

# Shared mobility and ride sourcing: Status quo, regulation and outlook

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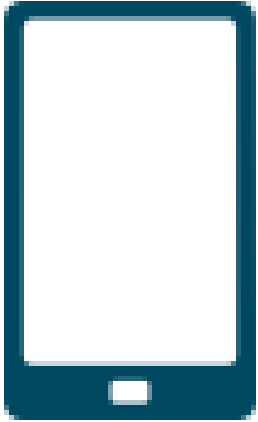
MOYCOT-Conference

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Knowledge for Tomorrow



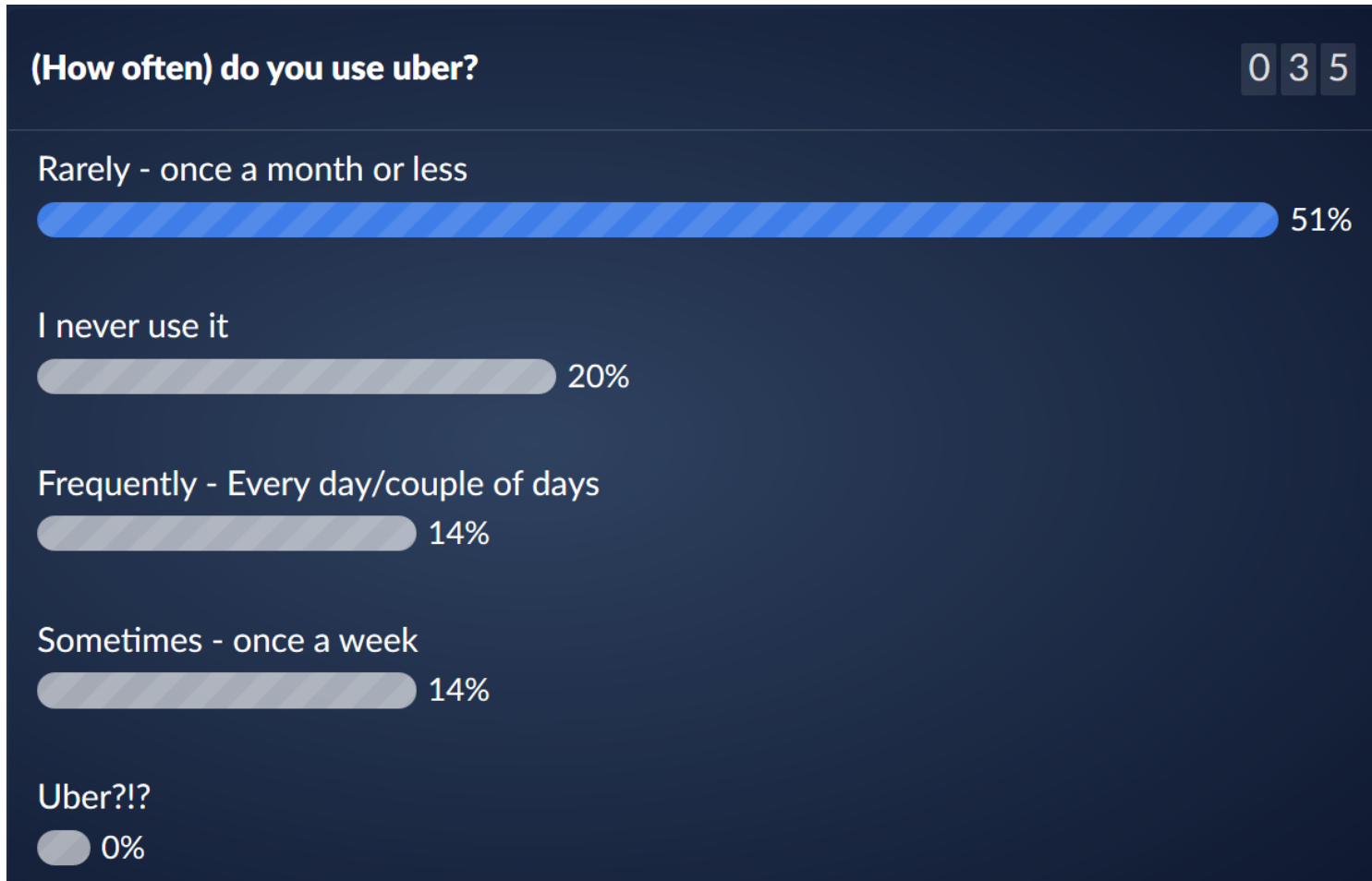


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**Do you use uber?**



# Pool with students from UNAL, yesterday



# Outline

## Shared mobility and ride sourcing

- Definition and conceptualisation
- Current state



## Case studies

- Market insights from case cities
- Paradigmatic cases



## Outlook

- Market outlook
- Regulatory frameworks



# Part I. Shared mobility and ride sourcing

## Shared mobility and ride sourcing

- Definition and conceptualisation
