Mobility Opportunities Valuable to Everybody (MOVE)

WP3: Data monitoring tool

Casper Van Gheluwe – Ghent University

MOVE Partner Meeting – Online – 2020-09-07

GHENT UNIVERSITY
Interreg North Sea Region MOVE
European Regional Development Fund
EUROPEAN UNION

CONTENT

1. Existing tools
   - Websurvey
   - Smartphone tracking
2. Data monitoring tool
   - Technical design & modules
   - Next steps & planning
3. Current research

GHENT UNIVERSITY
Interreg North Sea Region MOVE
European Regional Development Fund
EUROPEAN UNION

EXISTING TOOLS:

A quick reminder

GHENT UNIVERSITY
Interreg North Sea Region MOVE
European Regional Development Fund
EUROPEAN UNION

WEB SURVEY

1. Used successfully in Mechelen and Zeeland

2. 4 parts
   - Personal data
   - Travel behaviour
   - Specific pilot questions
   - Mobility attitudes

GHENT UNIVERSITY
Interreg North Sea Region MOVE
European Regional Development Fund
EUROPEAN UNION

WEB SURVEY

+ Inexpensive

+ Wide range of insights possible

+ Valuable in different phases of a pilot

+ Co-creation & targeted communication

- Cooperation of local authorities

GHENT UNIVERSITY
Interreg North Sea Region MOVE
European Regional Development Fund
EUROPEAN UNION

SMARTPHONE TRACKING

1. Used successfully in Zeeland (2017, 2019, 2020 ongoing)

2. Goals
   - Mobility flows
   - Modal split
   - Mobility patterns
   - Possible incentives?

GHENT UNIVERSITY
Interreg North Sea Region MOVE
European Regional Development Fund
EUROPEAN UNION

SMARTPHONE TRACKING

+ Higher data quality
+ Richer results
+ Continuous data collection
+ Mobility profiling / clustering
+ Can attach to existing initiatives

- More expensive
- Privacy concerns

GHENT UNIVERSITY
Interreg North Sea Region MOVE
European Regional Development Fund
EUROPEAN UNION

EXISTING TOOLS

Still available for interested pilots

12 For which trips have you ever used the Flexbus?

Check all that apply

- To another bus of De Lijn
- To a train
- To a shared car* (eg. Cambio, Cozycar)
- To a shared bicycle** (eg.Blue-bike, Mobit)
- To a shared ride*** (eg. Carpool, Blablacar)

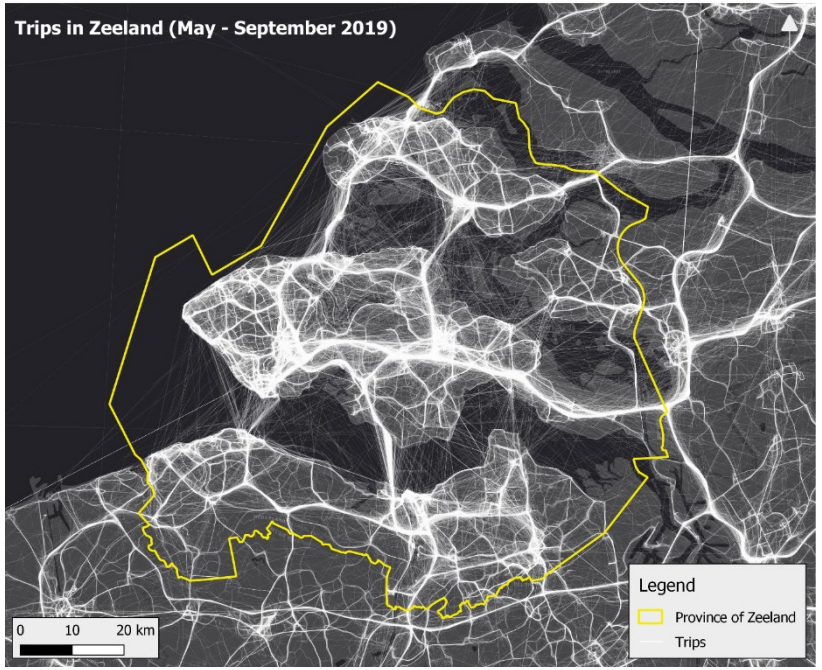
13 On which days do you use the Flexbus for the following trips?

14 At what times of the day do you use the Flexbus for the following trips?

16 In which way do you usually book your ride with the Flexbus?

Choose one of the following answers

15 During an average week, how often do you switch from the Flexbus to the following means of transport?



GHENT UNIVERSITY

Interreg North Sea Region MOVE

European Regional Development Fund

EUROPEAN UNION

DATA MONITORING
Mobility flows insight

GHENT UNIVERSITY

Interreg North Sea Region MOVE
European Regional Development Fund

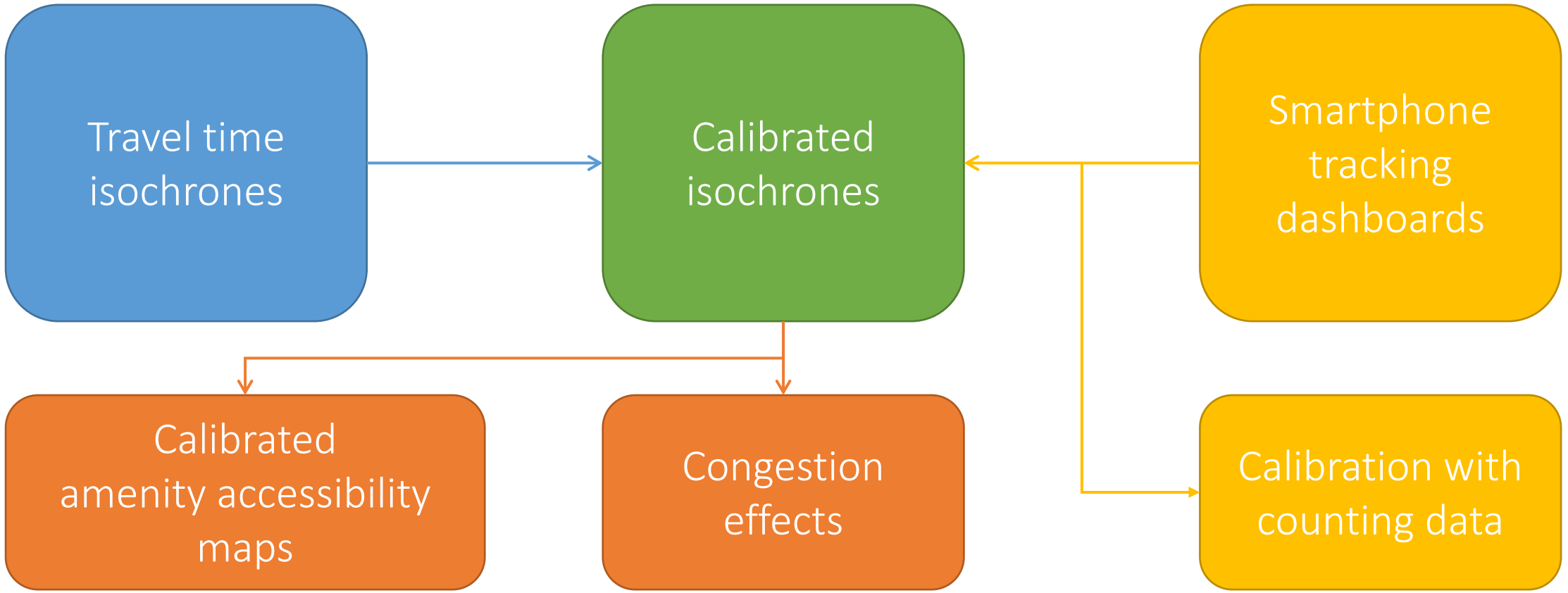
EUROPEAN UNION

DATA MONITORING SYSTEM

*"Online monitoring system that enables **insight into mobility flows** for the designated pilots. The methodology supports **quantitative research** to contextualize and **monitor mobility behavior** of population target groups within the different pilots"*

GHENT UNIVERSITY
Interreg North Sea Region MOVE
European Regional Development Fund
EUROPEAN UNION

