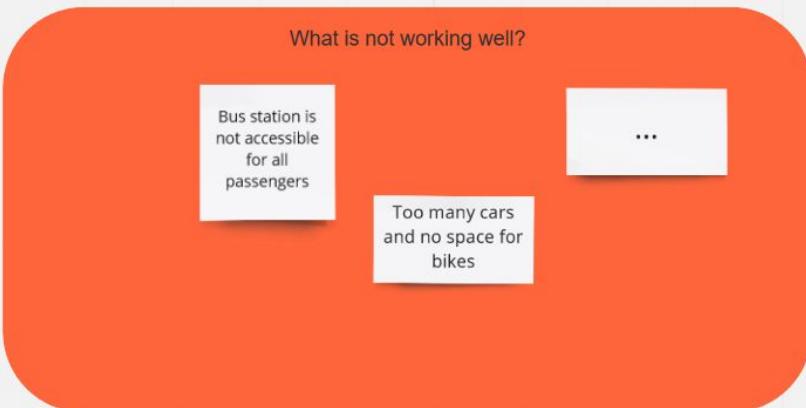
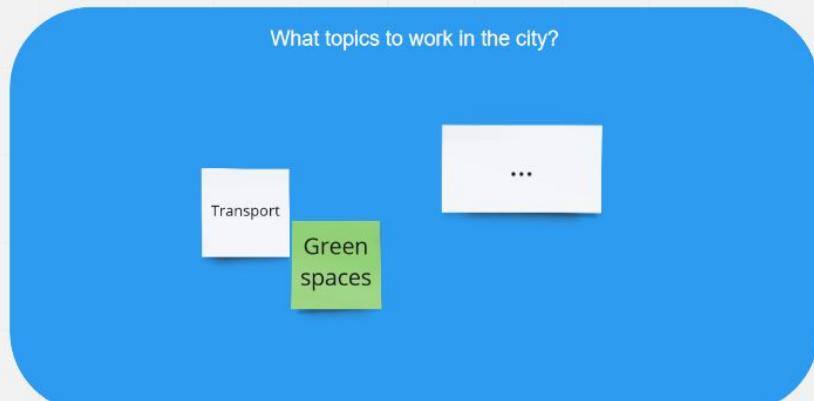
Nowadays, the vast amount of data available through social media, such as those from Facebook and Twitter can support the development of a genuinely smarter city, complementary to geospatial data provided by other platforms, such as Google and Open Street Maps and movement data provided by cell phone operators and application developers. These data provide insight to how people access amenities, move around cities and access information about resources through their social networks. In turn, city planners can use those insights to better evaluate where to place the next school, park or grocery store in a city or where to build smarter transportation systems in order to create better urban environments for all urban communities.

Talia Kauffmann course

Problems? Solutions!



https://miro.com/app/board/o9J_IX2dWxc=/



Smart city parts:

Infrastructure
Services
Functions

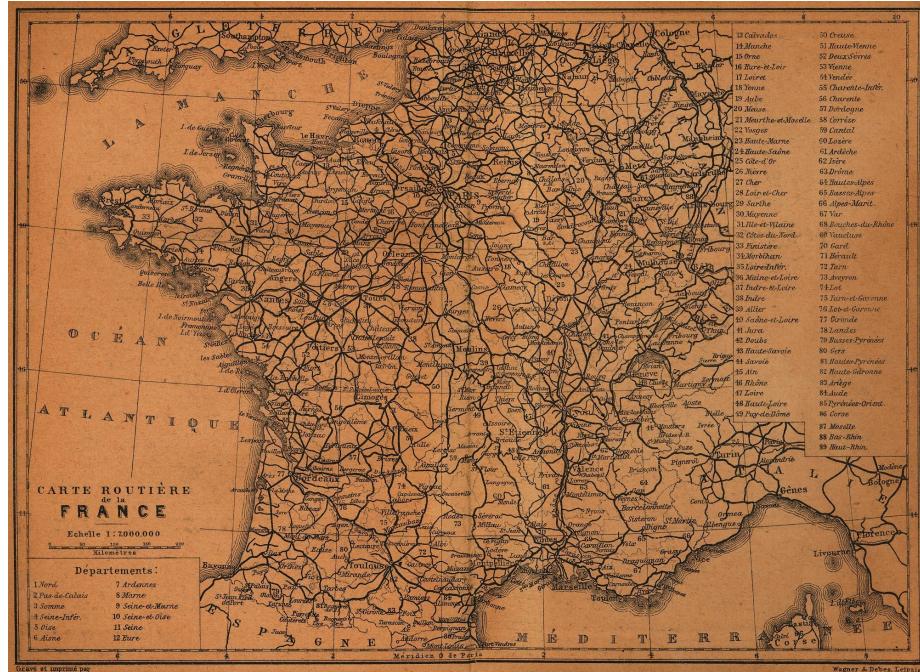


Smart city parts:

Infrastructure
Services
Functions



Can we construct modern more adapted maps of cities?