- Current state



## Case studies

- Market insights from case cities
- Paradigmatic cases

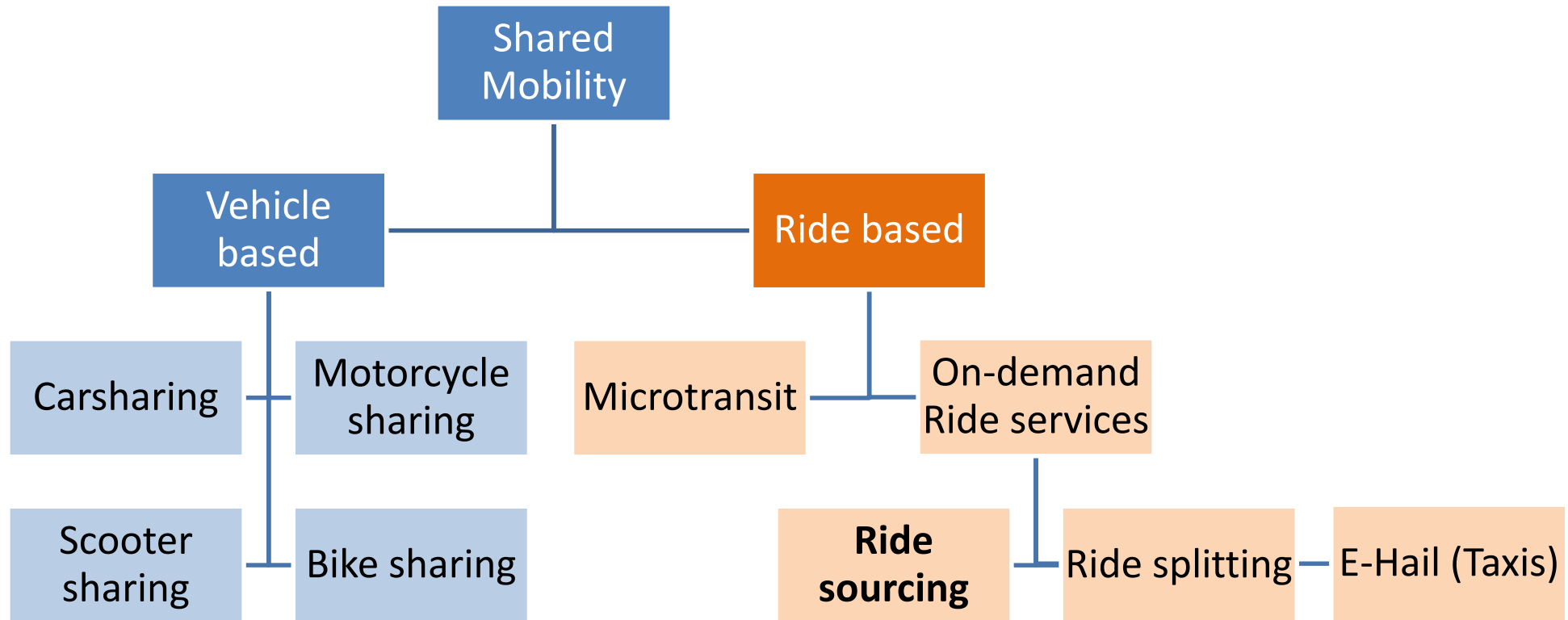


## Outlook

- Market outlook
- Regulatory frameworks



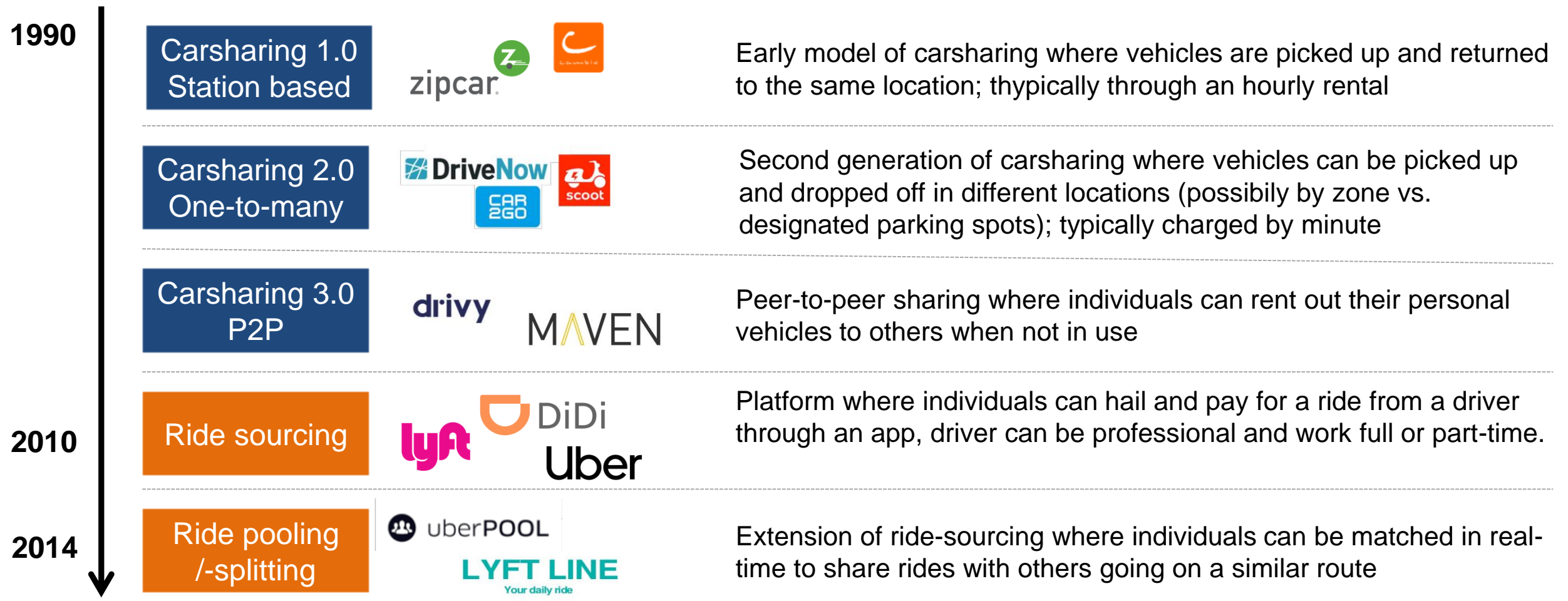
# Conceptualization of 'shared mobility'



Own, inspired by Shaheen & Chan 2016



# Overview of vehicle based shared mobility options



Source: Based on Clewlow & Mishra, 2017



## Transportation Network Companies (TNC)

- Companies like uber, Lyft, Cabify, Didi Chuxing offering a variety of services around “selling rides”
- TNC has established as the official term describing companies offering the variety of services around “selling rides”
- TNC defined by the California Public Utility Commission (CPUC):

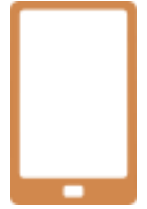
*“a company that uses an **online-enabled platform** to **connect passengers** with **drivers** using their **personal, non-commercial Vehicle**”*

- Companies are considered start-ups due to their relatively young age, their IT background and their business strategies of fast expansion
- Lyft & Uber have announced an Initial Public Offering (IPO) for this year, meaning they will become companies listed on the stock market

The Uber logo, consisting of the word "Uber" in a bold, black, sans-serif font.The DiDi logo, featuring an orange stylized 'D' icon followed by the word "DiDi" in a grey, sans-serif font.The Lyft logo, featuring the word "Lyft" in a bold, pink, sans-serif font.



