Urban Mobility Observatories

Session 2: Demystifying technical aspects of urban mobility observatories

15th of June 2023

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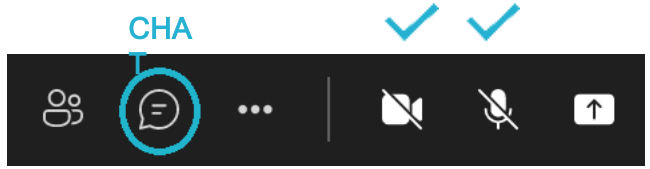
Some general notes on this session

Make sure you are muted and your camera is turned off



This session will be recorded. You will not appear in the recording if your camera is kept off

Include your questions in the chat, we will pose them in the Q&A at the end of the session

Don’t hesitate to share your ideas, comments and questions in the chat!

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Mastering Mobility Series

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Learning objectives

- Understand how to use the Urban Mobility Observatory
- Appreciate the replicability of the methodology in another city
- Learn how to access geospatial data

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Contents

1. Welcome, Housekeeping & Reminder of session 1
2. The technical architecture of the platform + Q&A
3. Open-source structure: an opportunity to implement the tool for another city
4. Geospetial data

   Q&A
5. Feedback & Farewell

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Speakers

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Oslandia

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Transitec

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Sustainable Mobility Expert

MobiliseYourCity Secretariat

Mobilise Your City

Oslandia is an innovative company specialized in GIS architecture.
We provide services on Open Source software for which we are editors or experts.

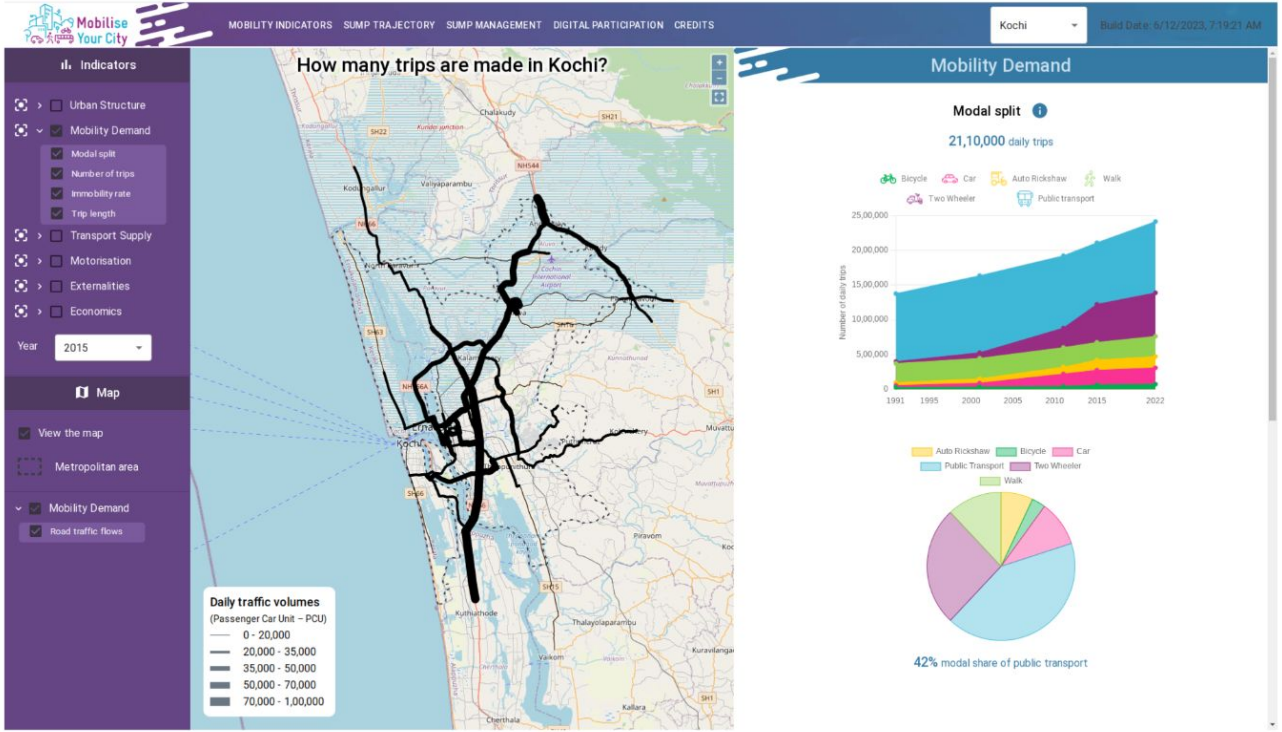
Vincent & Sylvain have been the lead devs on the observatories.

