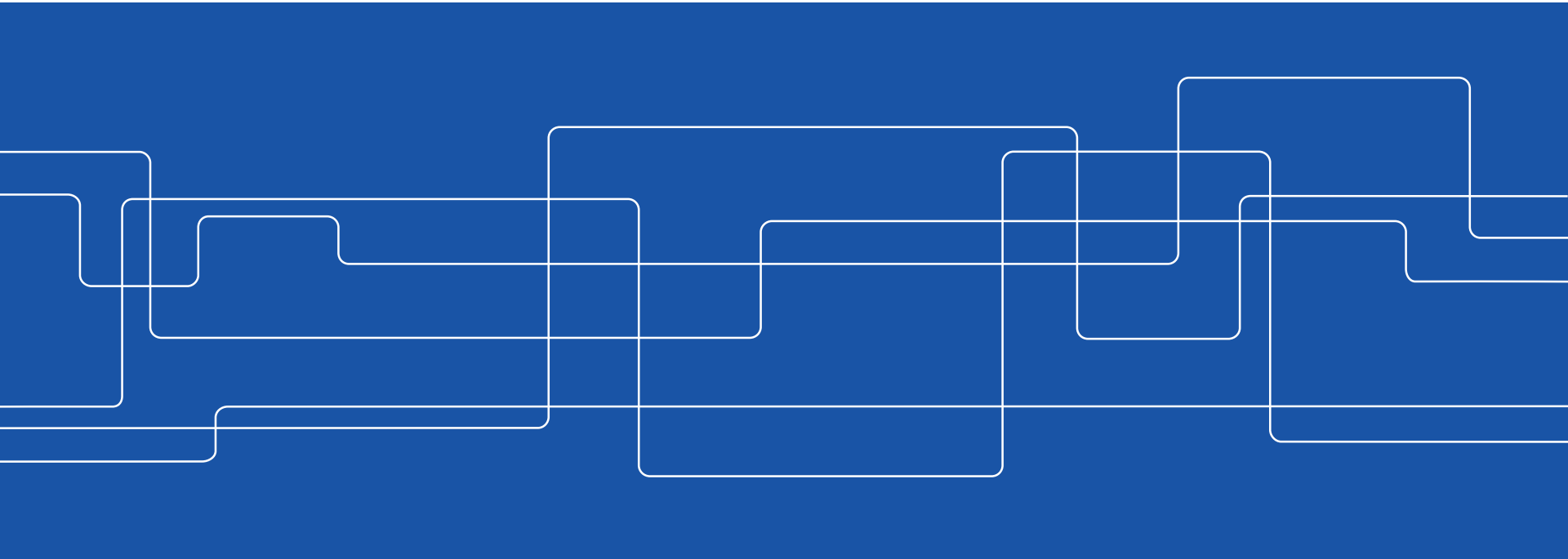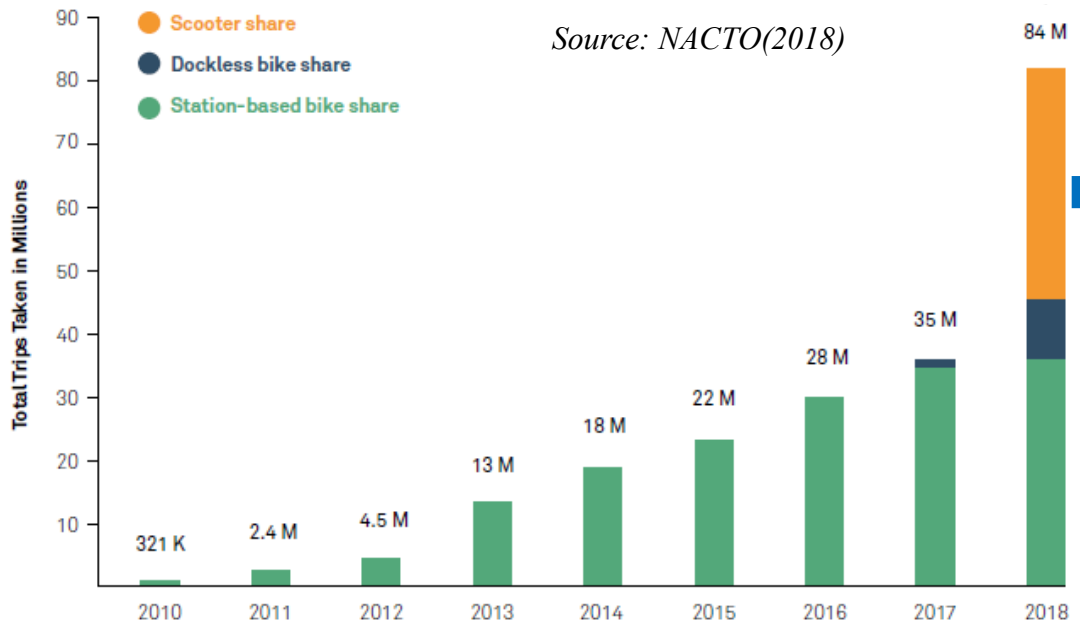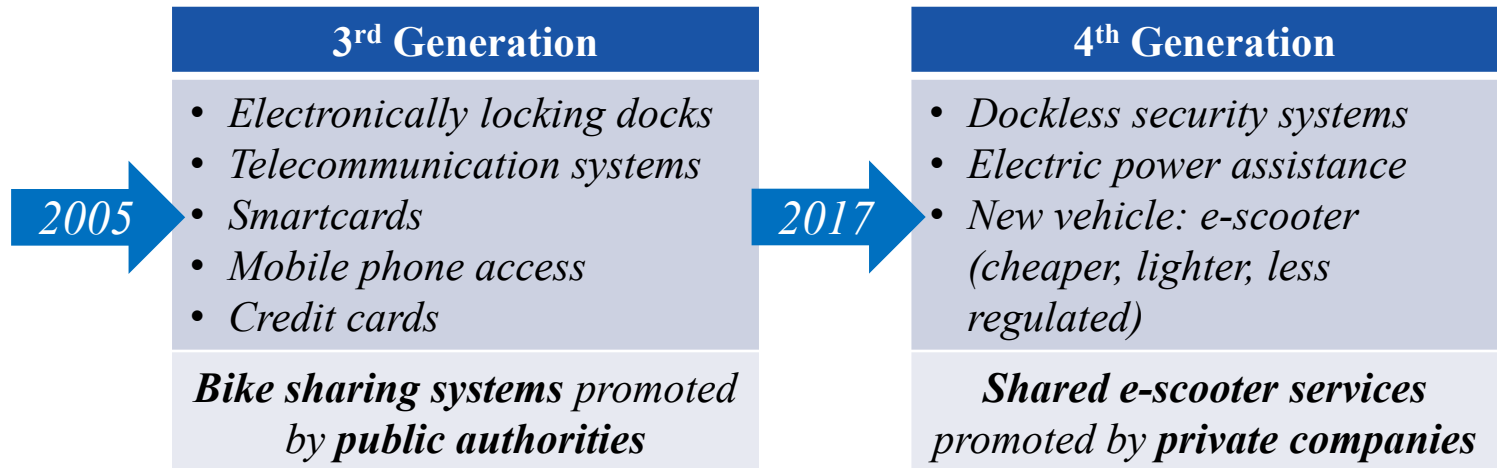# Overview of shared e-scooter services