# How ride sourcing works



**Supply**

**TNC**

**Demand**

Private, non-professional drivers  
Private, non-commercial vehicles

Matching

Passenger  
Ride-request  
(„Door-to-Door“)

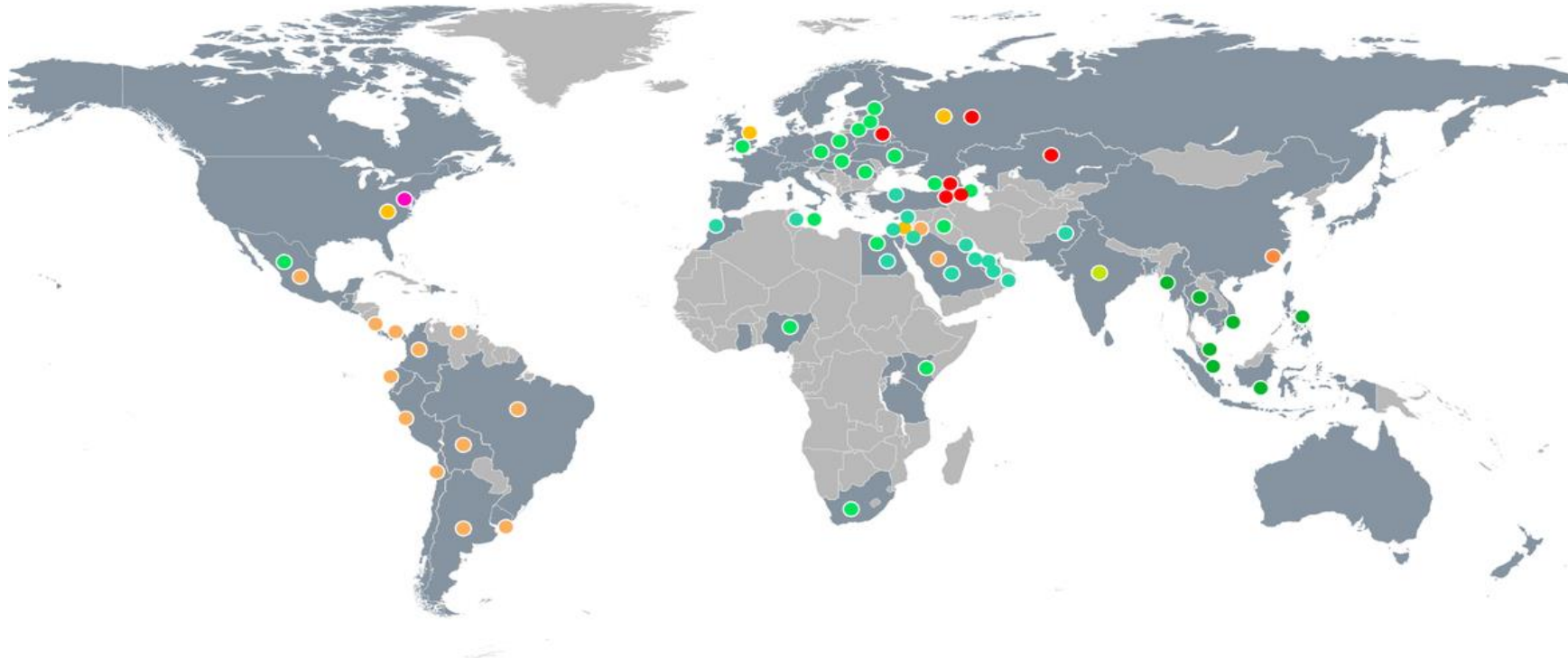
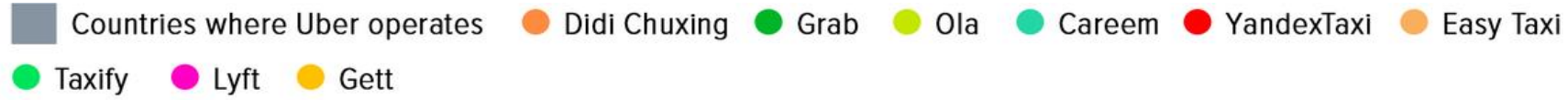
Routing and pricing based on  
real-time data before the trip  
(pre-price prediction)

20 – 25 % Commission  
of the price of the ride

Positioning using a  
GNSS (i.e. GPS)