"The growth equation of cities" Vincent Verbavatz, Marc Barthélémy
<https://arxiv.org/pdf/2011.09403>

How cities change in time?



What can change when city evolves in time?

- +
- +
- +

Approaches to help cities to transition to smart cities:

1. General Data collection by companies *
2. Citizen science approach

*GDPR law compliance

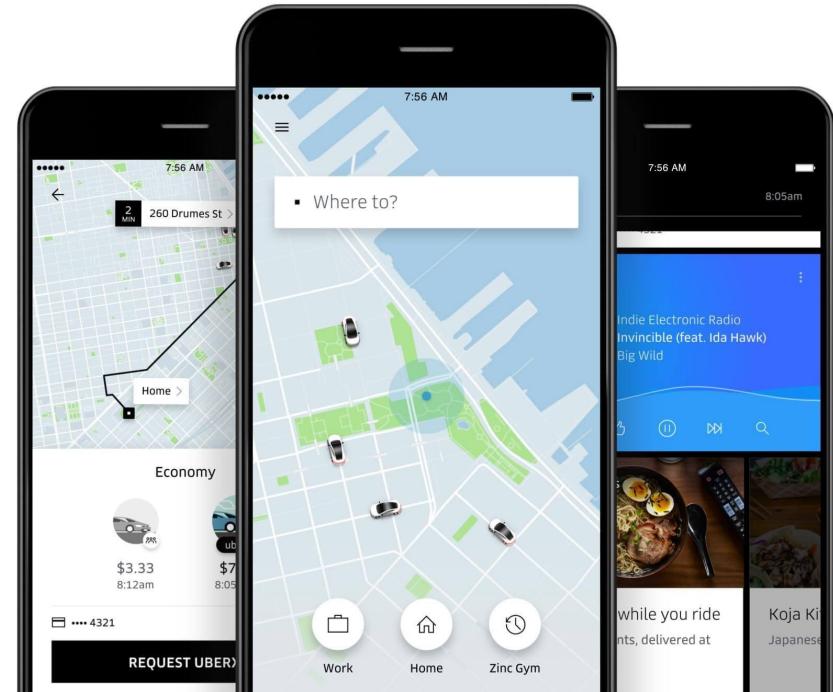
Smart city parts:

Infrastructure
Services
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Smart mobility

What is smart mobility?

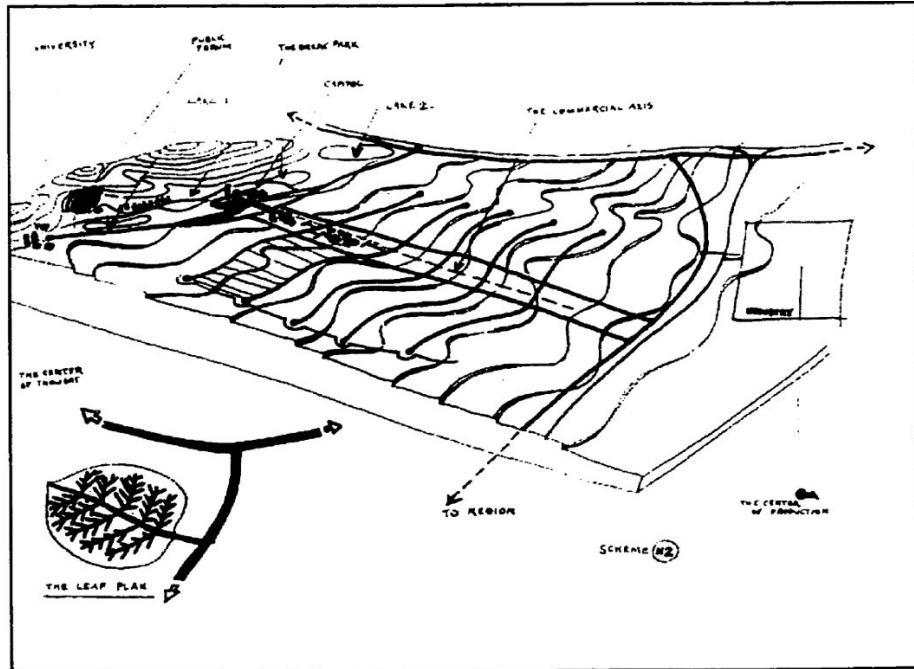
- when you can use the smart program in your phone to order a taxi?
- when you can see how many buses are around you at the moment?