Summary

This webinar will be split in 3 parts :

1. The Mobility Observatory architecture
2. How can I deploy a new instance ?
3. OpenSource, OpenData, OpenStreetMap

The observatory looks like the following …


Mobilise Your City
MOBILITY INDICATORS
SUMP TRAJECTORY
SUMP MANAGEMENT
DIGITAL PARTICIPATION
CREDITS
Kochi
Build Date: 6/12/2023, 7:19:21 AM
Indicators
Urban Structure
Mobility Demand
Modal split
Number of trips
Immobility rate
Trip length
Transport Supply
Motorisation
Externalities
Economics
Year
2015
Map
View the map
Metropolitan area
Mobility Demand
Road traffic flows
How many trips are made in Kochi?
Daily traffic volumes
(Passenger Car Unit – PCU)
0 - 20,000
20,000 - 35,000
35,000 - 50,000
50,000 - 70,000
70,000 - 1,00,000
Mobility Demand
Modal split
21,10,000 daily trips
Bicycle
Car
Auto Rickshaw
Walk
Two Wheeler
Public transport
Number of daily trips
25,00,000
20,00,000
15,00,000
10,00,000
5,00,000
0
1991
1995
2000
2005
2010
2015
2022
Auto Rickshaw
Bicycle
Car
Public Transport
Two Wheeler
Walk
42% modal share of public transport

As a reminder of the first webinar, the observatories :

- Provide a web interface with widgets
  - navigation, maps, charts, surveys…
- Provide an ergonomic and simple way to access the information

But what you see on the web, is just the tip of the iceberg.

- How is it built ?
- What components are used ?
- Let’s talk about the architecture