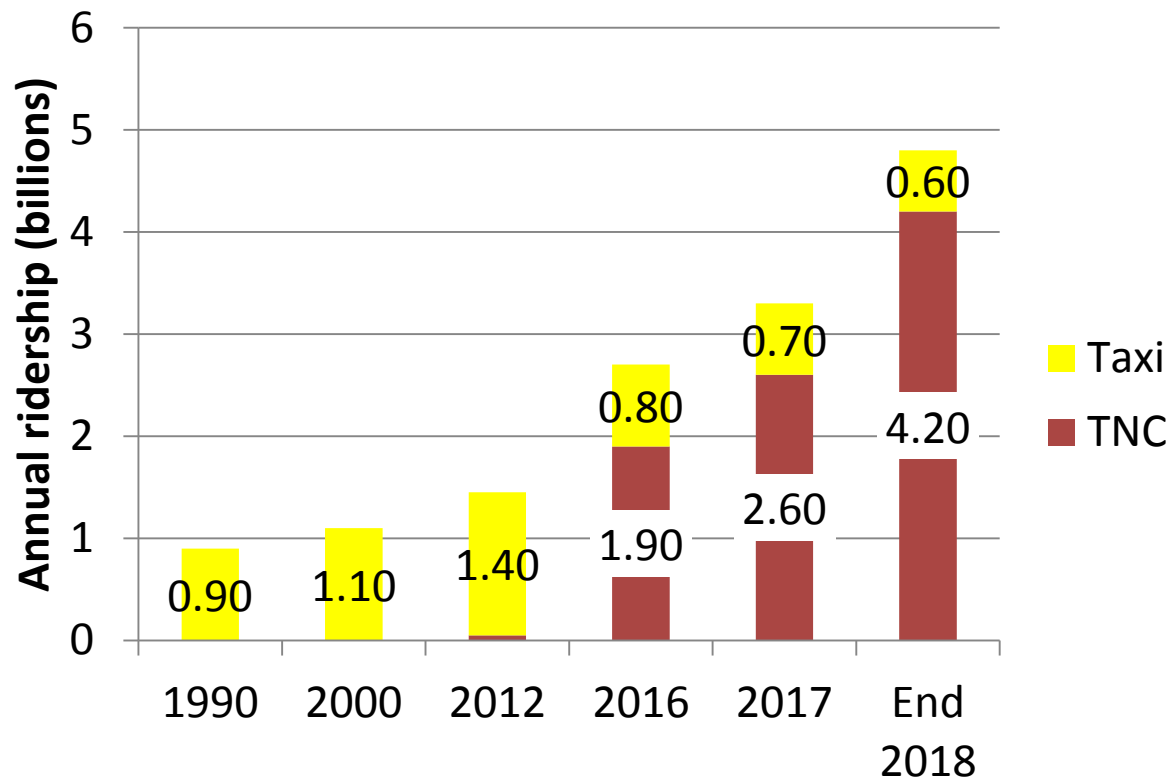
# The Global TNC Market in 2017: Uber & Co.



Source: Mashable.com, „Uber's global rivals are teaming up, and here's who they are”, Retrieved 04.05.2018  
<https://mashable.com/2017/08/16/uber-global-rivals-didi/#hS5qSx9zsgqf>



## Growth of ride sourcing: Evidence from USA



- In New York City, ride sourcing takes over a significant share of taxi rides within short time
- Further evidence on impacts:
  - VMT increase: 3.5% citywide, 7% in Manhattan
  - Around 30% of cities' inhabitants uses ride-sourcing
  - Takes share from all other modes, especially Bus (-6%) and Metro (-3%)
  - About 50% of all trips would not have been carried out, or carried out by NMT (Bike, Walk)

(Schaller 2017, 2018; Clewlow and Mishra 2017)