Pre-study: *Micromobility Modelling - Preliminary study on knowledge needs and usage patterns*

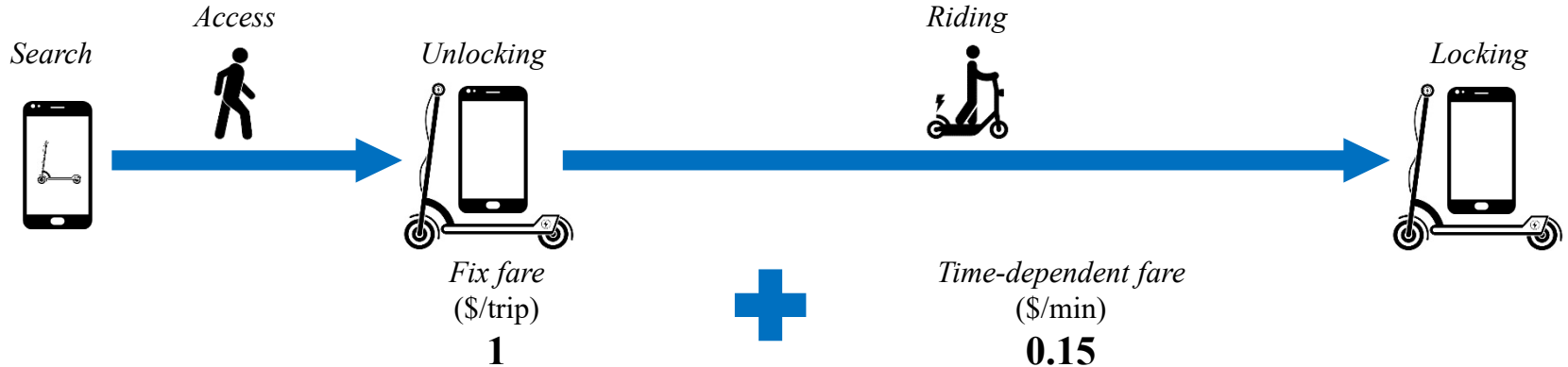Hugo Badia and Erik Jenelius

CTR day - October 19th, 2020

Micromobility - 4th Generation

3rd Generation	4th Generation
• *Electronically locking docks* • *Telecommunication systems* • *Smartcards* • *Mobile phone access* • *Credit cards*	• *Dockless security systems* • *Electric power assistance* • *New vehicle: e-scooter (cheaper, lighter, less regulated)*
Bike sharing systems *promoted by* ***public authorities***	***Shared e-scooter services*** *promoted by* ***private companies***

2005 *2017*

Source: NACTO(2018)