City planning models

What can architects use to design more sustainable cities?

Resource: Le Corbusier sketches of Chandigarh city



Resources page

www.worldpop.org spatial population analysis
hdx platform

www.kepler.gl for mobility data visualisation (browser)
Mapbox python integration

Packages:

Matplotlib, cartopy - simple plotting, **Folium** - online plotting, **geopandas**, **libpysal** -
spatial distribution,
Osmnx - analysis of openstreetmaps

Openstreetmaps analysis

Links to github

https://github.com/cityinteractionlab/openstreetmaps_osmnx_workshop

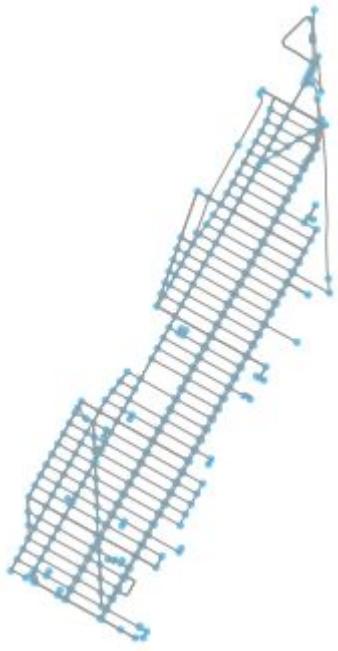
<https://github.com/gboeing/osmnx-examples>

https://github.com/cityinteractionlab/openstreetmaps_osmnx_workshop

Google colab

(careful, many packages required)

https://colab.research.google.com/drive/18aLg-YgrxMPUpR4iagZ5YnUnryi0_b30#scrollTo=KwoM_vordZ



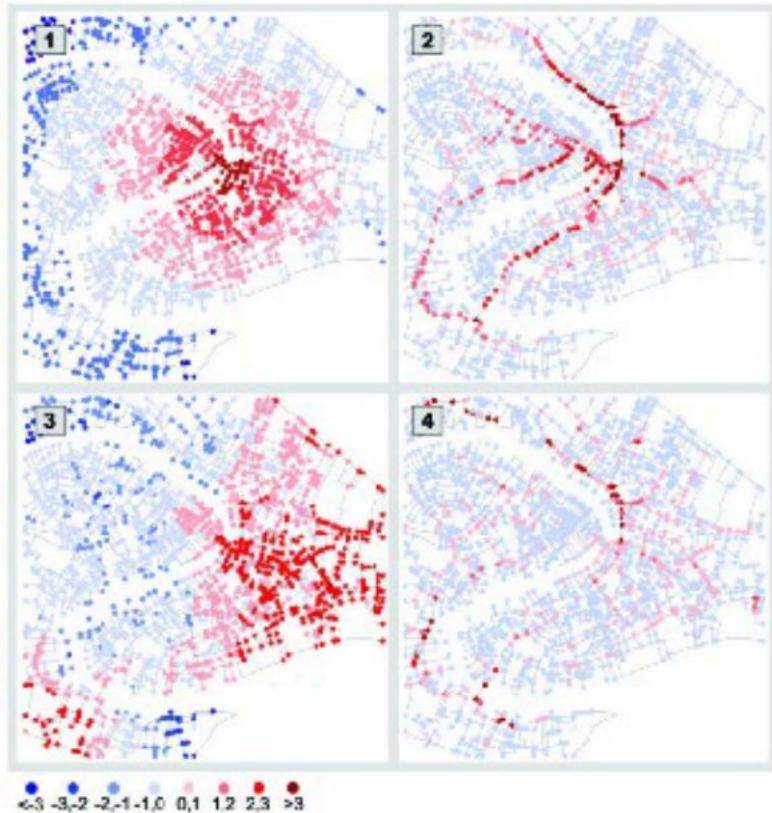
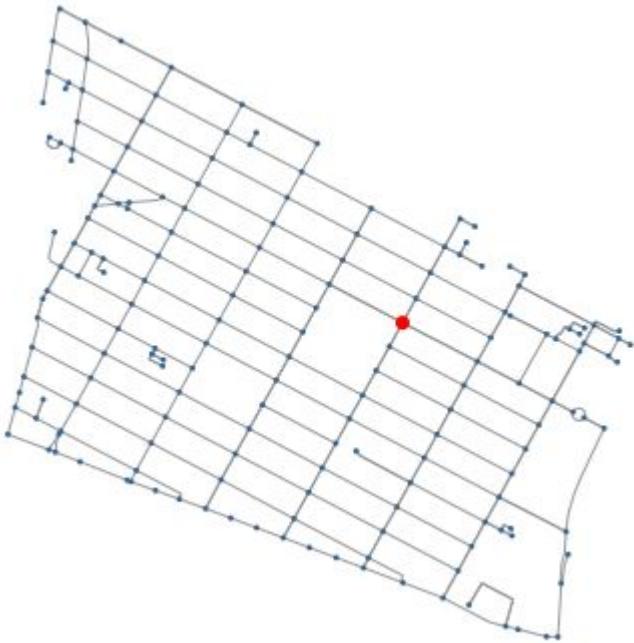