Part 1

The Mobility Observatory architecture

A classic Open Source GIS stack looks like the following diagram …

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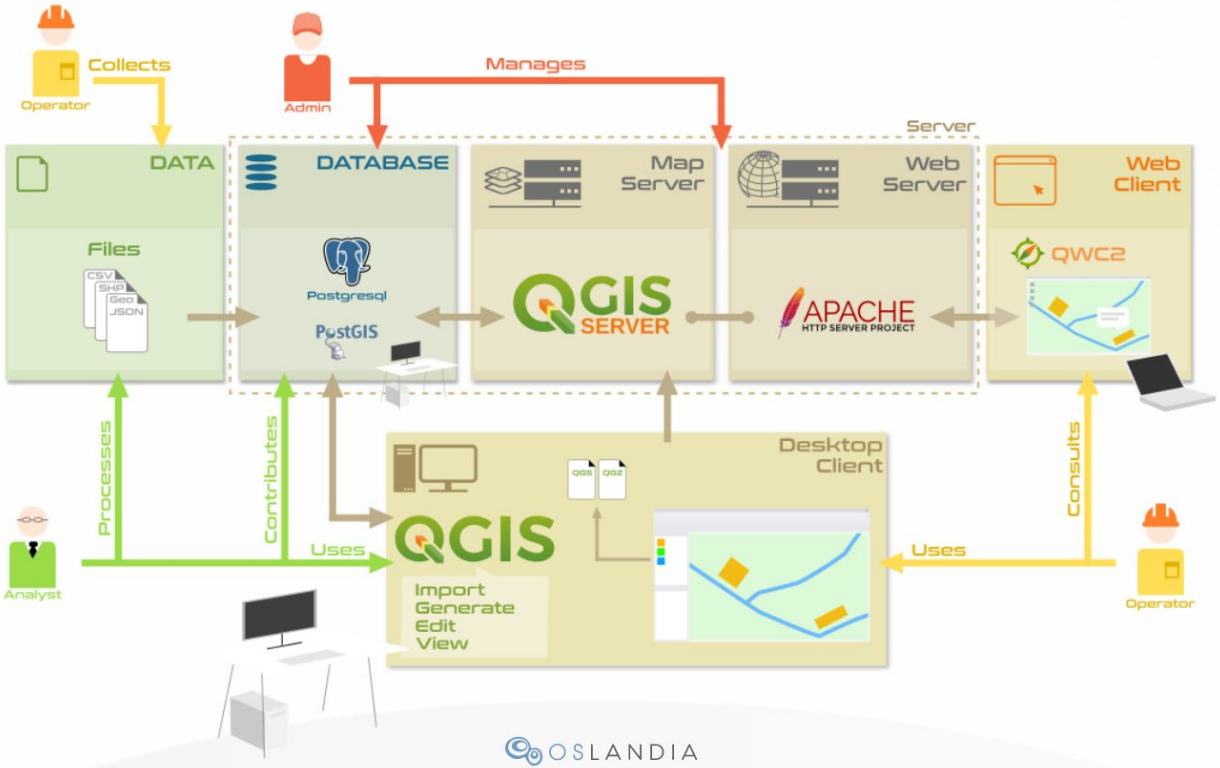
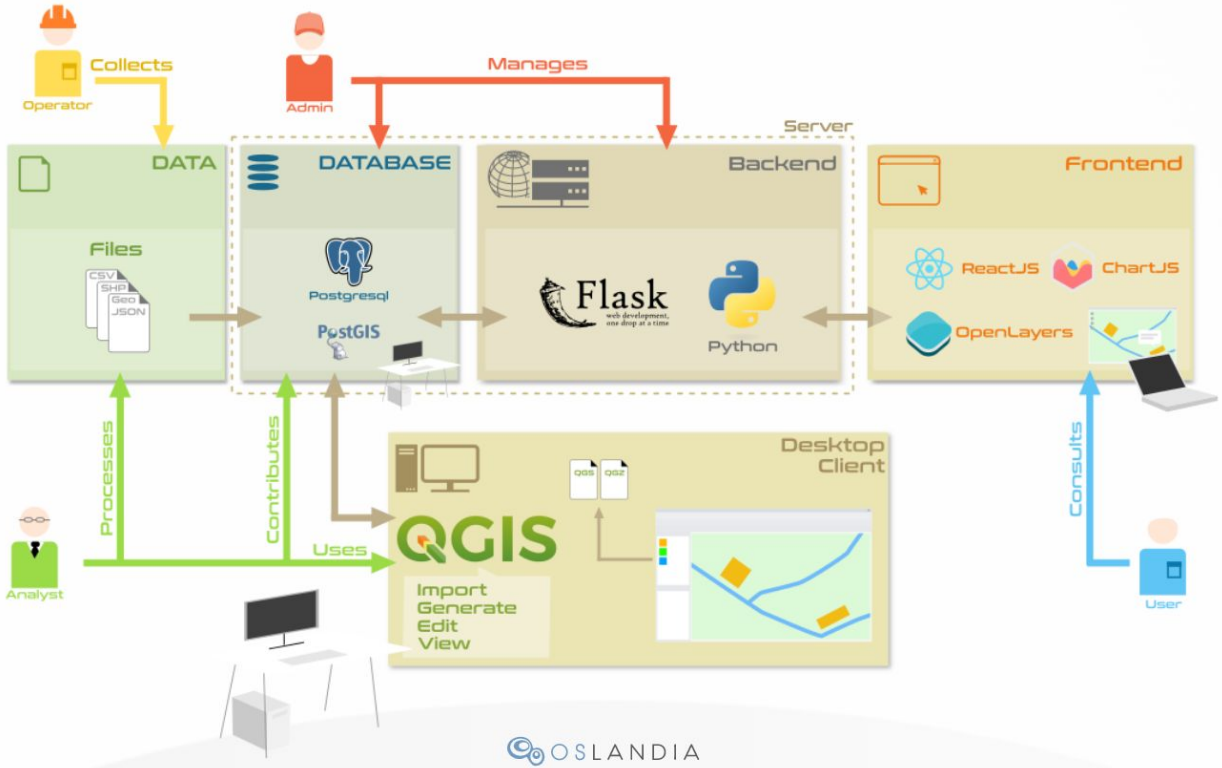
The Open Source GIS Tech Stack



For the observatory, we don’t need the map server nor the webserver, the architecture is more like the following …

Observatory architecture



Focus on data

- Many types of data
  - Text / numbers / dates …
  - Vector / raster (spatial data)
  - 2D / 3D
  - …
- For the observatories :
  - CSV files (Excel)
  - SHP files (geographic layers for maps)

Focus on the database

- PostgreSQL / Postgis (spatial extension)
- Import the data (via scripts)
- Store the data
- Process the data

Focus on the backend

- Python (Framework Flask)
- Custom API for the observatory
- Serve the data
- Process the communication between the front and the data stored in the database
    - via JSON/GeoJSON format mainly