Shared e-scooters x2 micromobility trips

Service operation

Distribution · Relocation · Collection · Charging

Search · Access · Unlocking · Riding · Locking

Fix fare ($/trip) **1** + Time-dependent fare ($/min) **0.15**

- Adjustment of prices
- Expensive service
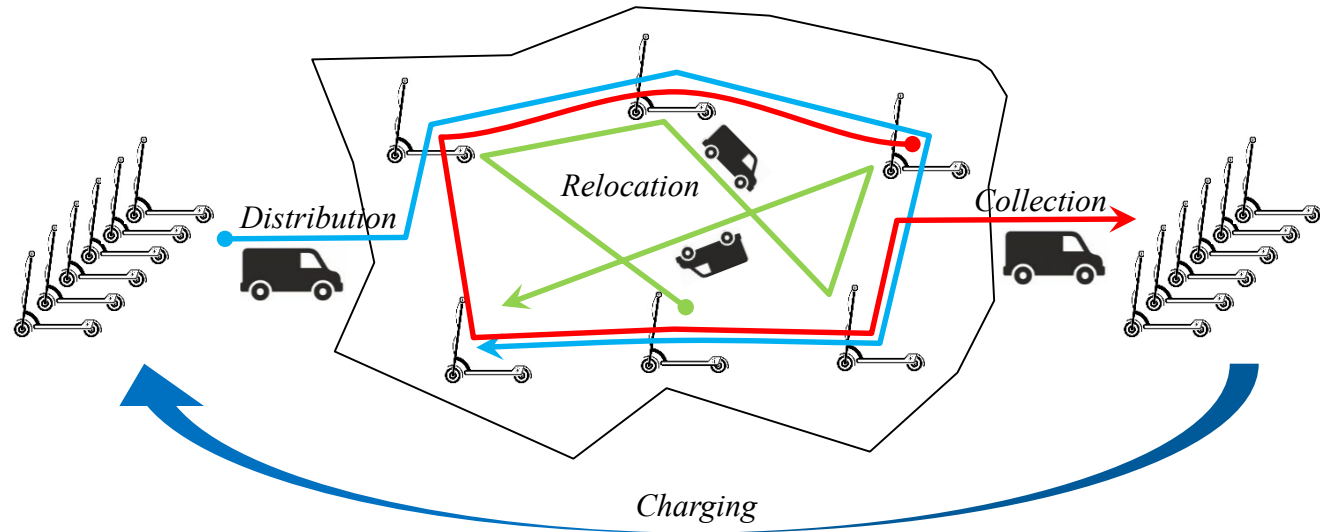
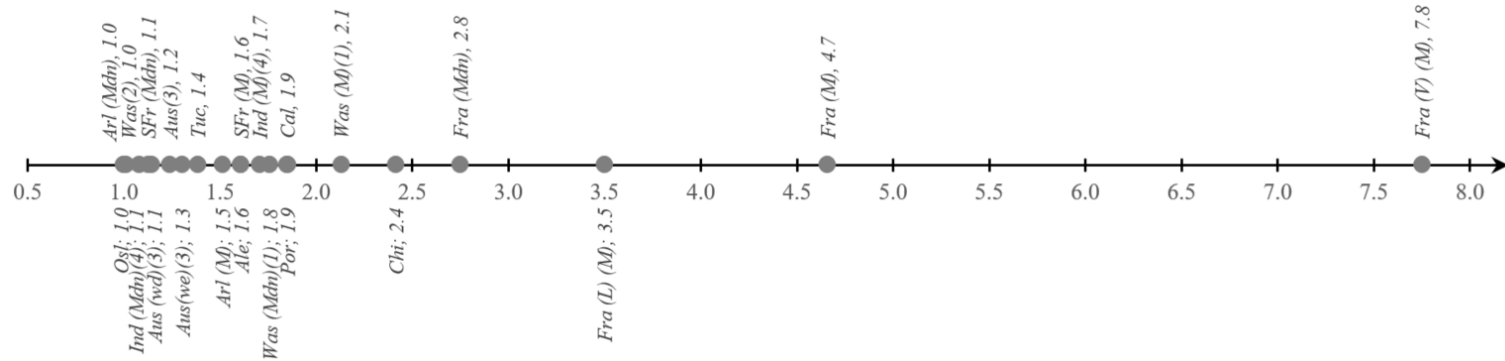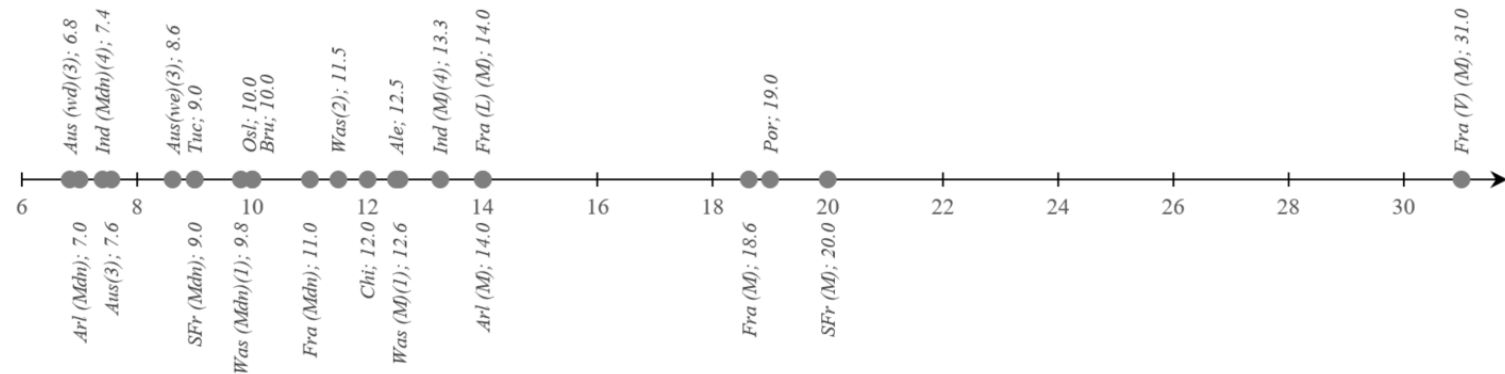| City/Company	Fixed fare	Time-dependent fare	Time (min) vs. PT	Time (min) vs. Bikesharing
Washington, DC ($) (Lazo, 2019); PT: Metrobus $2 (WMATA); BS: Capital bikeshare $2/30 min (Capitalbikeshare)				
Bird	1	0.39	2.6	2.6
Bolt	-	0.30	6.7	6.7
Jump	-	0.25	8.0	8.0
Lime, Lyft, Razor	1	0.24	4.2	4.2
Skip	1	0.25	4.0	4.0
Spin	-	0.29	6.9	6.9

Trip characteristics

Distance (km)
1.85

Arl (Mdn), 1.0
Was(2), 1.0
SFr (Mdn), 1.1
Aus(3), 1.2
Tuc, 1.4
SFr (M), 1.6
Ind (M)(4), 1.7
Cal, 1.9
Was (M)(1), 2.1
Fra (Mdn), 2.8
Fra (M), 4.7
Fra (V) (M), 7.8