Figure: TNC and Taxi ridership in USA 1990 - 2018

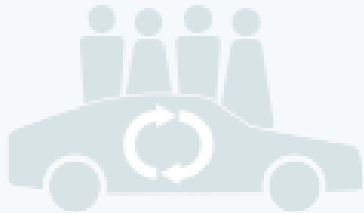
Source: Schaller 2018



## Part II. Case studies on the regulation

### Shared mobility and ride sourcing

- Definition and Conceptualisation
- Current state



### Case studies on regulation

- How do different global ride sourcing markets develop?
- Regulative approaches

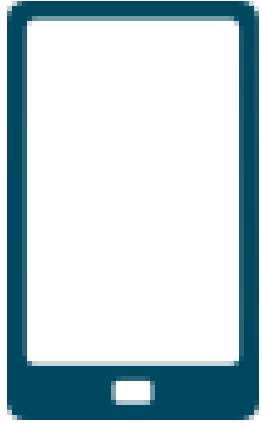


### Outlook

- Market outlook
- Regulatory frameworks



## Get interactive: On-the-fly Pool



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# One word about uber...



# One word about uber

0 3 0



## Base of this research: Pre-analysis of 16 cities, 3 extensive case studies

**Goal: Identify paradigmatic, leading ride sourcing markets in cities and assess their regulation strategies**

Europe	America	China	Africa
<ul style="list-style-type: none"> <li>▪ <b>Paris</b></li> <li>▪ Wien</li> <li>▪ London</li> <li>▪ Amsterdam</li> <li>▪ Moskau</li> </ul>	<ul style="list-style-type: none"> <li>▪ Atlanta</li> <li>▪ Los Angeles</li> <li>▪ <b>San Francisco</b></li> <li>▪ New York</li> <li>▪ Vancouver</li>   <li>▪ Bogotá</li> <li>▪ <b>Mexiko-City</b></li> <li>▪ São Paulo</li> </ul>	<p>Chongqing Hangzhou Shanghai</p>	<p>Cape Town</p>



# Subsequent qualitative Analysis

Target group	Topics
Administration	<ul style="list-style-type: none"><li>- View on ride sourcing and other EMT</li><li>- Regulatory approach</li><li>- Intermodal integration</li></ul>
Service Providers (TNC)	<ul style="list-style-type: none"><li>- Service and supply</li><li>- Strategies and cooperations with PT</li></ul>
Academia, NGO	<ul style="list-style-type: none"><li>- Effects on the mobility</li><li>- Users and usage</li><li>- Outlook</li></ul>
Results based on 15 expert interviews (+ additional background talks)	





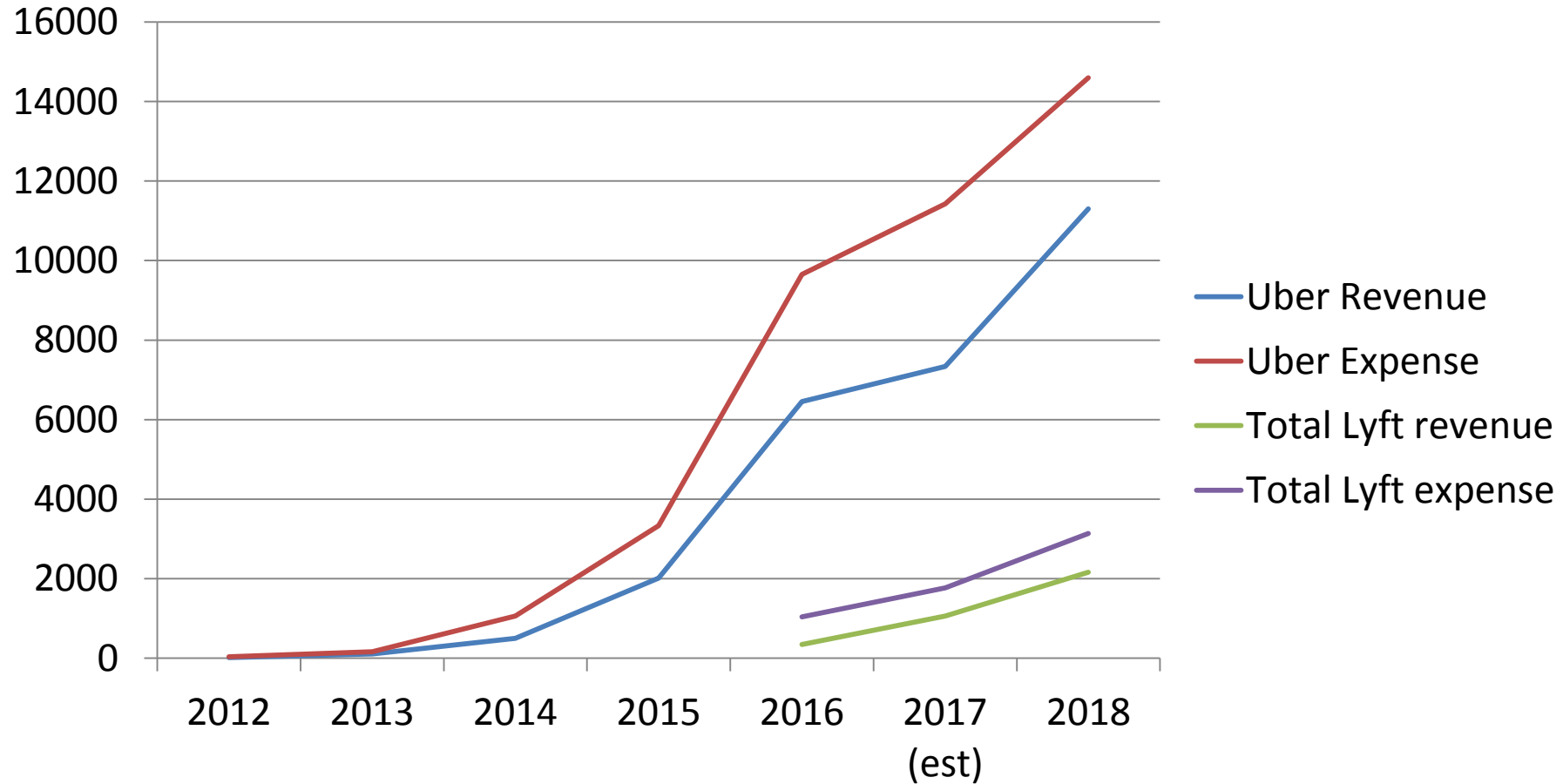
## Key research finding: TNC are not profitable