DATA MONITORING SYSTEM



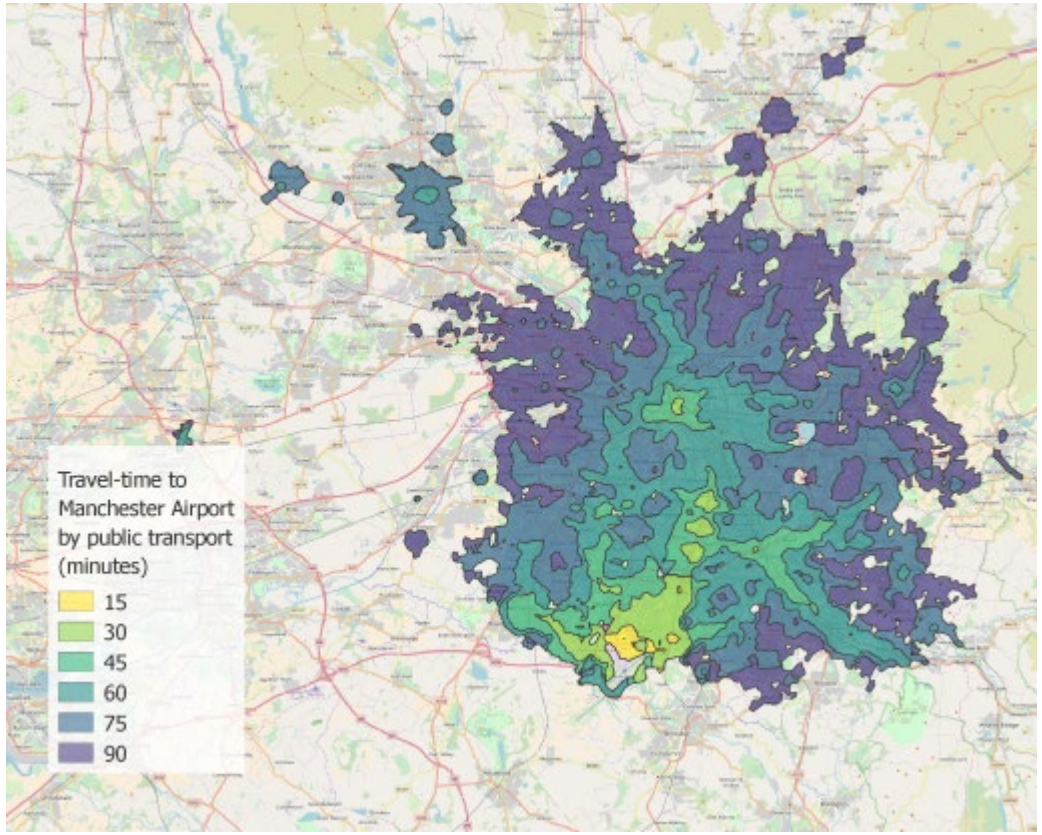
TRAVEL TIME ISOCHRONES

Requirements

- OpenStreetMaps
- Public transport GTFS feeds
- Region boundaries

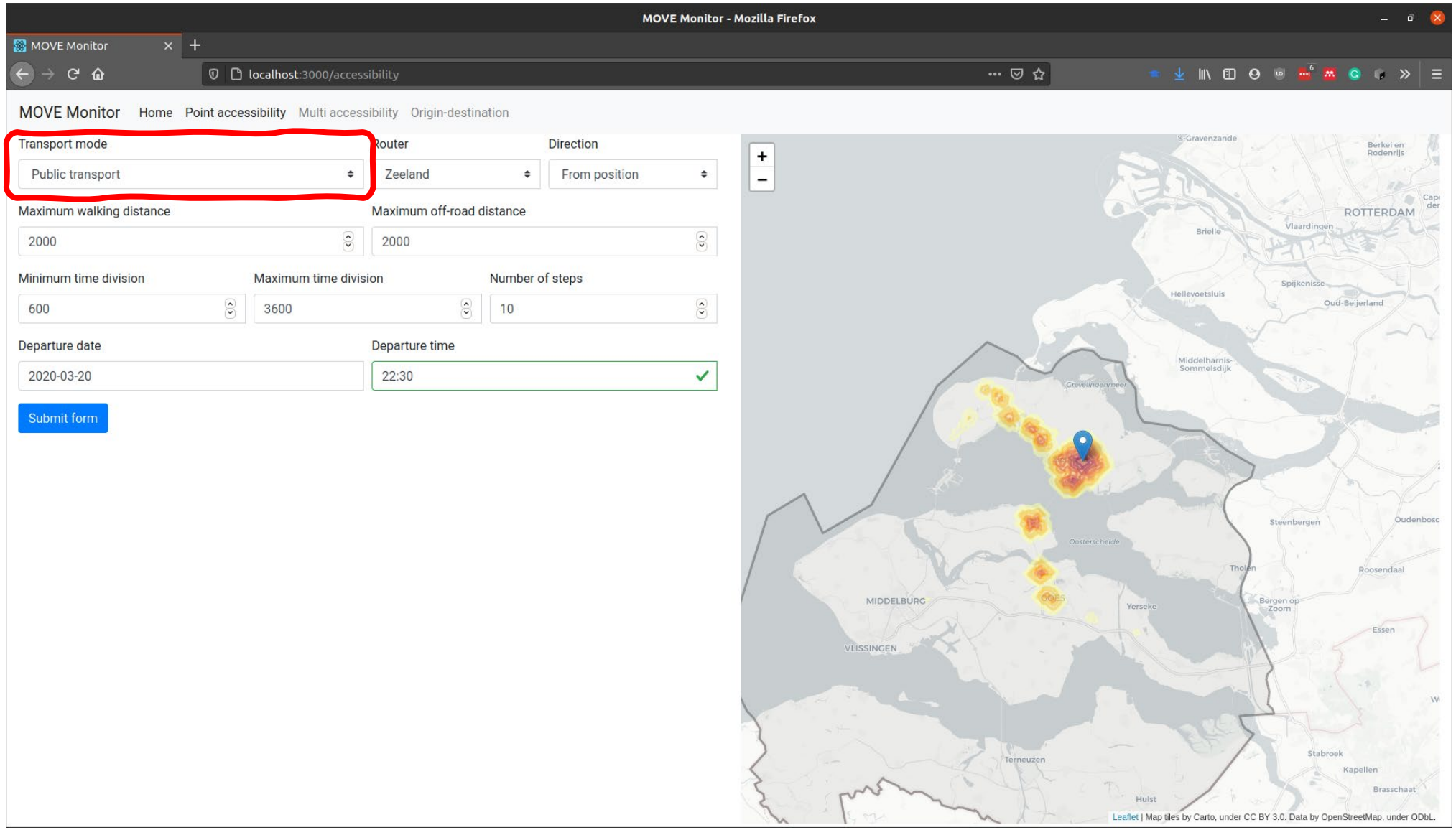
Existing work

- OpenTripPlanner
- ArcGIS Accessibility Toolbox

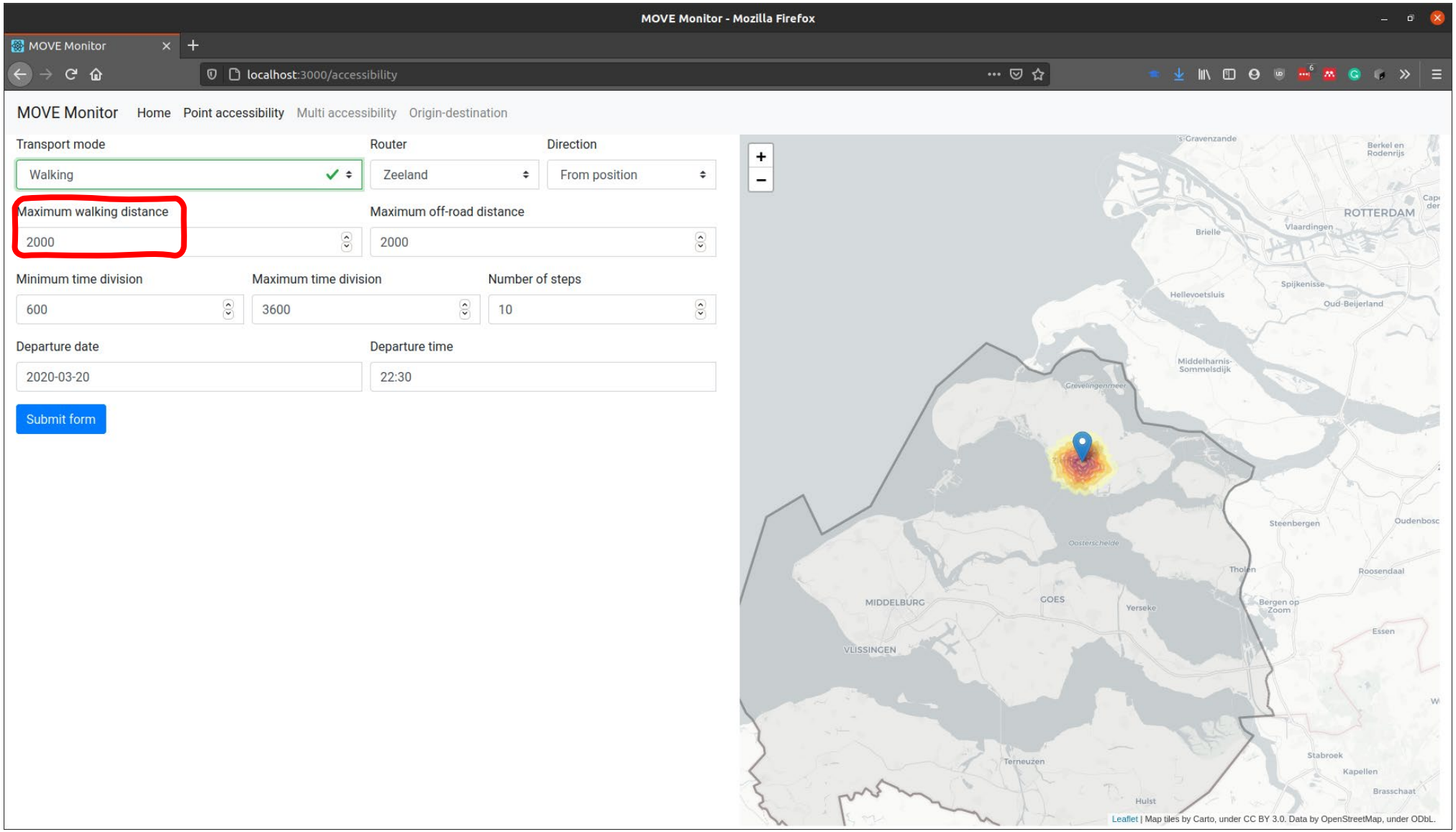


GHENT UNIVERSITY
Interreg North Sea Region MOVE
European Regional Development Fund
EUROPEAN UNION