Osl, 1.0
Ind (Mdn)(4), 1.1
Aus (wd)(3), 1.1
Aus(we)(3), 1.3
Arl (M), 1.5
Ale, 1.6
Was (Mdn)(1), 1.8
Por, 1.9
Chi, 2.4
Fra (L) (M), 3.5

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0

Duration (min)
13.12

Aus (wd)(3), 6.8
Ind (Mdn)(4), 7.4
Aus(we)(3), 8.6
Tuc, 9.0
Osl, 10.0
Bru, 10.0
Was(2), 11.5
Ale, 12.5
Ind (M)(4), 13.3
Fra (L) (M), 14.0
Por, 19.0
Fra (V) (M), 31.0

Arl (Mdn), 7.0
Aus(3), 7.6
SFr (Mdn), 9.0
Was (Mdn)(1), 9.8
Fra (Mdn), 11.0
Chi, 12.0
Was (M)(1), 12.6
Arl (M), 14.0
Fra (M), 18.6
SFr (M), 20.0

6   8   10   12   14   16   18   20   22   24   26   28   30

Speed (km/h)
8.36

SFr (M), 4.8
Por, 5.8
Arl (M), 6.5
Ind (M)(4), 7.7
Arl (Mdn), 8.6
Aus(we)(3), 9.1
Aus(3), 9.9
Was (M)(1), 10.2
Chi, 12.1
Fra, 15.0

Was(2), 5.3
Osl, 6.0
SFr (Mdn), 7.5
Ale, 7.7
Ind (Mdn)(4), 8.7
Tuc, 9.2
Aus (wd)(3), 10.0
Was (Mdn)(1), 10.8
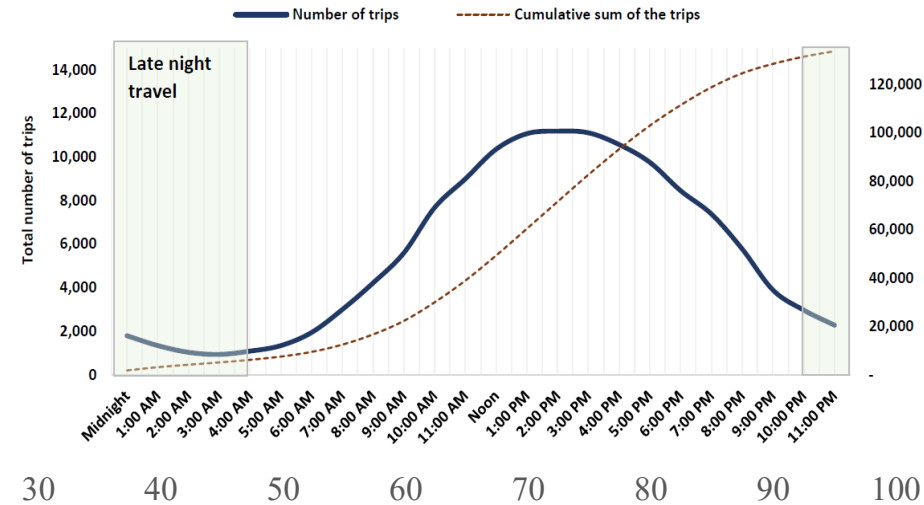
4   5   6   7   8   9   10   11   12   13   14   15
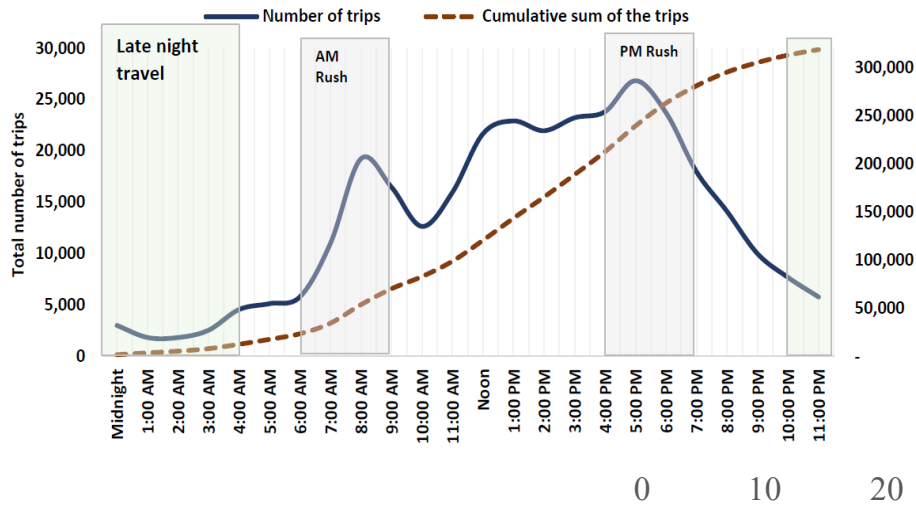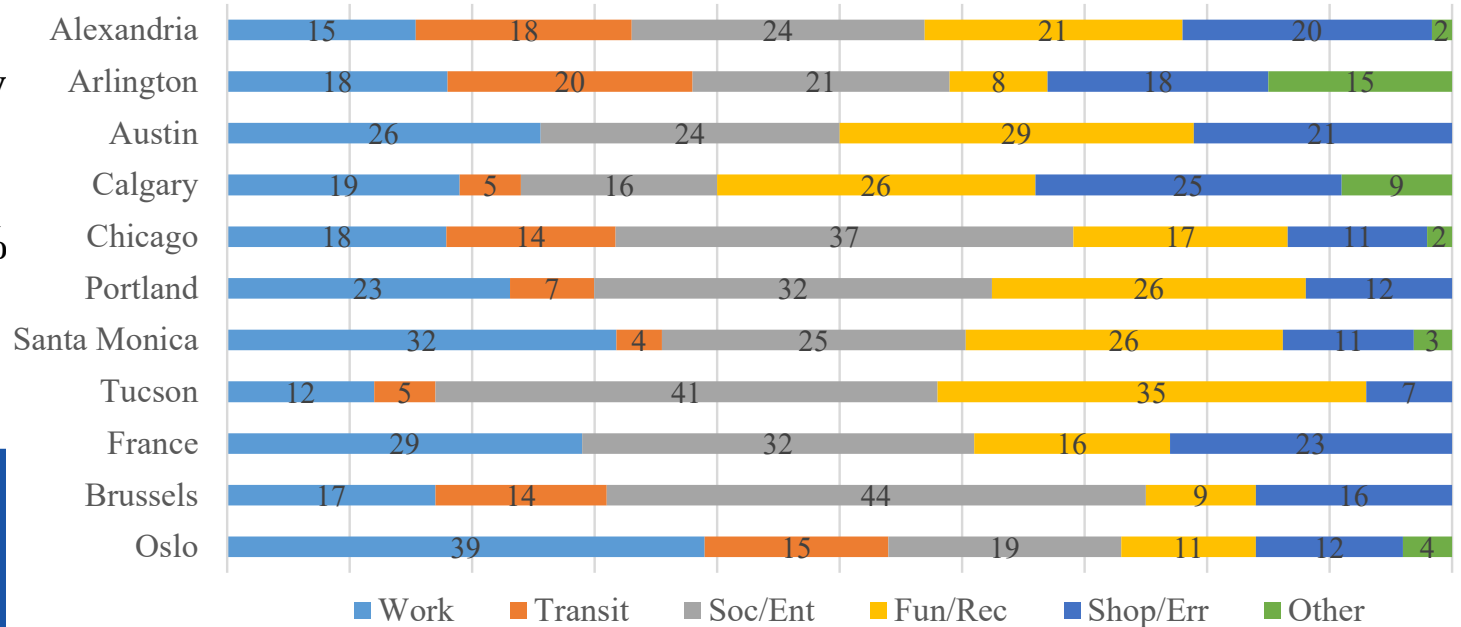
Temporal distribution and Trip purpose