Focus on the frontend

- FrontEnd ? The UI (User Interface) (what the users can see)
- JavaScript / HTML / CSS
  - Framework ReactJS
  - OpenLayers
  - ChartJS
- The client logic
  - Custom JS code to implement the specific mechanics

Gitlab & Continuous Integration

- Code source is store on a GIT repository (Gitlab is used)
  - Code versionning
- CI (continuous integration) has been set up
  - Once a functionnality is developped, it is deployed automatically
  - Tests are run each time to insure stability
- Tickets
  - User stories
  - Bug reporting

Auxiliary tool : QGIS

- Desktop GIS app
  - Designing the maps
  - Explore the data

No use of a map server

What is a map server ?

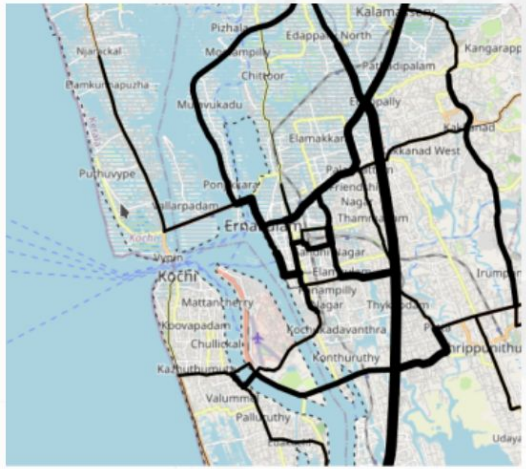
- A map server is an application which can read many sources of geographic data (files, databases, web), compute that data with symbology rules, and build some images to represent a map
- Standard protocols you may have heard of are : WMS, WFS, WMTS …
- We speak also often of raster tiles / vector tiles

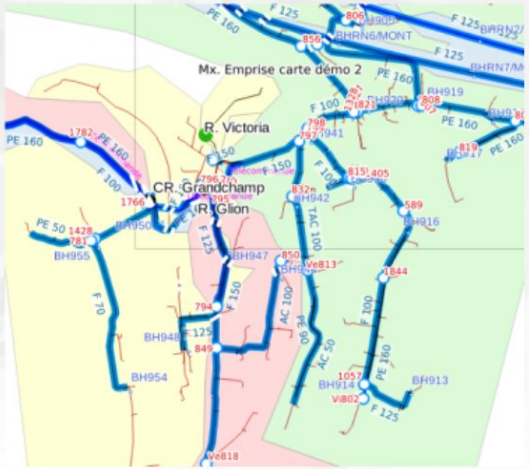
Examples : QGIS Server, MapServer, GeoServer, ArcGIS Server …

Why it is not used for the observatories ?

- Maps on the observatory are simple (circles, colored polygons, lines with colors). We don't have complex symbology to display. And we don't have much data.
- The browser can do the job. So the server just have to send some JSON and GeoJSON data. OpenLayers (the webmapping library) can deal with it.
- Remember that in that case, it is the browser which is working, not the server. That can be a problem is there is too much data to display.
- But tomorrow, if we need one, it would be easy to add it to the architecture

GeoJson vs Map server





Generic code

- It can be reused for a second plateform
- It can be reused for another data visualization project
- It's easier to maintain
- Transition to Open Source model is facilitated
- An admin can do the job, no more dev involved
- Examples :
    - add new indicators
    - add new themes
    - add new maps
    - add new widgets

Now that the platform architecture has no more secret for you,
you want your own web site, with your specific data
...

But before, maybe you have some questions about that first part.

Part 2

How can I deploy a new instance ?

Open Source software and data as a general rule

- Why do we build Open Source apps ?
  - It's a philosophy, softwares are meant to be shared so they will progress and become more efficient
  - Better to pay some people instead of licences
- Who can do that ?
  - Many companies only work with OS components
  - You need skills on technologies involved
- Making a software is not only code
  - Specifications are important
  - Documentation is important
  - Human communication is important

I want my own platform

- Do you have some data ?
  - No data = no website
  - Few data = unattractive website
  - Sufficient data = go to the next step

I’ve got some data, what’s next ?