FIG. 24 Colour-coded maps for different centralities in Venice, Italy (see [102]). (1) Closeness, (2) Betweenness centrality, (3) Straightness, (4) Information (from blue to red the centrality increases). From [102].





Project example: air pollution

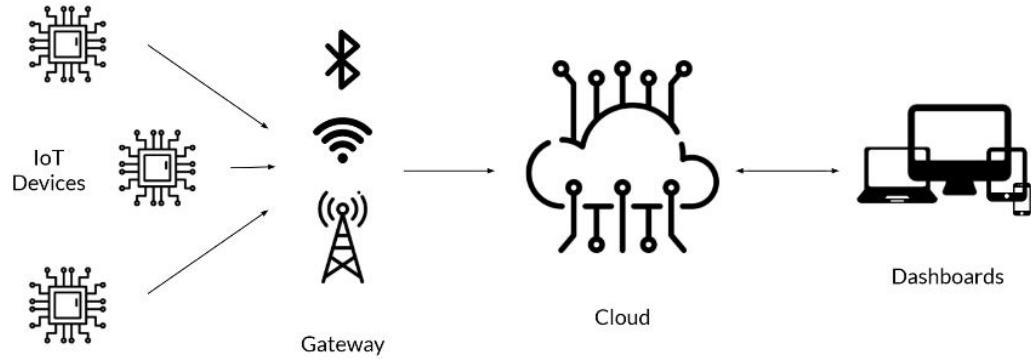


© Shutterstock / 24November / WWF

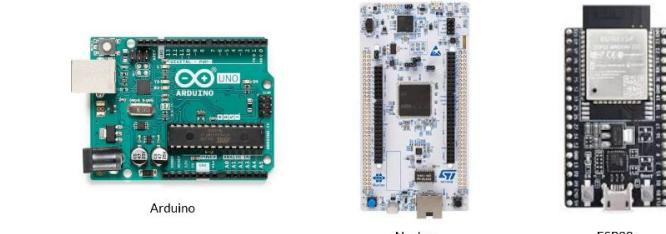
City sensors are important for many cities around the globe. (Picture: medium.com)

https://github.com/cityinteractionlab/presentations/blob/main/presentations_2020/Air%20Pollution%20Monitoring%20Sensor%20Networks.pdf

Sensor Networks



Processing

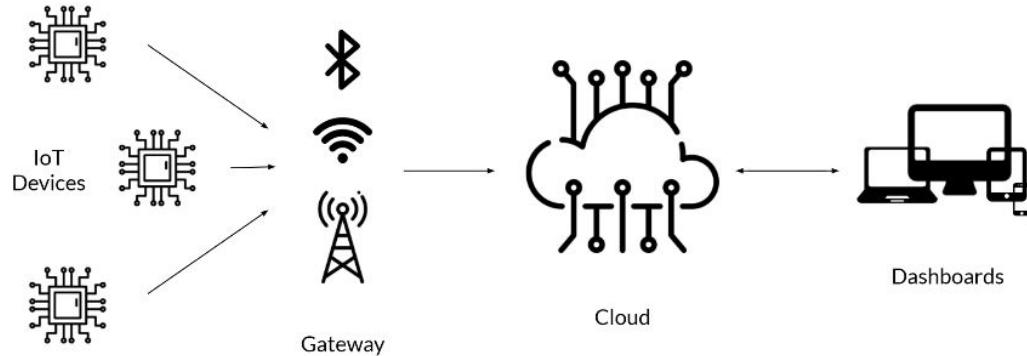


City sensors are important for many cities around the globe. Chetan presented his project on city sensors in India