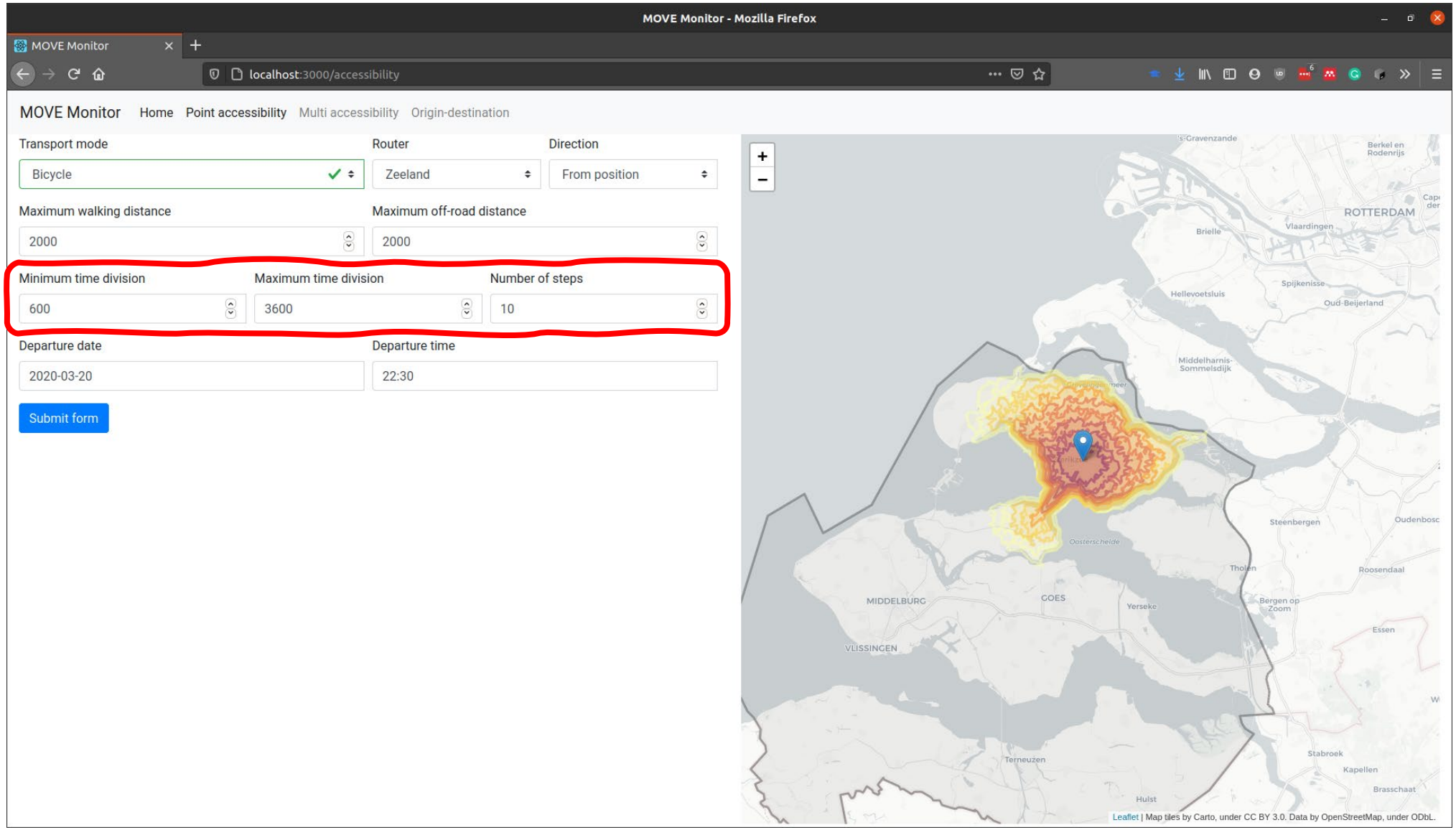
TRAVEL TIME ISOCHRONES



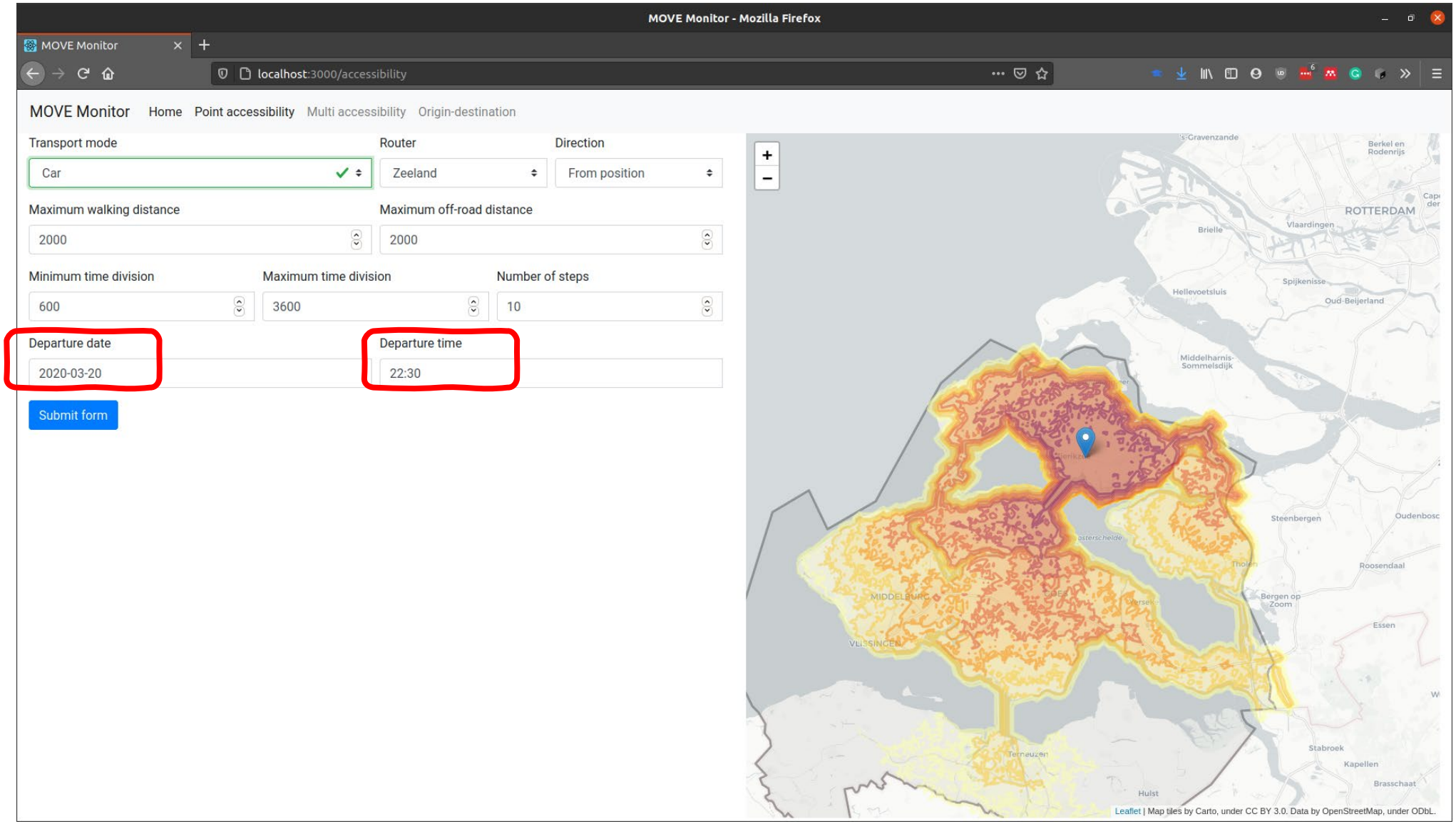
TRAVEL TIME ISOCHRONES



TRAVEL TIME ISOCHRONES



TRAVEL TIME ISOCHRONES



SMARTPHONE TRACKING DASHBOARDS

Requirements

- Smartphone tracking campaign active/finished
- Geo-information of municipalities/areas in the region of interest

Existing work

- IWEPS GPSWAL
- TMaaS / Link.Gent

GHENT UNIVERSITY
Interreg North Sea Region MOVE
European Regional Development Fund
EUROPEAN UNION