“Uber is basically a bet of the tech-VCs on robo-taxis and that, whoever dominates this market when the technology is ready, will become market leader” – Researcher, USA

- Uber, Lyft have faced **high losses** ever since
- **Expansion** is the main goal
- TNCs try to **diversify** their **strategies** and products and develop new business models
  - Diversification of **vehicle types**: uberGreen, uberVan, uberAccess, ...
  - **New services**: Food-delivery (uberEats), Parcel Delivery (uberDelivery) and more
  - **Selling data**
  - **Cooperation's with car** manufactures for leasing contracts (monthly rate is absorbed with drivers' ride revenues)
- Lyft announced its IPO early 2019
- Uber plans to follow later this year



# Revenue and expenses from uber and Lyft



## Financial Results from Uber, year 2017 (unofficial)

- Uber: Deficit of over 4 Billion. US\$ in 2017, +61 % to 2016

US\$millions	2012	2013	2014	2015	2016	est2017
Total passenger payments		685	2957	8900	20000	36900
Driver gross revenue			2462	6890	13550	29560
% pax fares retained by drivers			83%	77%	68%	80%
Uber Revenue	16	104	495	2010	6450	7340
Uber Expense	35	161	1060	3330	9650	11428
EBITDTAR margin		55%	114%	66%	50%	56%
EBIDTAR contribution	-19	-57	-565	-1320	-3200	-4088

<https://www.nakedcapitalism.com/2017/12/can-uber-ever-deliver-part-eleven-annual-uber-losses-now-approaching-5-billion.html>



## Financial results from Lyft, based on IPO 2019 documents

<b>US\$thousands</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Total Lyft revenue	343.298	1.059.881	2.156.616
Total Lyft expense	1.035.901	1.768.153	3.134.327
% expenses covered by revenue	33%	60%	69%
Lyft net income	- 682.794	-688.301	-911.335
Lyft net margin	-199%	-65%	-42%

Source: <https://www.nakedcapitalism.com/2019/03/hubert-horan-can-uber-ever-deliver-part-eighteen-lyfts-ipo-prospectus-tells-investors-no-idea-ridesharing-ever-profitable.html>



## San Francisco Bay Area: Starting point for the ride sourcing industry

- High density city
- Innovative environment regarding companies, users, policy makers
- Patchy public transport network
- 2018 more than 40.000 ride sourcing vehicles registered