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Air pollution sensors

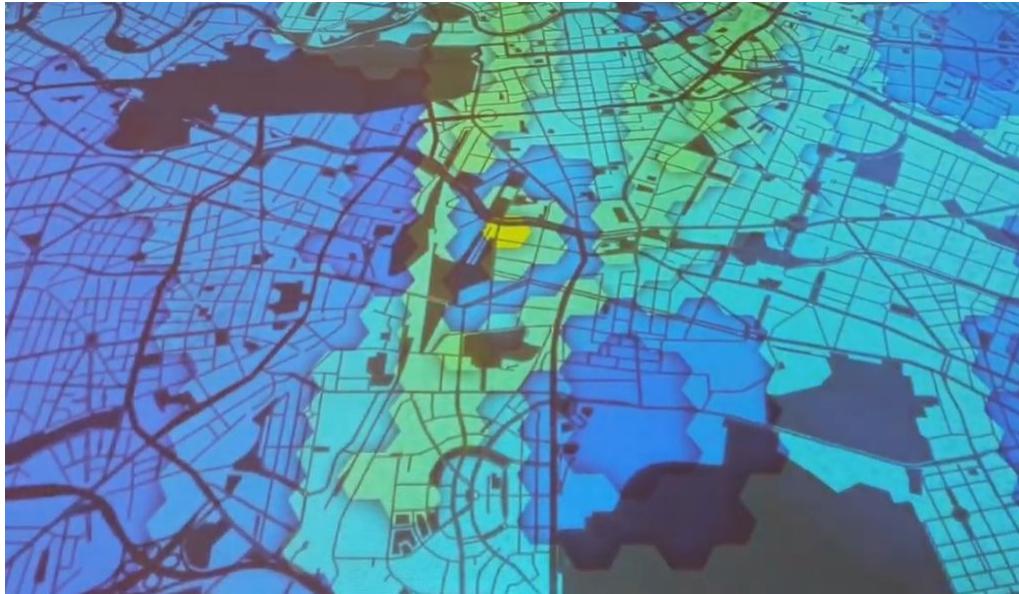