June 29, 2019, 1:05
Most recent trip start

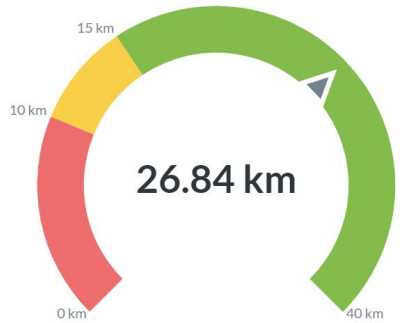
0
Number of trips today

7,049
Number of trips

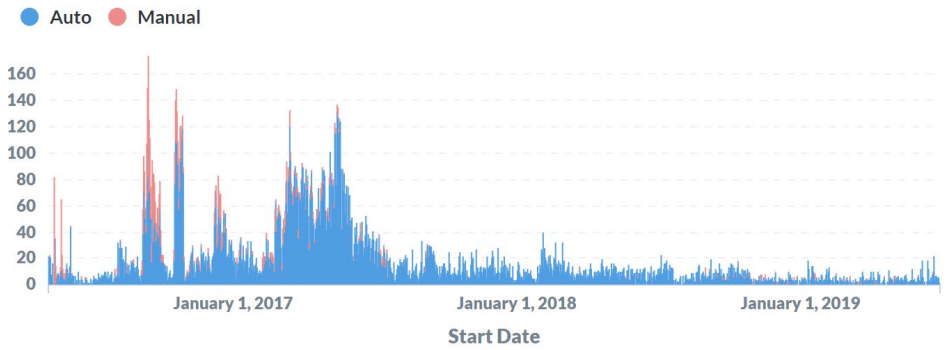
368,938 km
Total kilometers

89
Total users

Average distance per trip



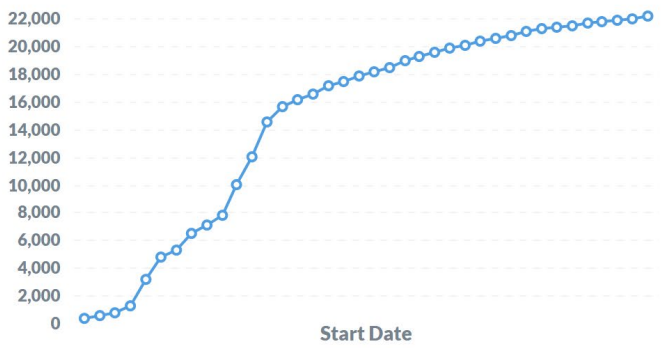
Trips per day



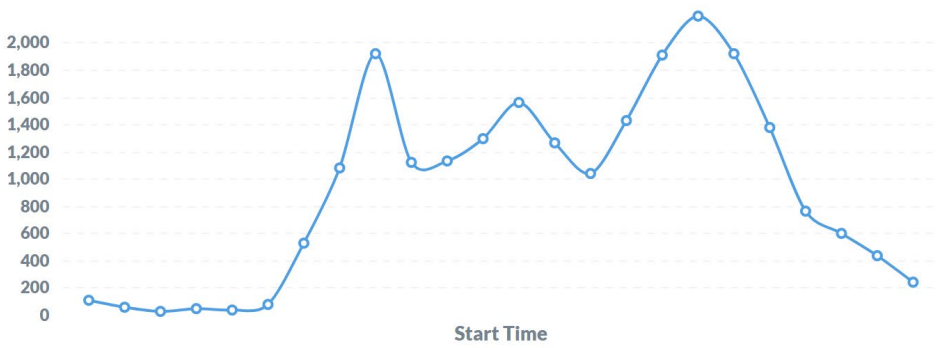
18
Trips per day

953 km
Average distance per day

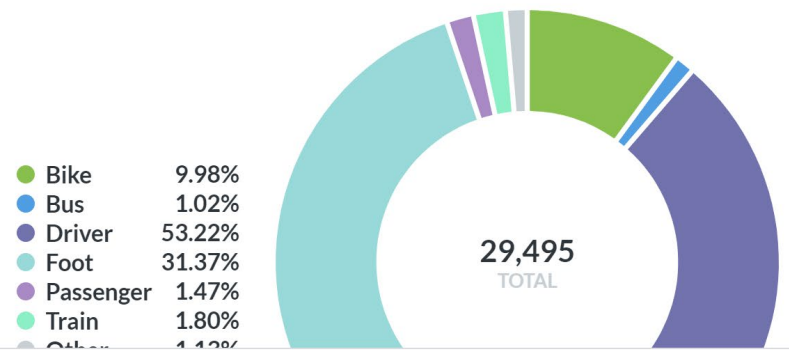
Cumulative count of trips



Trip starts per hour of day

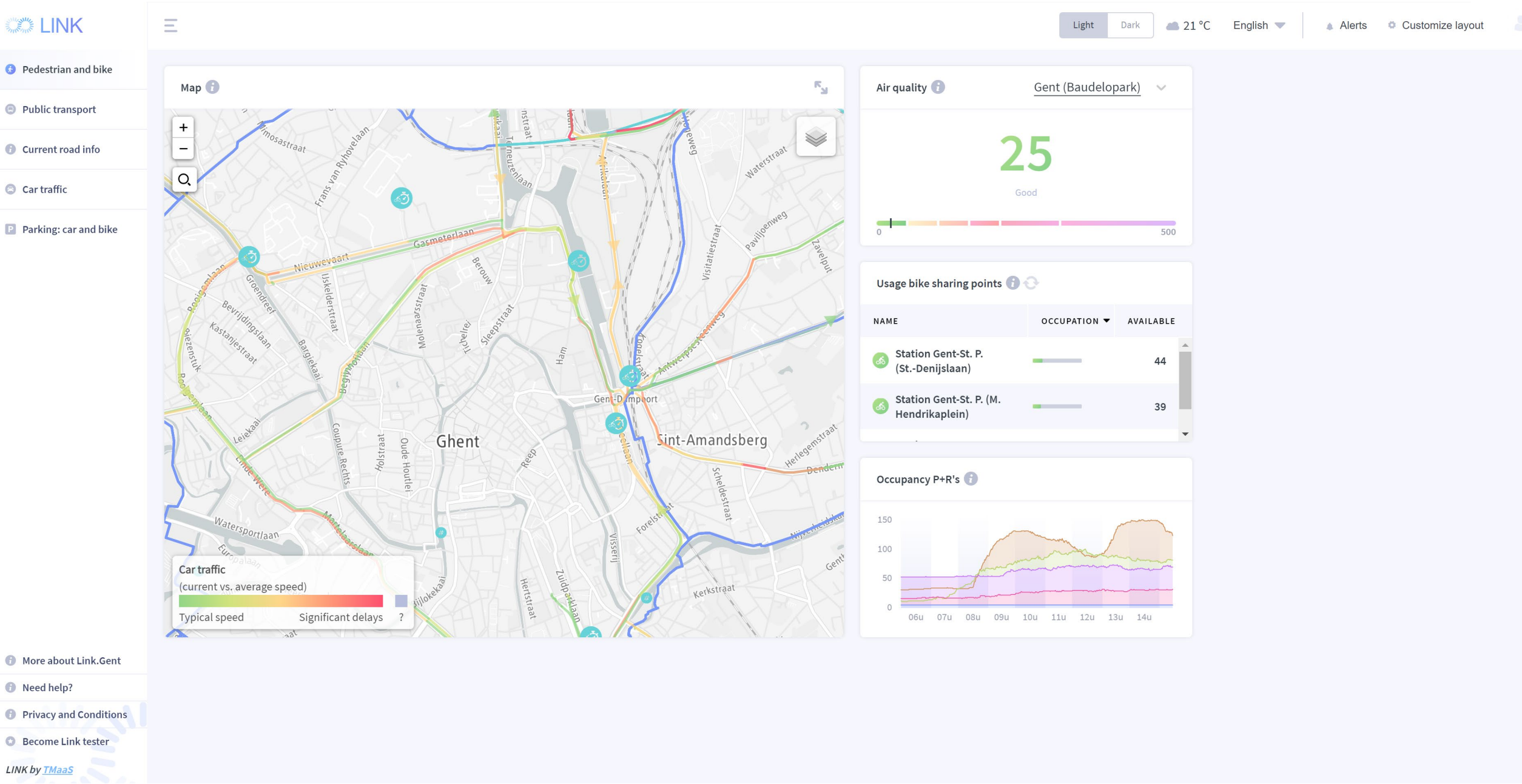


Modal split

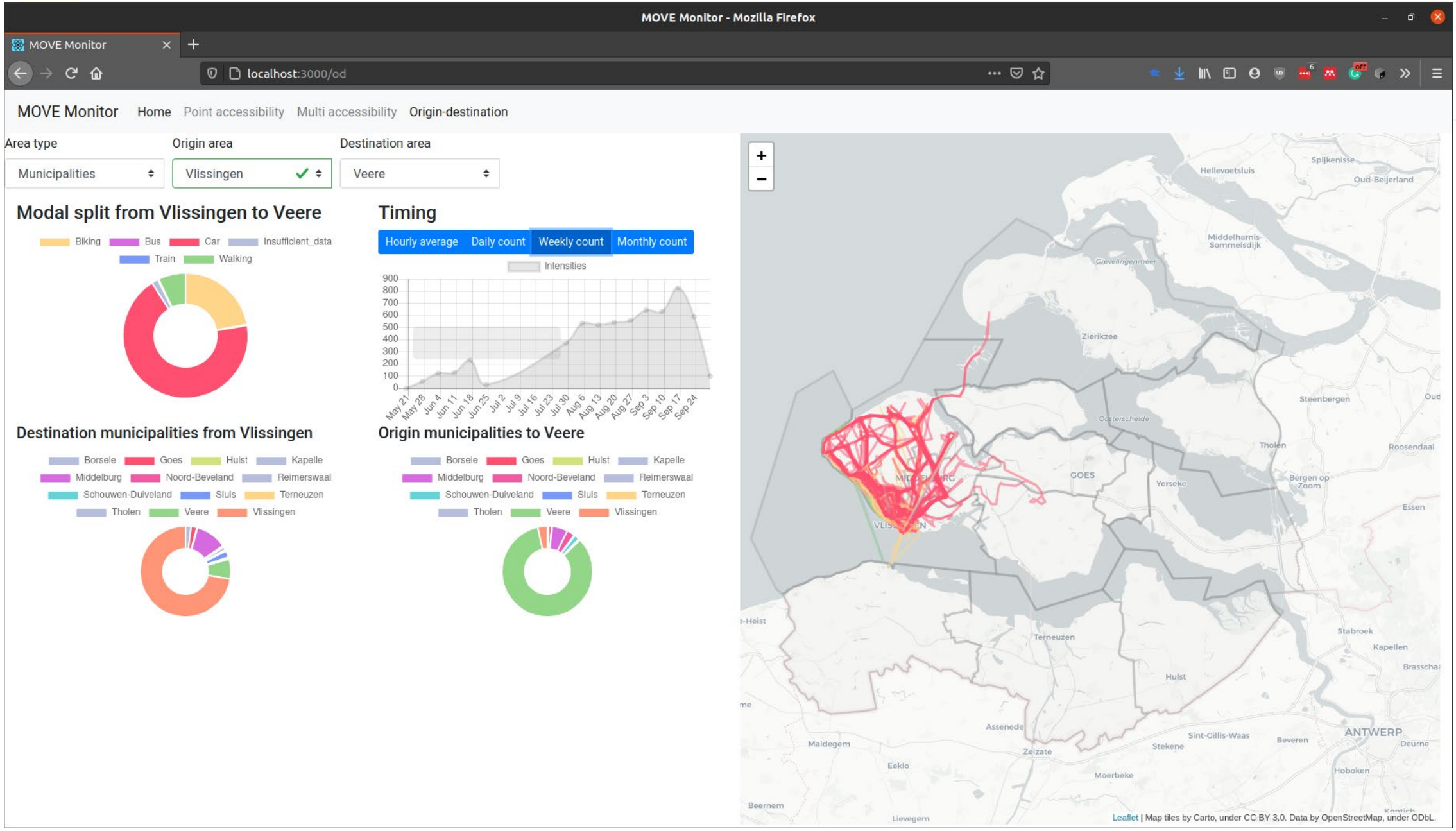


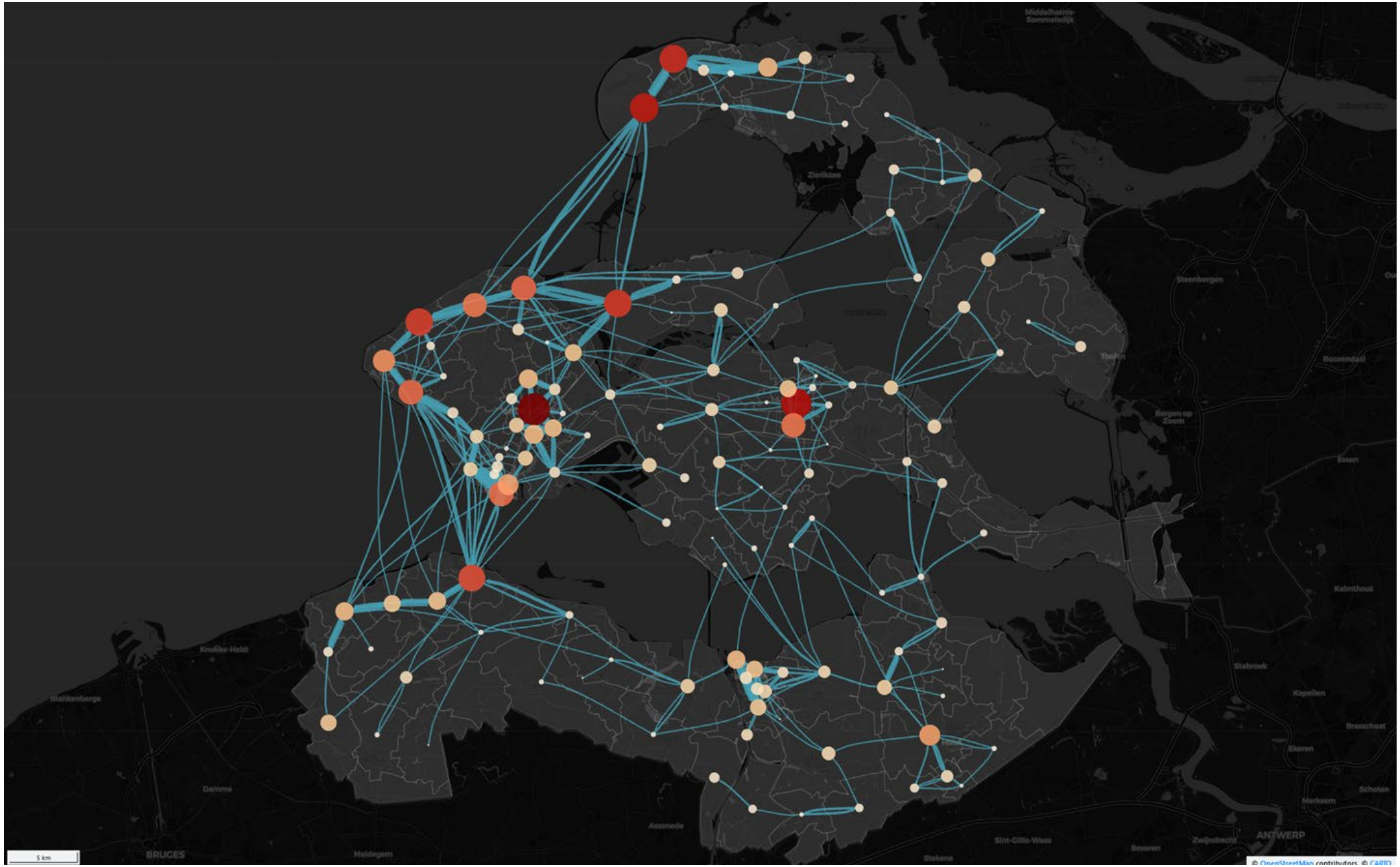
Purposes

Purpose by Day of Week

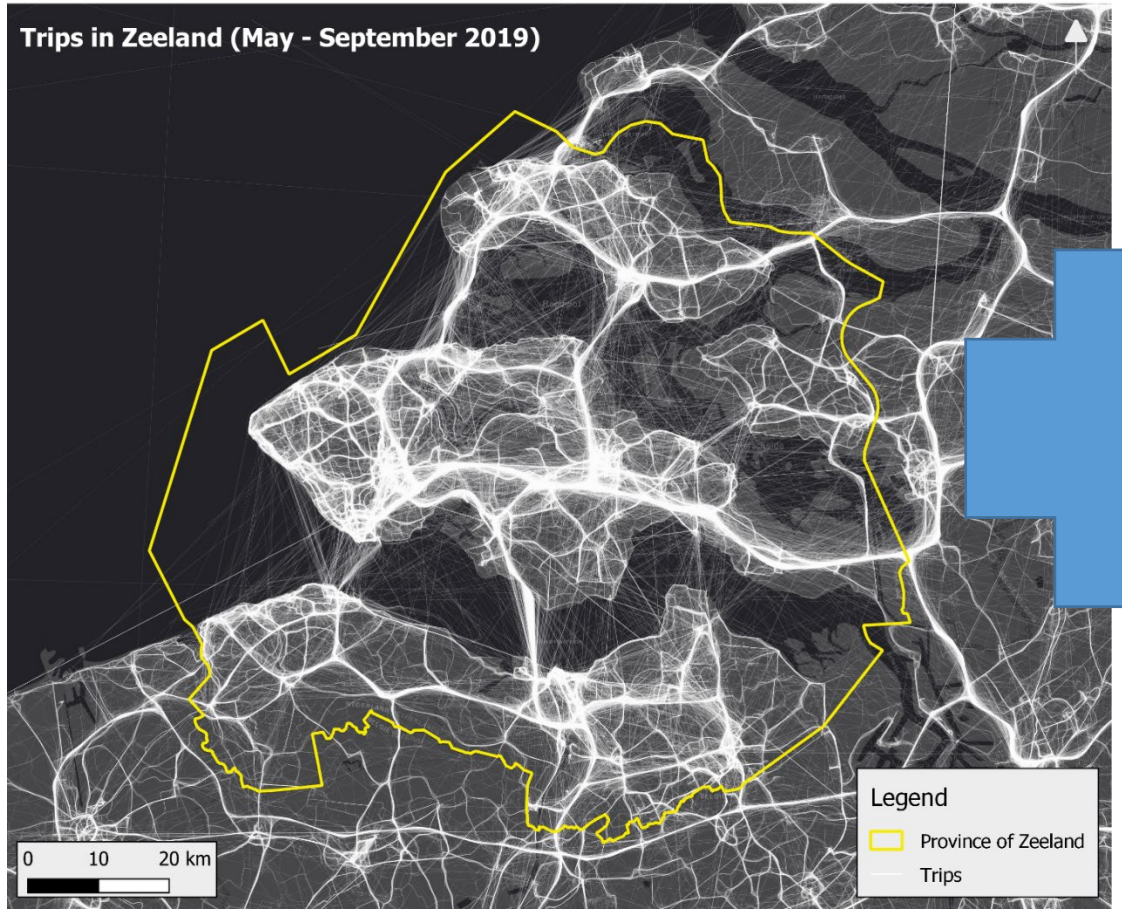


https://link.tmaas.eu/gent


MOVE Monitor - Mozilla Firefox
MOVE Monitor
localhost:3000/od
MOVE Monitor
Home
Point accessibility
Multi accessibility
Origin-destination
Area type
Origin area
Destination area
Municipalities
Vlissingen
Veere
Modal split from Vlissingen to Veere
Biking
Bus
Car
Insufficient_data
Train
Walking
Timing
Hourly average
Daily count
Weekly count
Monthly count
Intensities
900
800