▪ Main peak hour in the **afternoon – evening**, more demand during **weekends**

▪ Scooters are mainly used for **social life and free time**, 40%

	Work	Transit	Soc/Ent	Fun/Rec	Shop/Err	Other
Alexandria	15	18	24	21	20	2
Arlington	18	20	21	8	18	15
Austin	26		24	29	21	
Calgary	19	5	16	26	25	9
Chicago	18	14	37	17	11	2
Portland	23	7	32	26	12	
Santa Monica	32	4	25	26	11	3
Tucson	12	5	41	35	7	
France	29		32	16	23	
Brussels	17	14	44	9	16	
Oslo	39	15	19	11	12	4

Usage Frequency

- **Low daily use**, around 5%
- 3 out of every 5 users take scooters **monthly or even less frequently**
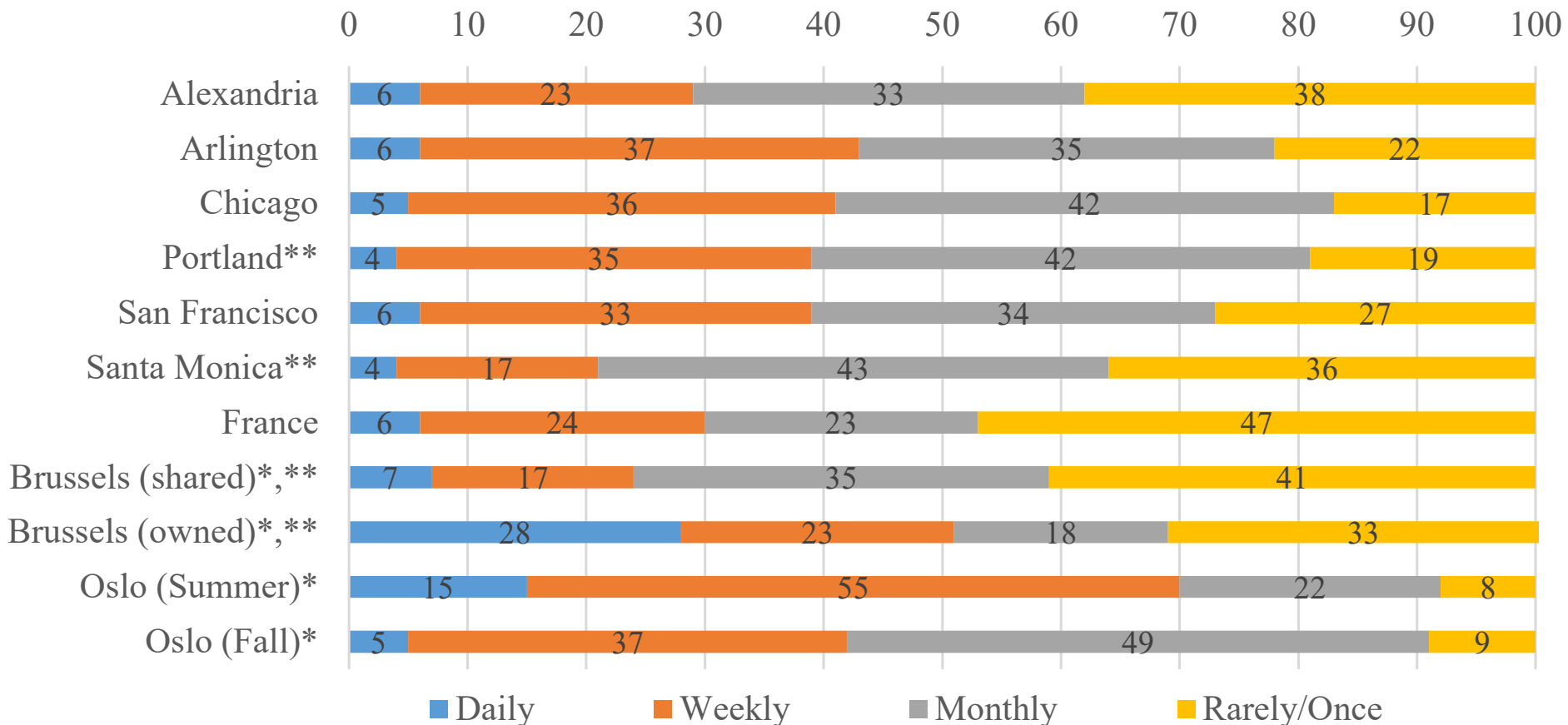
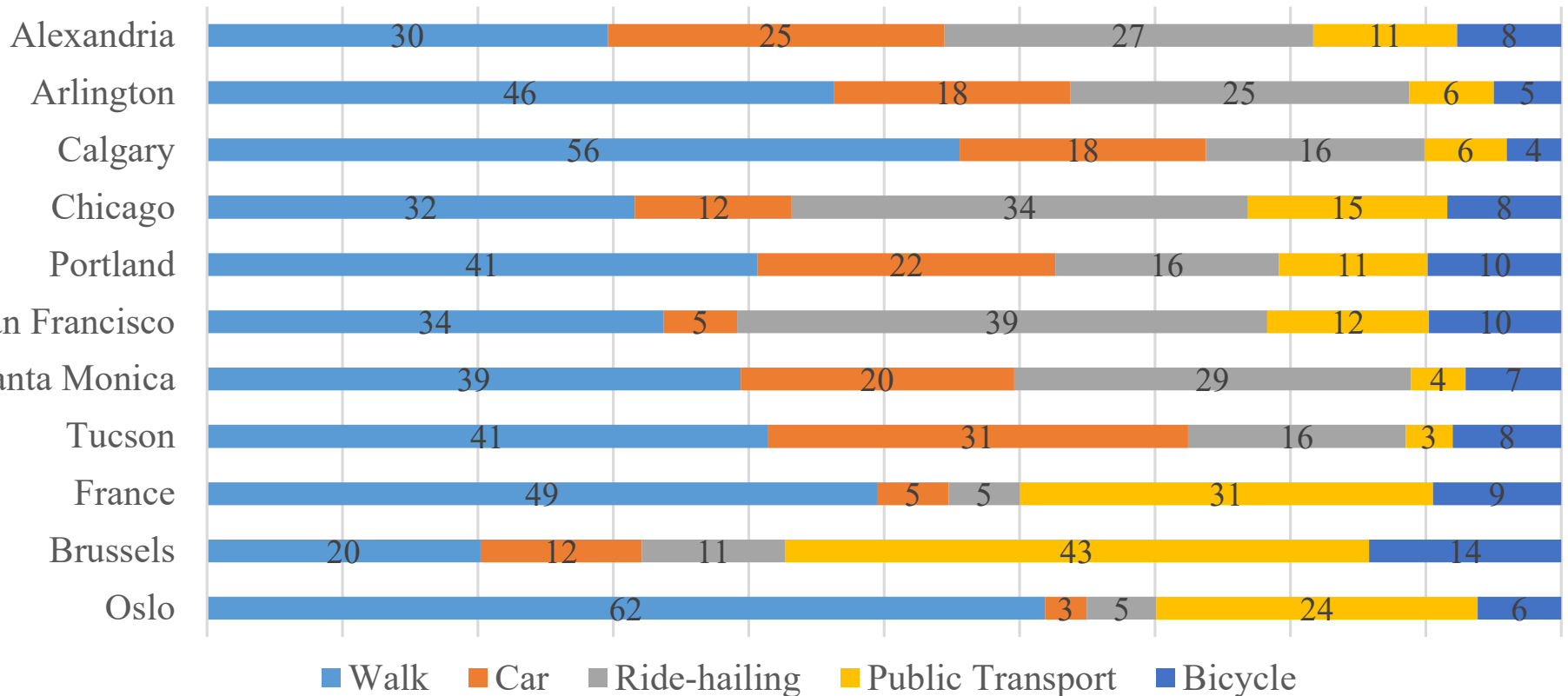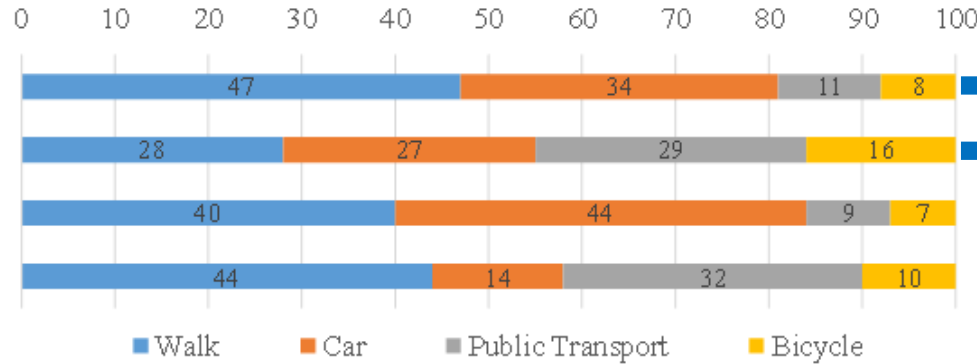| City	Daily	Weekly	Monthly	Rarely/Once
Alexandria	6	23	33	38
Arlington	6	37	35	22
Chicago	5	36	42	17
Portland**	4	35	42	19
San Francisco	6	33	34	27
Santa Monica**	4	17	43	36
France	6	24	23	47
Brussels (shared)*,**	7	17	35	41
Brussels (owned)*,**	28	23	18	33
Oslo (Summer)*	15	55	22	8
Oslo (Fall)*	5	37	49	9