Sensor Networks



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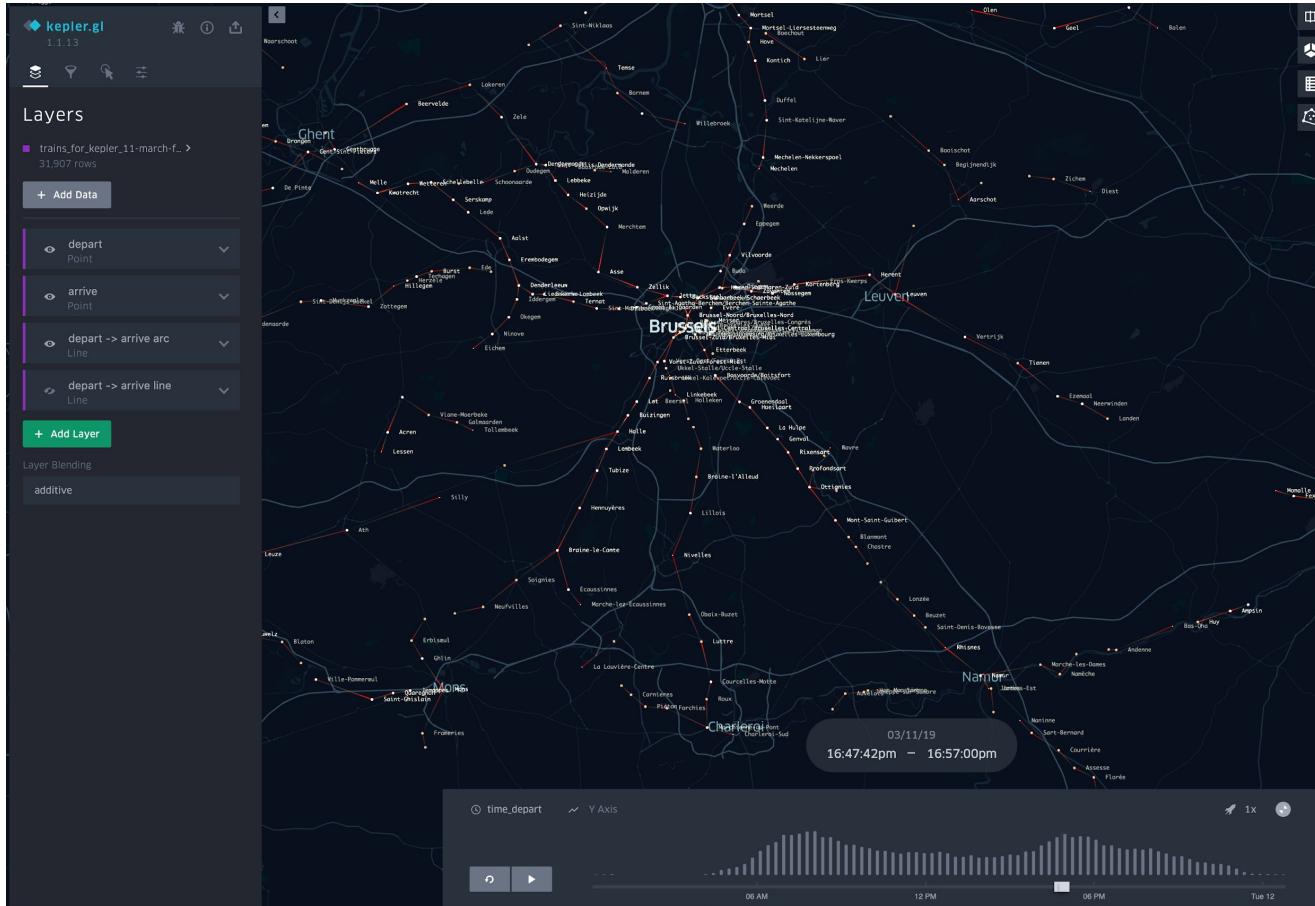
City labs projects