700
600
500
400
300
200
100
0
May 21
May 28
Jun 4
Jun 11
Jun 18
Jun 25
Jul 2
Jul 9
Jul 16
Jul 23
Jul 30
Aug 6
Aug 13
Aug 20
Aug 27
Sep 3
Sep 10
Sep 17
Sep 24
Destination municipalities from Vlissingen
Origin municipalities to Veere
Borsele
Goes
Hulst
Kapelle
Middelburg
Noord-Beveland
Reimerswaal
Schouwen-Duiveland
Sluis
Terneuzen
Tholen
Veere
Vlissingen
Hellevoetsluis
Spijkenisse
Oud-Beijerland
Middelharnis-Sommelsdijk
Zierikzee
Steenbergen
Tholen
Roosendaal
GOES
Yerseke
Bergen op Zoom
Essen
Terneuzen
Stabroek
Kapellen
Hulst
Assenede
Maldegem
Zelzate
Sint-Gillis-Waas
Stekene
Beveren
ANTWERP
Deurne
Eeklo
Moerbeke
Hoboken
Beernem
Lievegem
Leaflet | Map tiles by Carto, under CC BY 3.0. Data by OpenStreetMap, under ODbL.


Middelharnis-Sommelsdijk
Zierikzee
Steenbergen
Roosendaal
Bergen op Zoom
Essen
Kalmthout
Stabroek
Kapellen
Brasschaat
Schoten
Merksem
ANTWERP
Zwijndrecht
Beveren
Sint-Gillis-Waas
Stekene
Assenede
Maldegem
BRUGES
Damme
Knokke-Heist
Blankenberge
5 km
© OpenStreetMap contributors, © CARTO

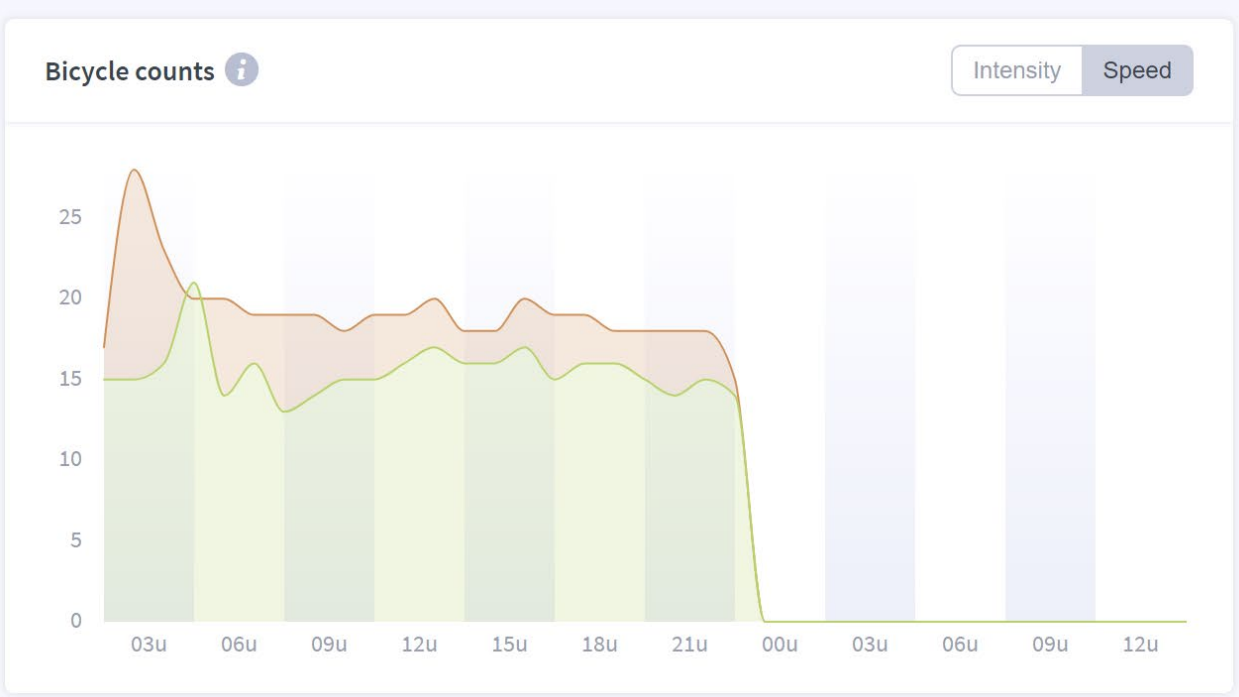
CALIBRATION WITH COUNTING DATA

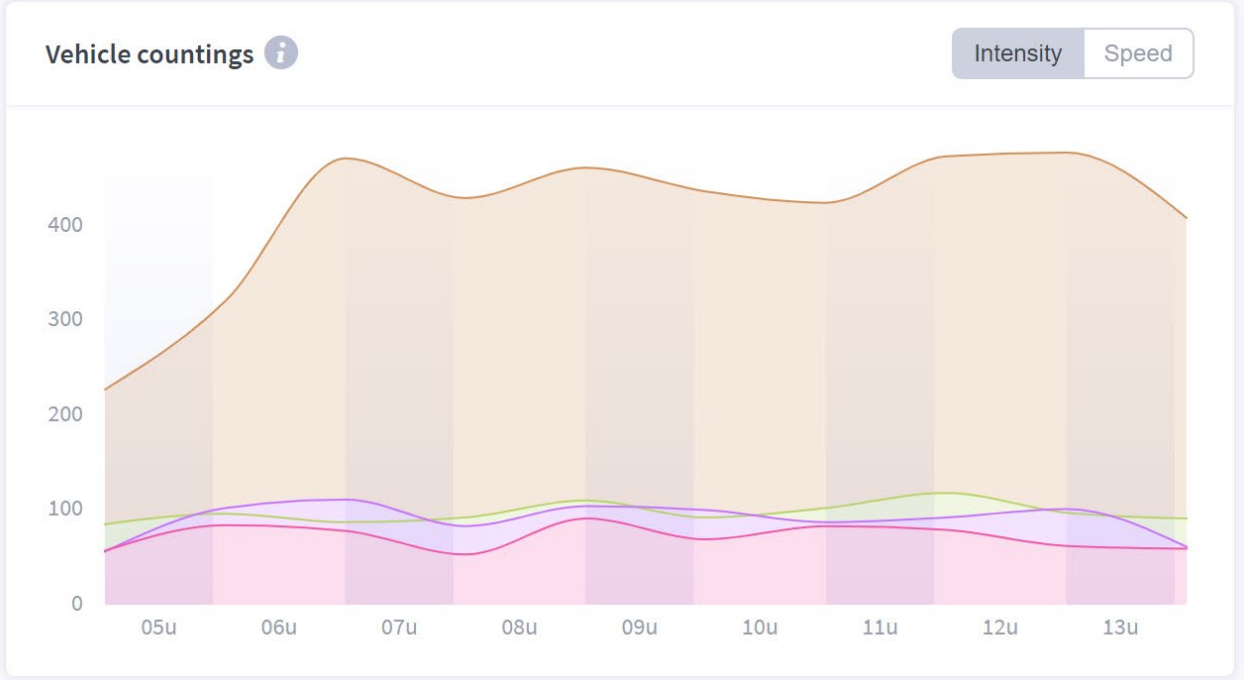