Environmental Impact

Global warming impact
(g CO2 eq/pax-km)

	e-scooter	displaced mode
Hollingsworth et al. (2019)	125	93
Moreau et al. (2020)	131	110

Material → **Manufacturing** → **Transport** → **Use phase** — Collect-Dist / Charging

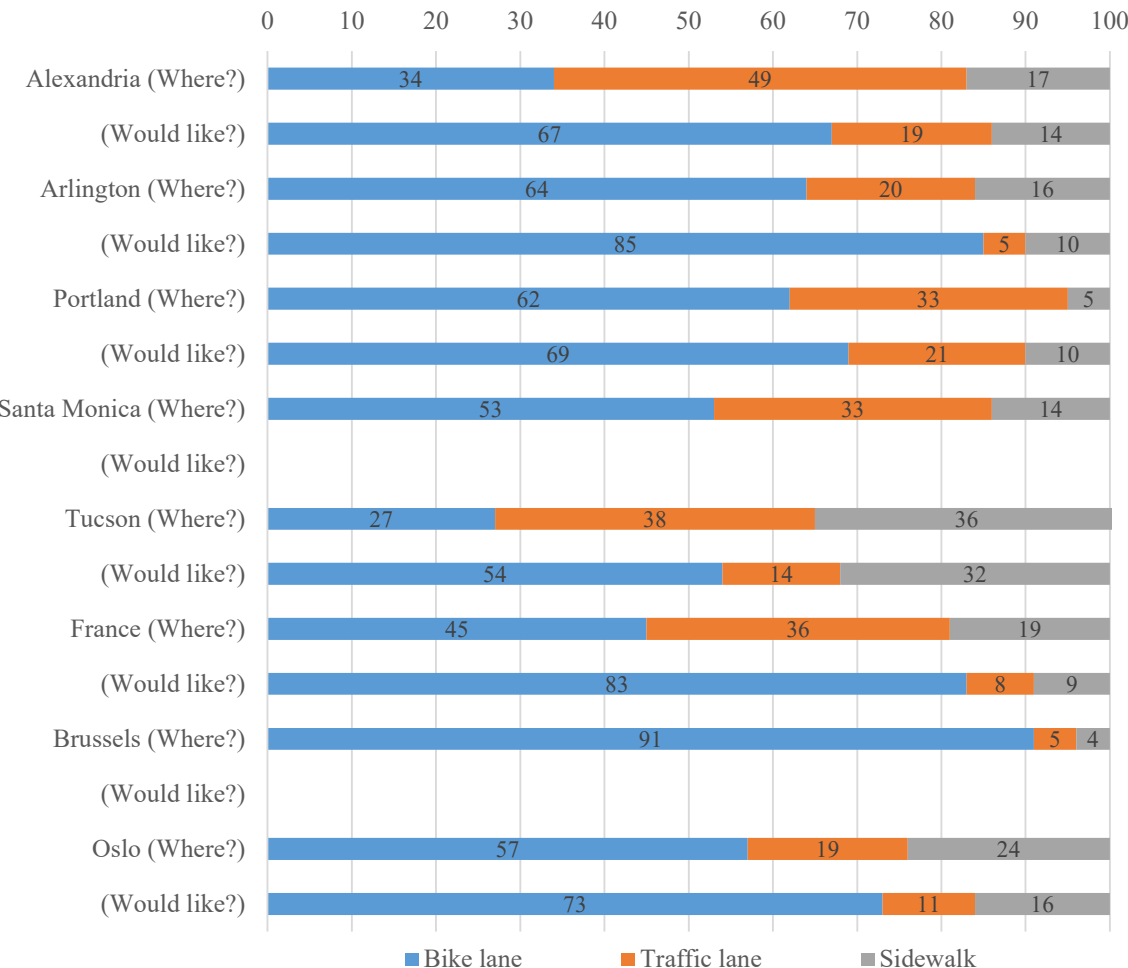50% - 80%   20% - 40%

- Short lifetime (months)
- Low usage rate (km/scooter-day)

- Type of auxiliary vehicle
- Distance traveled between scooters
- Low usage rate (km/scooter-day)

Riding and Parking

- Generalized **complains** for parked scooters and scooters riding on sidewalks
- **Most of riders use bike lanes**, being traffic lanes the main alternative
- **Riders demand more lanes for micromobility**, lack of this type of infrastructure

	Bike lane	Traffic lane	Sidewalk
Alexandria (Where?)	34	49	17
(Would like?)	67	19	14
Arlington (Where?)	64	20	16
(Would like?)	85	5	10
Portland (Where?)	62	33	5
(Would like?)	69	21	10
Santa Monica (Where?)	53	33	14
(Would like?)			
Tucson (Where?)	27	38	36
(Would like?)	54	14	32
France (Where?)	45	36	19
(Would like?)	83	8	9
Brussels (Where?)	91	5	4
(Would like?)			
Oslo (Where?)	57	19	24
(Would like?)	73	11	16

- **Properly parked**: 81% Chicago, 76% Tucson, 73% Portland
- **Longer disruptions** than cars (taxi, distribution, etc.), 5 minutes vs 2 hours
- Worst image than studies observe
- Esthetic/visual problem