Some information for city volunteers

For Berlin <https://www.citylab-berlin.org/> and Paris

Kepler.gl - geodata visualisation

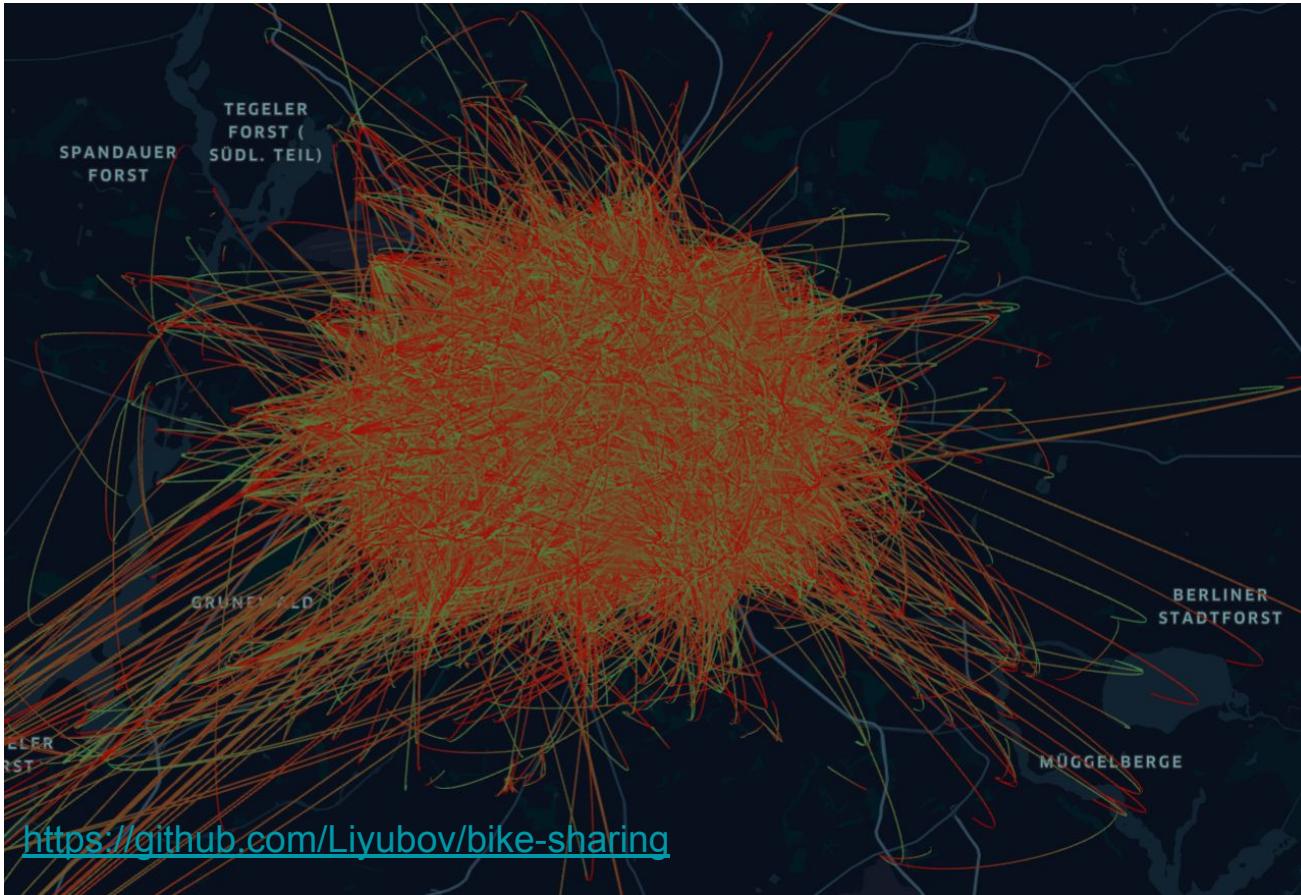


Kepler.gl - geodata visualisation



Open taxi data <https://github.com/uber-web/kepler.gl-data/blob/master/nyctrips/data.csv>

Kepler.gl - example visualisation



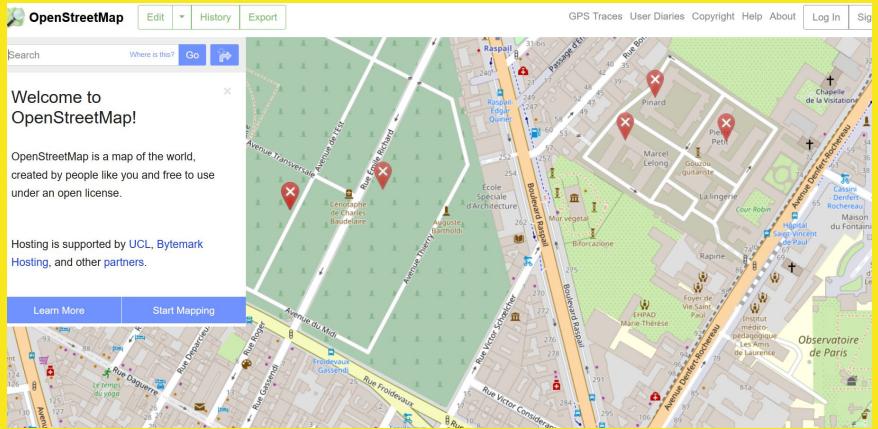
<https://github.com/Liyubov/bike-sharing>

How can I participate?