Gemiddelde voertuigverdeling per uur van 2020-08-28 00:00:00 tot 2020-09-04 23:59:59 voor A58 naar Vlissingen op knppnt Stelleplas ri afrit 37 thv hmp 160.2 (GEO0K_Z_RWSTI544) op werkdagen

uur op de dag	Intensiteit	tussen 1,85 m en 2,40 r	tussen 2,40 m en 5,60 r	tussen 5,60 m en 11,50	tussen 11,50 m en 12,2	groter dan 12,20 m (%)	onbepaald (%)
00:00 - 00:59	111,2	0,1	94,5	2,7	0	2,7	0
01:00 - 01:59	49,5	2	84,5	7,4	0	6,1	0
02:00 - 02:59	36,3	0	70,6	15,6	0	13,3	0,5
03:00 - 03:59	31,2	1,6	72,7	15	0,5	10,2	0
	41,2	0	70,4	11,7	4	13,4	0,4
	99,8	1	76	9,3	0,2	13,4	0,2
	621,3	0,6	82,4	10,7	0,3	5,8	0,1
	1303	0,8	84,8	10,2	0,3	3,6	0,2
	1426,3	0,7	87,2	7,9	0,3	3,7	0,3
	983,4	0,7	83,9	10,8	0,2	4,3	0,2
10:00 - 10:59	1119	0,8	84,1	10,5	0,4	4	0,3
11:00 - 11:59	1275	0,6	85,9	9,8	0,4	3,1	0,3
12:00 - 12:59	1394,4	0,8	86,6	8,8	0,5	3,1	0,3
13:00 - 13:59	1426	0,6	86,5	9	0,8	2,7	0,3
14:00 - 14:59	1469,8	0,8	87,3	8,6	0,6	2,6	0,1
15:00 - 15:59	1505,6	0,6	89,7	6,8	0,3	2,3	0,3
16:00 - 16:59	1978,4	0,6	91,2	5,8	0,2	1,9	0,3
17:00 - 17:59	2141,8	0,7	94,3	3,8	0,1	1	0,1
18:00 - 18:59	1103,2	0,7	93	4,6	0,1	1,4	0,3