Service regulation

- **Off-street competition**: maximum number of operators (from 1 to 8) and fleet size limited by operator or city (from 250 – 2000 e-scooters)
- **Permitting fees**: application and/or permission (per operation yearly and/or per vehicle)
- Requirements of efficiency, **expansion or reduction** of fleet size allowed. Between 2 and 3 trips per scooter and day
- Boundaries where companies operate and scooters can be parked (geofencing)
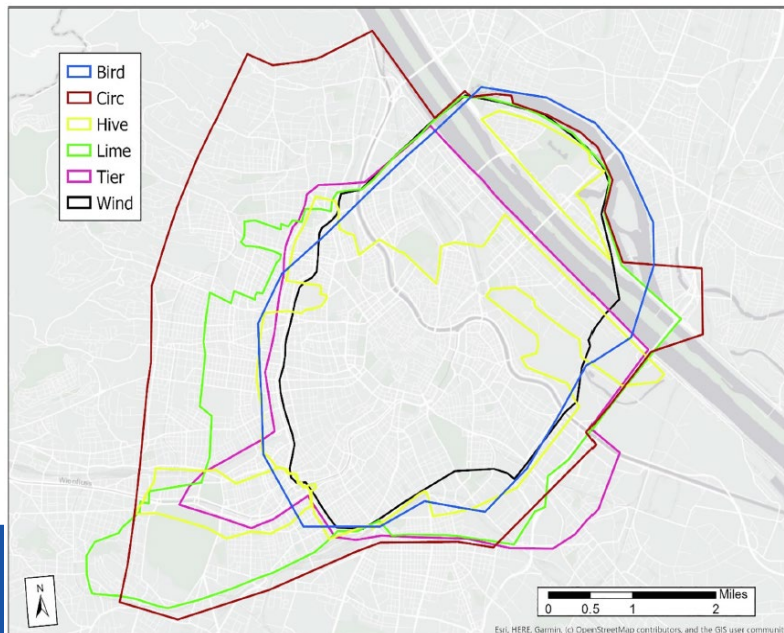
Future research

- Understanding this mobility services, their potentialities and market niche
  - Real data from e-scooter services and other transport modes
  - Comparison of e-scooter trips and trips by other modes
  - Survey for users
  - Survey for non-users
  - Swedish case

- Planning level, analysis of policies and regulations
  - Fleet sizing
  - Where e-scooters make the transport system more sustainable
 - Riding and Parking areas, management of urban space

Trip purpose data analysis

- MSc thesis Erik Lansner, soon to finish

- Trip data from Voi, about 3.5 million trips in Stockholm area

  - Start time and position, end time and position, hashed customer id, vehicle id

- Locations from Open Street Map, grouped into categories

- Identifies the locations near the end position of each trip

Heatmap including all activity in the
Stockholm area
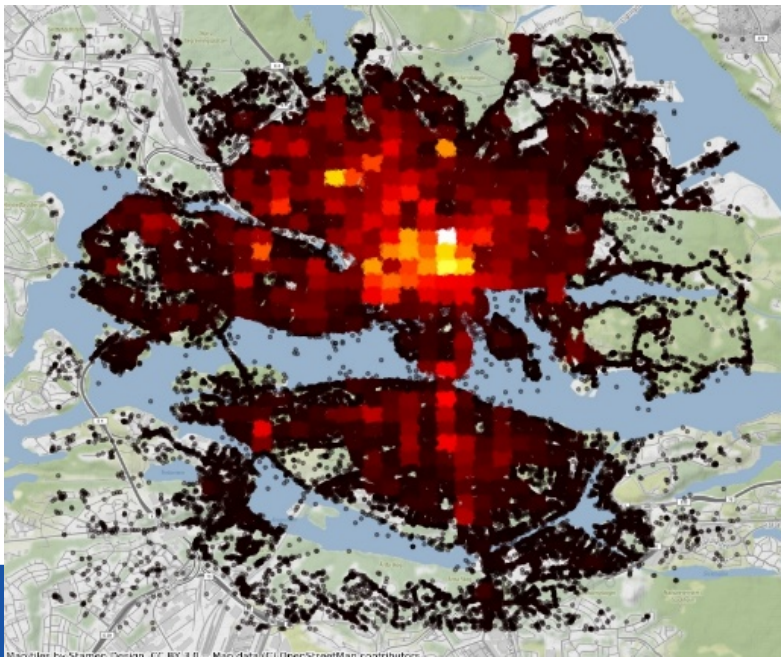
busandsubway
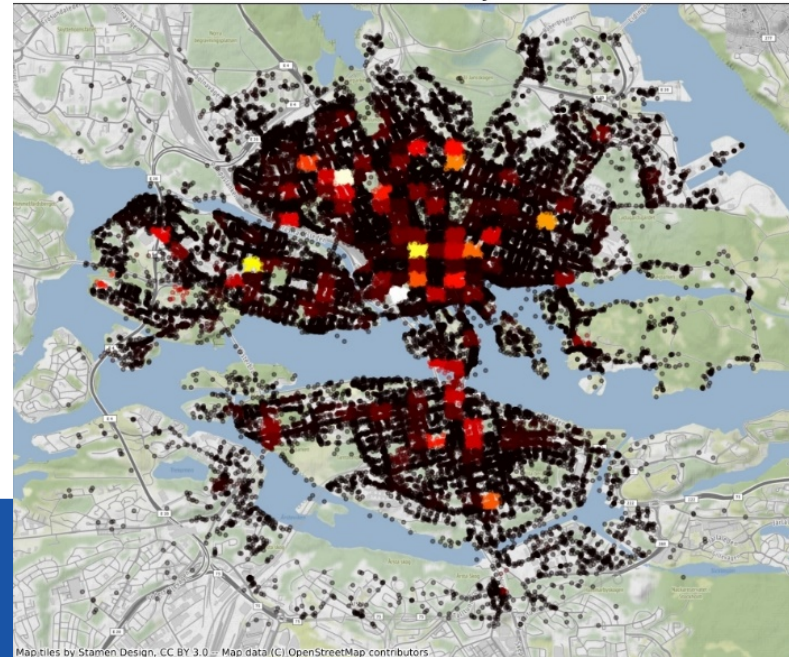
Thank you for your attention

hubr@kth.se