- You need to acquire the skills
  - it’s not plug’n’play yet
  - not a product, but still a custom plateform
- Or you need to find someone (company) who can support you

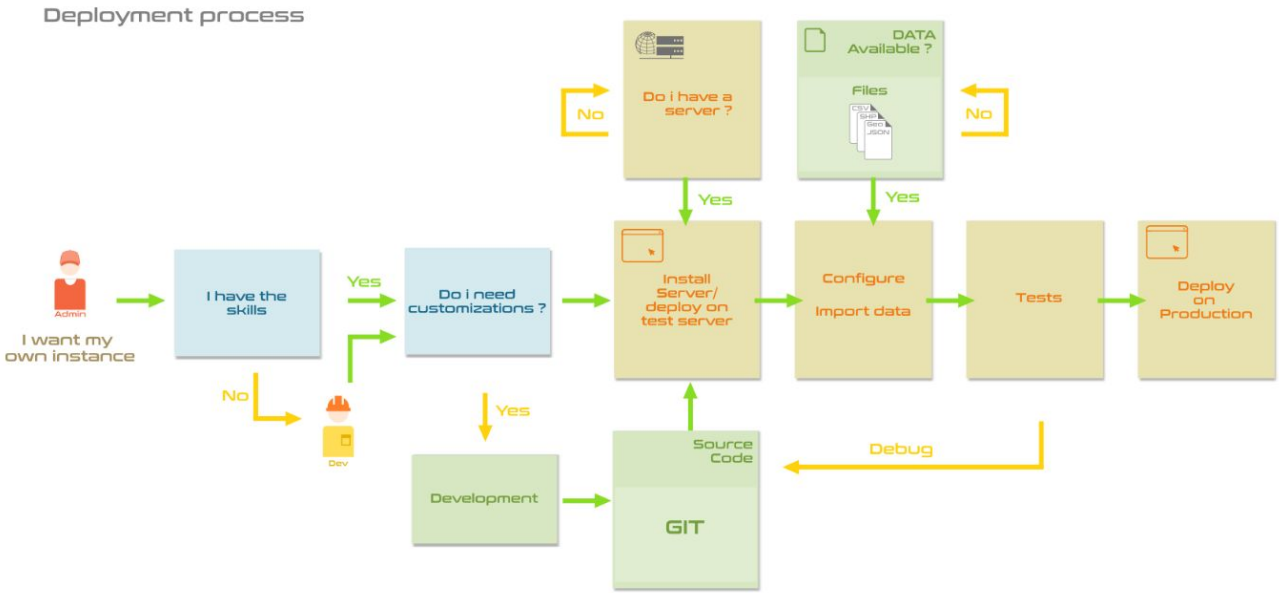
What is the process ?

- Write some specifications
  - Are my data compatible ?
  - Do I need exactly the same observatory ?
- Provide or ask for a graphic chart (colors, logos)
- Engage a process with the development team
- Rent a web server
- Think about tomorrow
  - A web app is not a one day investment

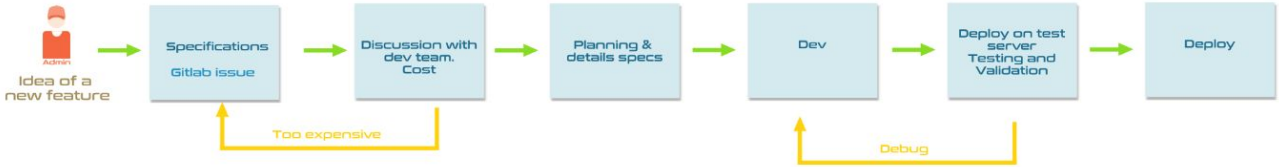
How much does it cost ?

- It depends on what you want
  - The more specific you want, the more it will cost
- The first to invest in the software will have to pay more…
- … but will get the benefits when other will invest
  - New features
  - Shared experiences

An example for a deployment



An example for a new feature



How can the platform evolve in the future?

- Contribute to the source code (it will be hosted on Oslandia's Gitlab, where code from various open source projects is stored)
- Imagine new features
- Share ideas with others
- Make the software as generic as possible so it can become a universal base

To conclude that part, work as a team

- Agile methods
  - Customer must be satisfied
  - Talk often and direclty with the customer
  - Regularly deploy new functionalities
  - Changes are welcome
  - Think about changes as early as possible
  - People and interactions are more important than tools
  - A software that works is better then a complete documentation
  - Keep the process simple

Do you have some questions ?

Part 3

Open Source, Open Data, OpenStreetMap

If you build an **Open Source** application,

why not using **Open Data** ?

Open source

Open source refers to software whose source code is publicly available, meaning that users are free to study, modify and distribute it.