CALIBRATION WITH COUNTING DATA





AMENITY ACCESSIBILITY MAPS

MOVE Monitor Home Accessibility Proximity

OpenStreetMap Tag Key

amenity

OpenStreetMap Tag Value

hospital

Fetch nodes

Transport mode

Public transport

Router

Flanders

Direction

From position

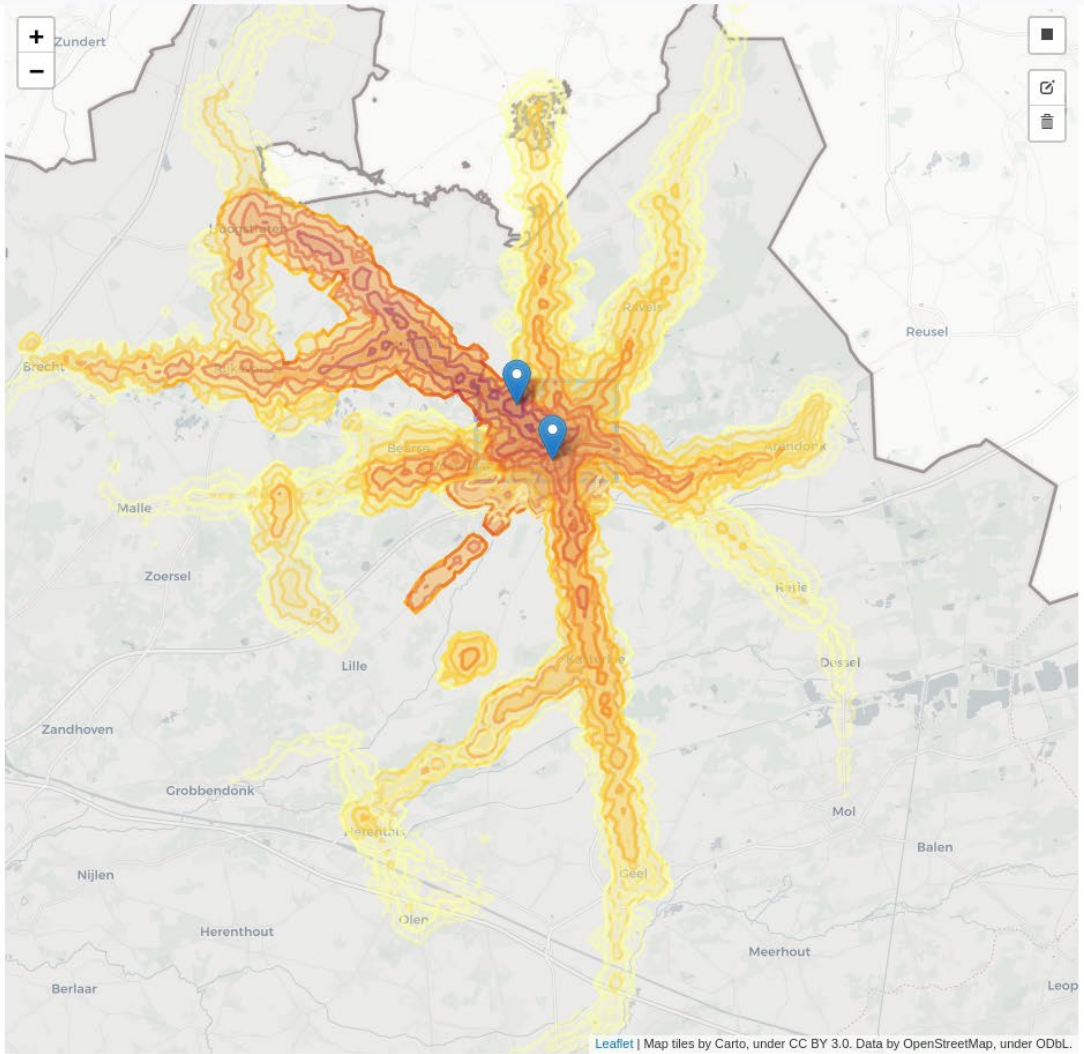
Departure date

YYYY-MM-DD

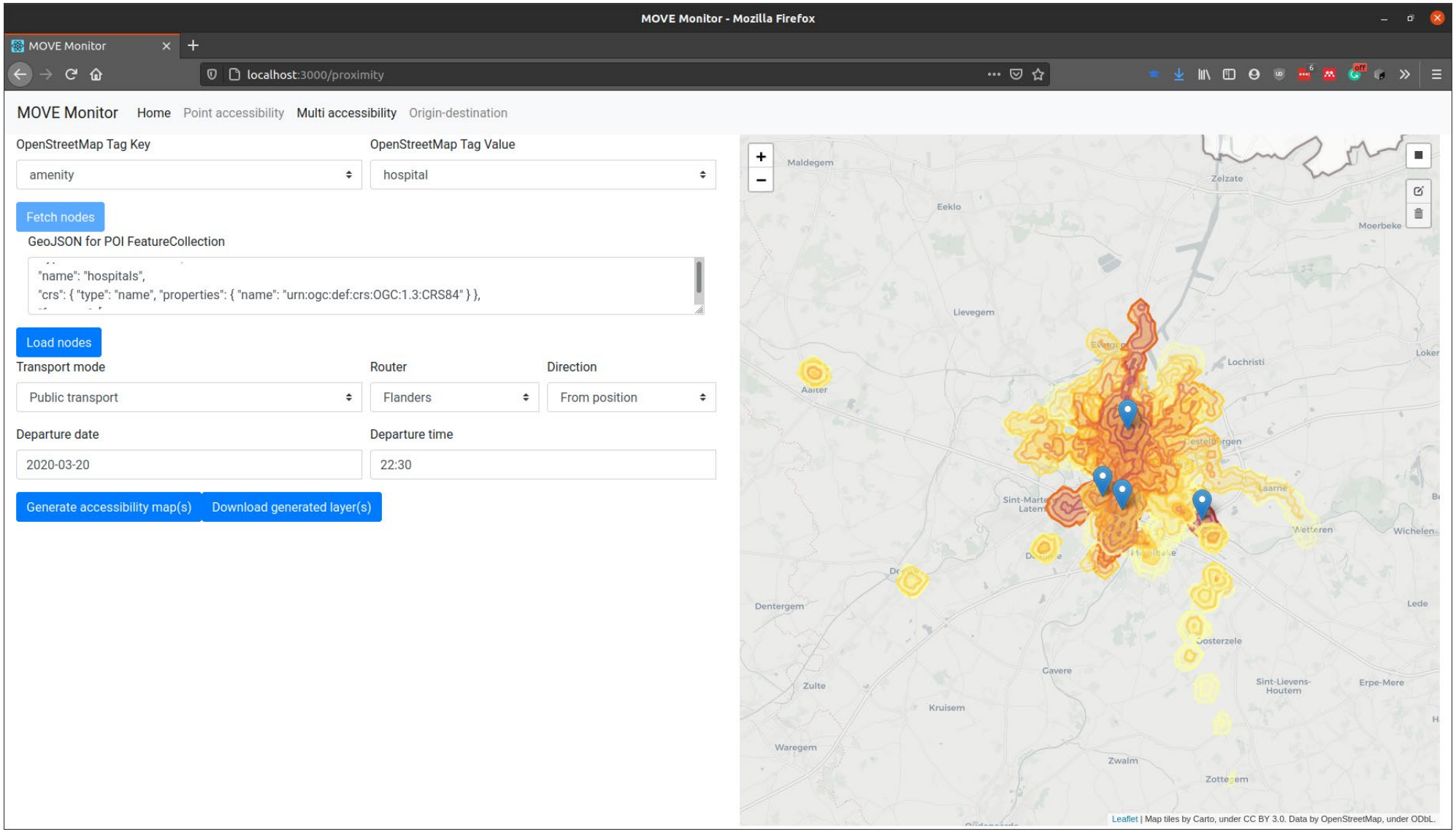
Departure time

HH:MM

Generate accessibility map(s) Download generated layer(s)