Infrastructure: 1. participate in openstreetmaps

www.openstreetmap.org/

2. Collect and distribute open data on the city
3. Connect to city halls and city labs

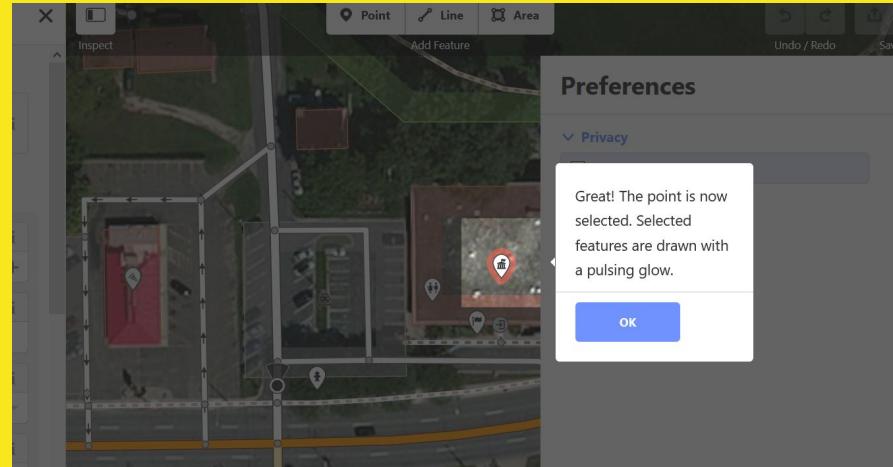
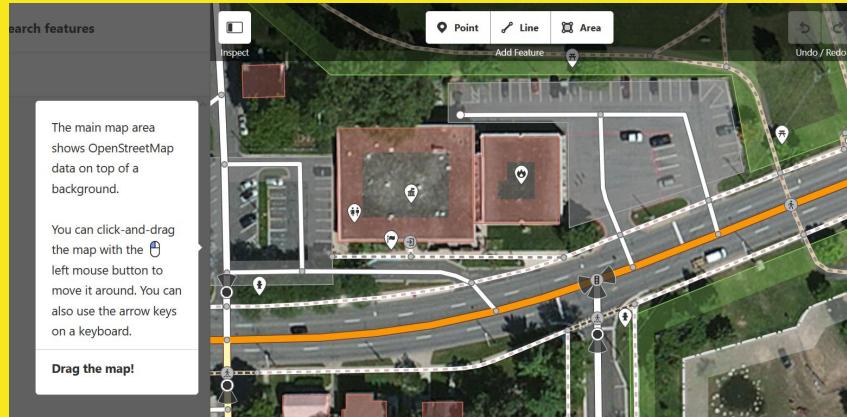


How can I participate?

Infrastructure: 1. participate in openstreetmaps

<https://www.openstreetmap.org/edit#map=17/48.83685/2.33008>

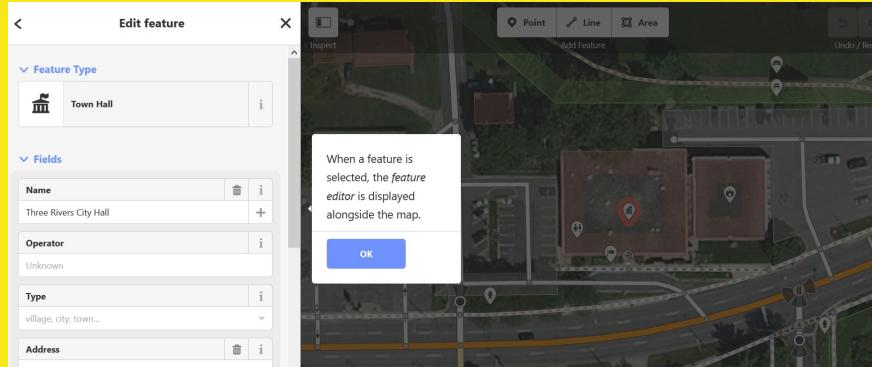
See what is NOT mapped in your city in Romania



How can I participate?

City mapping games
<https://covadeo.univ-fcomte.fr/>

Citizen science approaches -
What is it?



Some books:

1. “Happy City” C.Montgomery
2. “Soft City” D.Sim, (J.Gehl)
3. “The smart enough city” B.Green
4. Urban designer books

<https://strelkamag.com>



Carpenter Center for the Visual Arts

Some city architecture resources
Resource: strelka videos

Open Challenges



Green city



Data visualisation from city



City under crisis

Open Challenges



Green city

1. Robots in the city - how they could help for cities?

Automotised transport and robots in the city: Where could we add them and in which places we would better avoid them?
Describe solutions for cities with low and middle income.

2. What is the way for a small city to become greener?

Luis Bettencourt mentions in his article: <https://www.nature.com/articles/467912a>

The problems of non-sustainable small (!!) cities also are rising. The bigger the city, the easier it is (per capita) to make it sustainable (with less resources)

3. City maps mapping challenge:

How to define new maps and how to make old maps to be more useful?

Inspiration from temporal maps (O.Kisseleva project)



Data visualisation from city



City under crisis:



Challenges on the board
<https://miro.com/signup/>

Listen more about
architecture and urbanism
https://www.youtube.com/channel/UCIPrlqDFvM_o6kcyRkhIbdO

Contact me

liubov.tupikina@cri-paris.org

What take home messages do you have?