- Access to source code
- Free distribution
- Freedom of modification
- Low cost
- Transparency
- Collaborative community

Open Data

Also known as open data, refers to the concept of making data freely available and accessible to all. It refers to data that is made available to the public without undue restrictions.

Main characteristics :

- Accessibility
- Free of charge
- Reusability
- Open license
- Interoperability
- Quality and reliability
- Transparency

What types of data

- Geographic and non-geographic data
- Data classified by theme: demographics, environment, urban planning, economy, health, transport, finance, etc.
- Data from different sources: governmental, public, private
- Data vary depending on the portal
- Metadata to qualify data and facilitate searches: data format, year, producer, theme, …

Open data in India

Some examples of platforms:

- Open Government Data Platform India (https://data.gov.in/)
- National Remote Sensing Centre (https://bhuvan.nrsc.gov.in/)
- Humanitarian Data Exchange (https://data.humdata.org/) (on a worldwide scale)
- OpenStreetMap (https://www.openstreetmap.org/) (on a worldwide scale)

Example with the city of New Delhi

- Open Government Data Platform India (https://data.gov.in/)
- National Remote Sensing Centre (https://bhuvan.nrsc.gov.in/)
- Delhi Integrated Multi-Modal Transit System (DIMTS) (http://www.dimts.in/)
- Delhi Traffic Police (https://traffic.delhipolice.gov.in/maps)
- Delhi Developement Authority (https://dda.gov.in/gis)
- Geospatial Delhi Limited (http://www.gsdl.org.in/)
- Delhi Metro Rail Corporation (https://www.delhimetrorail.com/)
- OpenCity Urban Data Portal (https://data.opencity.in/organization/government-of-delhi) (on a worldwide scale)
- GADM (https://gadm.org/index.html) (on a worldwide scale)
- OpenStreetMap (https://www.openstreetmap.org/) (on a worldwide scale)

Visualize data using a GIS Software

For example, the open-source GIS software QGIS (https://www.qgis.org/en/site/forusers/download.html) allows you to:

- Create
- Edit
- View
- Analyze
- Publish geospatial data

Multiple formats are supported, so let's import some data from open-data portals, customize the style and perform some spatial processing.

OpenStreetMap

OpenStreetMap is a collaborative open data map of the world, where volunteer contributors add and update geographic data.

- Collaborative map
- Open data
- Contributors add and edit data
- Community plays an essential role
- Data used in many projects
- Data quality

Search OpenStreetMap data

Different solutions depending on your profile (more or less technical):

- Online export from the site (https://www.openstreetmap.org/) based on a geographic range
- From sites that regularly download data: https://www.geofabrik.de/, https://planet.openstreetmap.org/.
- Overpass API (https://overpass-turbo.eu/)
- Libraries and tools such as: the “osmnx” Python library (https://osmnx.readthedocs.io/), the osmium tool (https://osmcode.org/osmium-tool/)
- Directly in QGIS via extensions: QuickOSM, OSMDownloader

Contribute to OpenStreetMap

Why contribute?

- Share knowledge
- Improve maps for all
- Engage the local community
- Support humanitarian initiatives

Contribute to OpenStreetMap

How to contribute?

- Create an account on the OpenStreetMap website (https://www.openstreetmap.org/).
- Use the OSM editor: The iD editor is OpenStreetMap's integrated online editing tool.
- Contribute locally
- Verify and validate data
- Contribute to specific projects

Do you have some questions ?

5

Questions, Feedback and Farewell

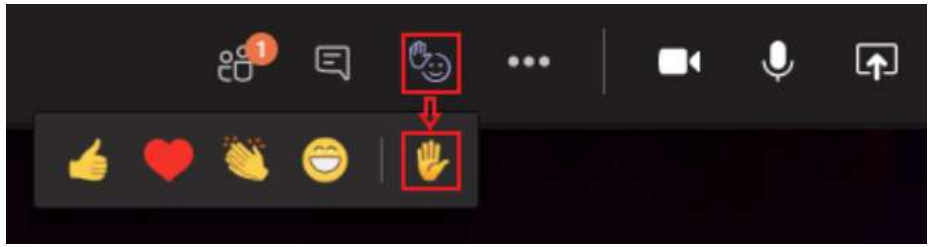
Q&A

Chat

→ Post your questions in the chat and we will include them in the Q&A

Speak

→ Select “Show reactions” in the meeting controls, and then choose “Raise your hand”. Everyone in the meeting will see that you've got your hand up.



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