AMENITY ACCESSIBILITY MAPS



NEXT STEPS

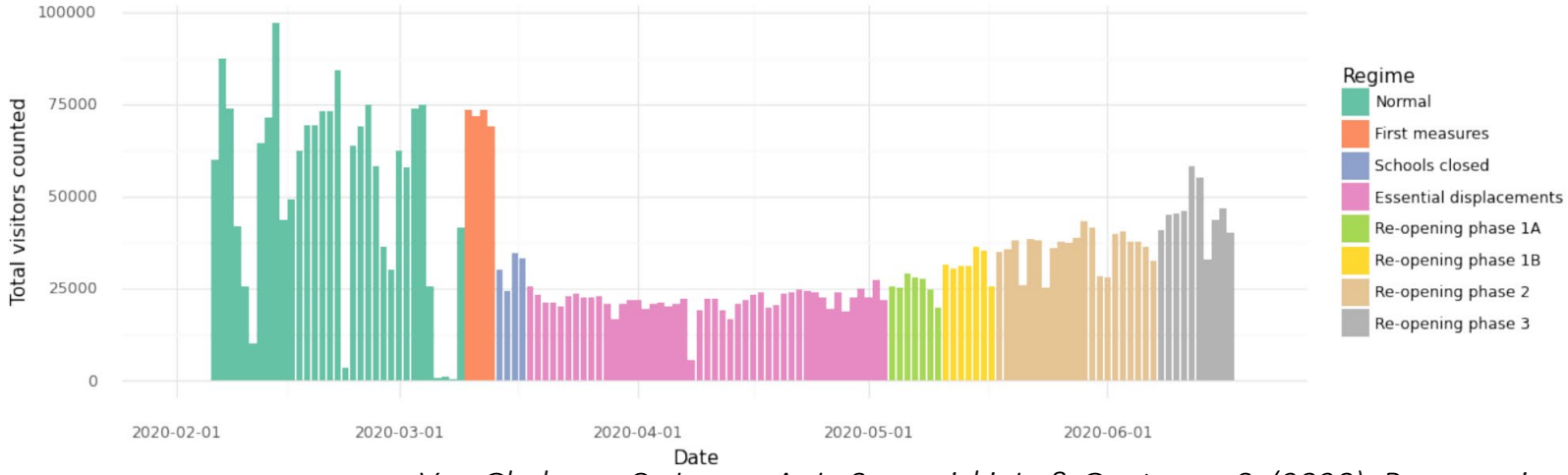
- Counting data calibration
  - Ingesting counting data *(Q4 2020)*
  - Aligning the counters with the recorded GPS tracks *(Q4 2020)*
- Travel time isochrone calibration
  - How well do theoretical isochrones predict actual travel times? *(Q2 2020)*
  - Quantify effect of congestion on the theoretical isochrones? *(Q3 2021)*
  - Create more realistic isochrones with tracking & counting data (Q4 2021)
- Apply calibrated travel time isochrones for amenity accessibility maps in rural areas *(Q4 2021)*

CURRENT RESEARCH

GHENT UNIVERSITY
Interreg North Sea Region MOVE
European Regional Development Fund
EUROPEAN UNION

REPURPOSING EXISTING TRAFFIC DATA SOURCES FOR COVID-19 CRISIS MGMT.

- Rapid flexible decision making in crisis situations
- Credible data for policy makers
- Existing TMC data sources
- Available data repurposed for Covid-19 crisis management with minimal effort



Category	Data source	Availability
Connected traveler	Mobility tracking smartphone app	
	Mobility tracking private companies	✓
	CDR tracking	
	Social media	✓
Connected vehicle	Floating car data - flows	✓
	Floating car data - speeds	✓
	Floating car data - fleets	
Connected infrastructure	Vehicle detection systems - counts	✓
	Vehicle detection systems - flows	✓
	Bike counts	✓
	Pedestrian counts	✓
	Environmental sensors	✓
	V2I/I2V systems	
Transactional data	Off-street parking	✓
	On-street parking	✓
	Tolling data	
	Public transport ticketing	
	Shared vehicle ticketing	
	Shared bicycle ticketing	✓

TABLE I: Availability of operational traffic management data sources in Ghent, Belgium

Van Gheluwe, C., Lopez, A. J., Semanjski, I., & Gautama, S. (2020). Repurposing existing traffic data sources for COVID-19 crisis management, 2020 IEEE International Smart Cities Conference (IEEE ISC2)

DATA-DRIVEN INSIGHTS FOR TOURISM HOTSPOT DETECTION

- Density-based clustering to discover tourist areas
- Based on Zeeland 2017 smartphone tracking

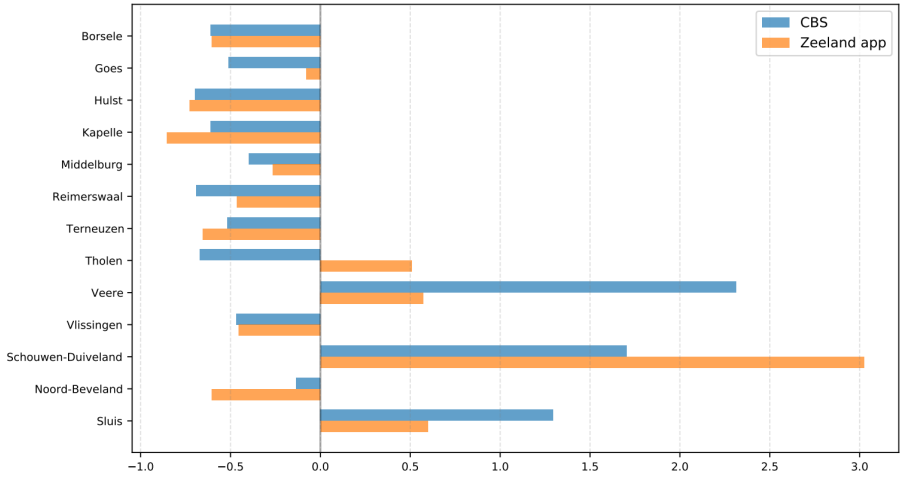
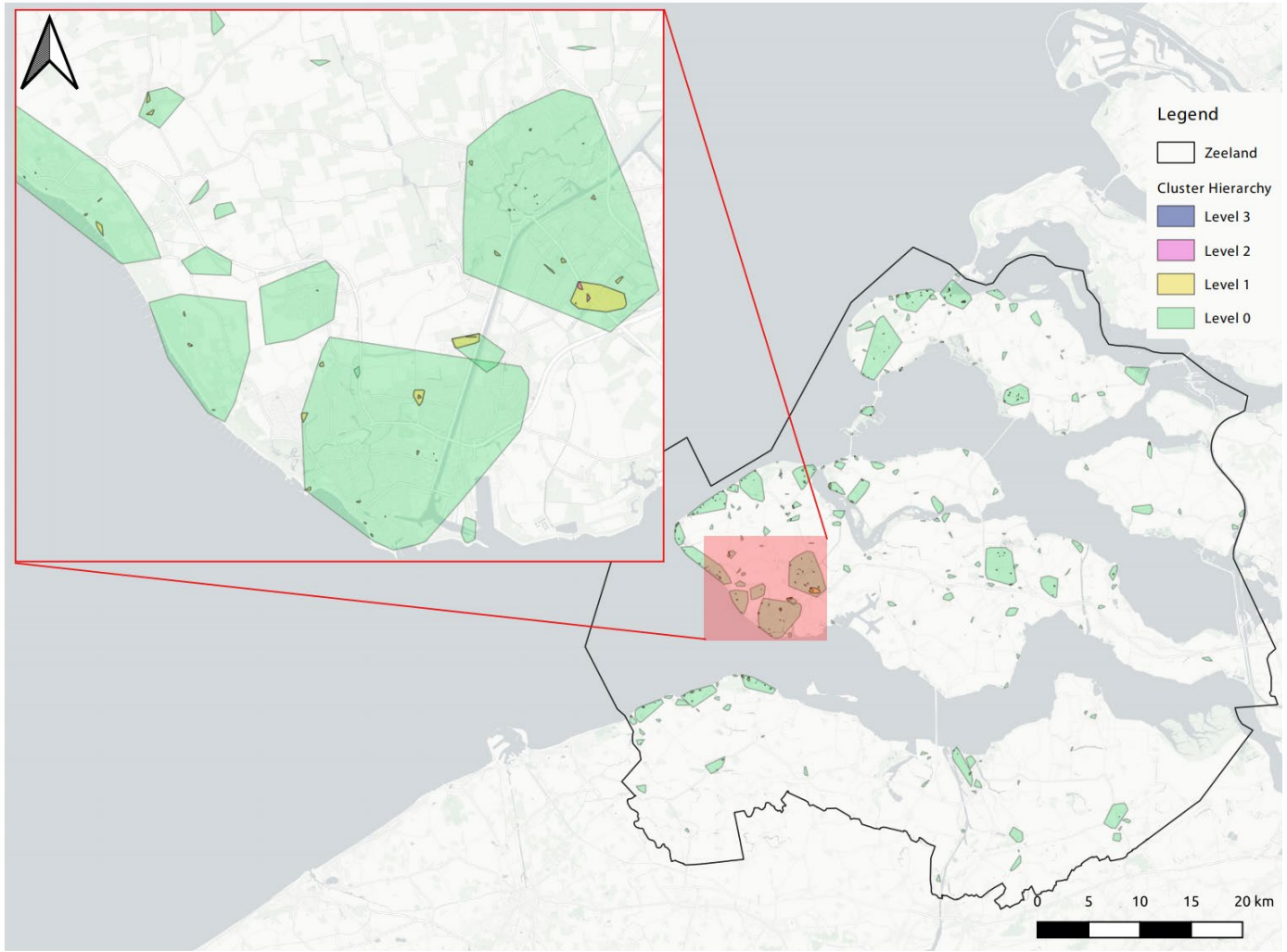


Figure 3. Guest in tourist accommodations (CBS) and crowdsourced inbound travels by Municipalities of the Province of Zeeland.



Rodriguez, J., Semanjski, I., Van Gheluwe, C., Gautama, S., IJben, H., & Ochoa, D. (2020). Data-driven insights for tourism hotspot detection. ISPRS Int. J. Geo-Inf., Smart Tourism: A GIS-Based Approach.

Mobility Opportunities Valuable to Everybody (MOVE)