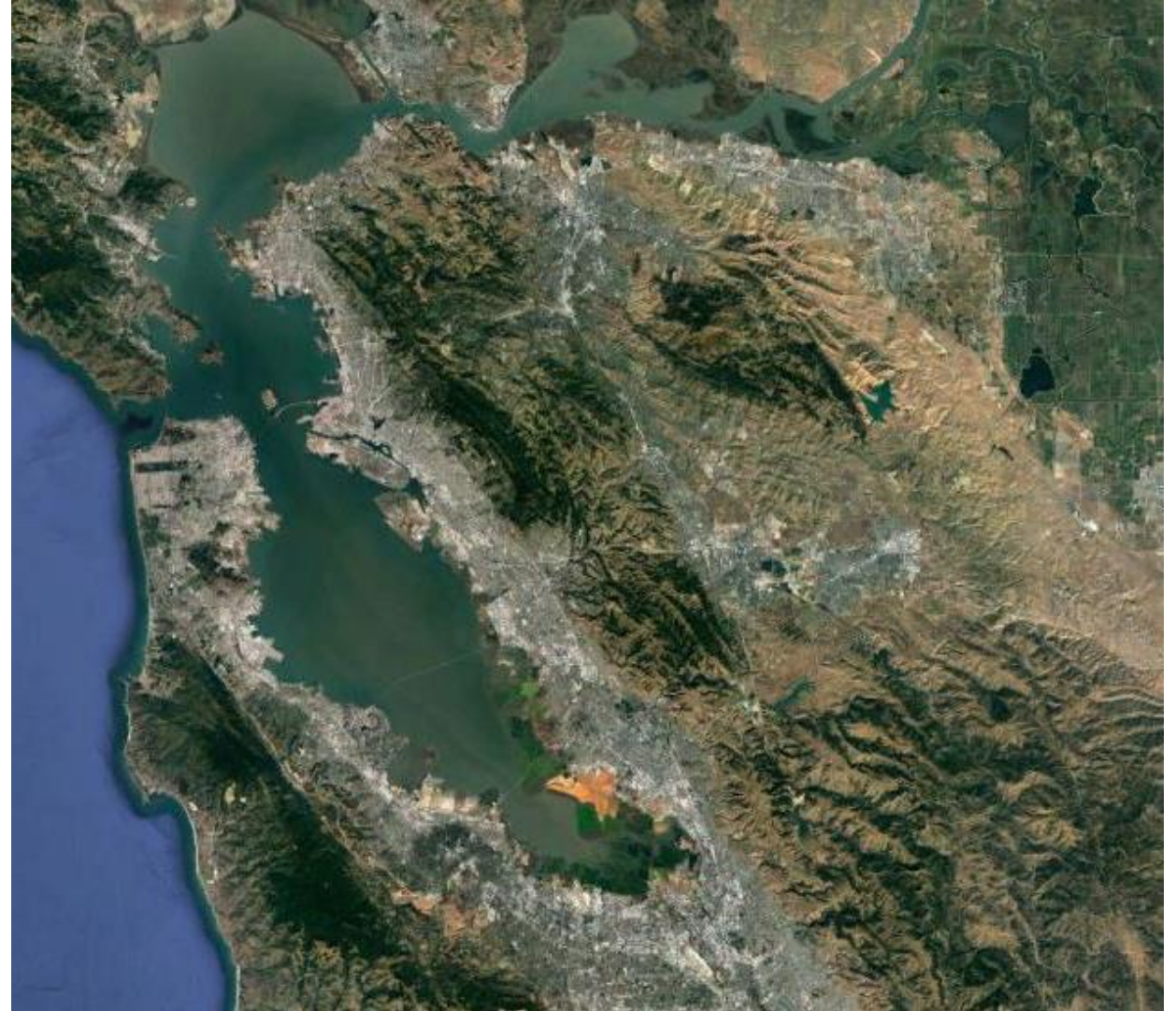


Photo: Google Earth

Source: Own research

## Mexiko City: First regulation in Latin America

- Latin Americas largest agglomeration
- (Relatively) advanced public transport network with 12 metro lines and BRT
- Ride sourcing considered to have high impact on the mobility in the city
- About 50.000 drivers registered for Uber (by Jan. 2018)



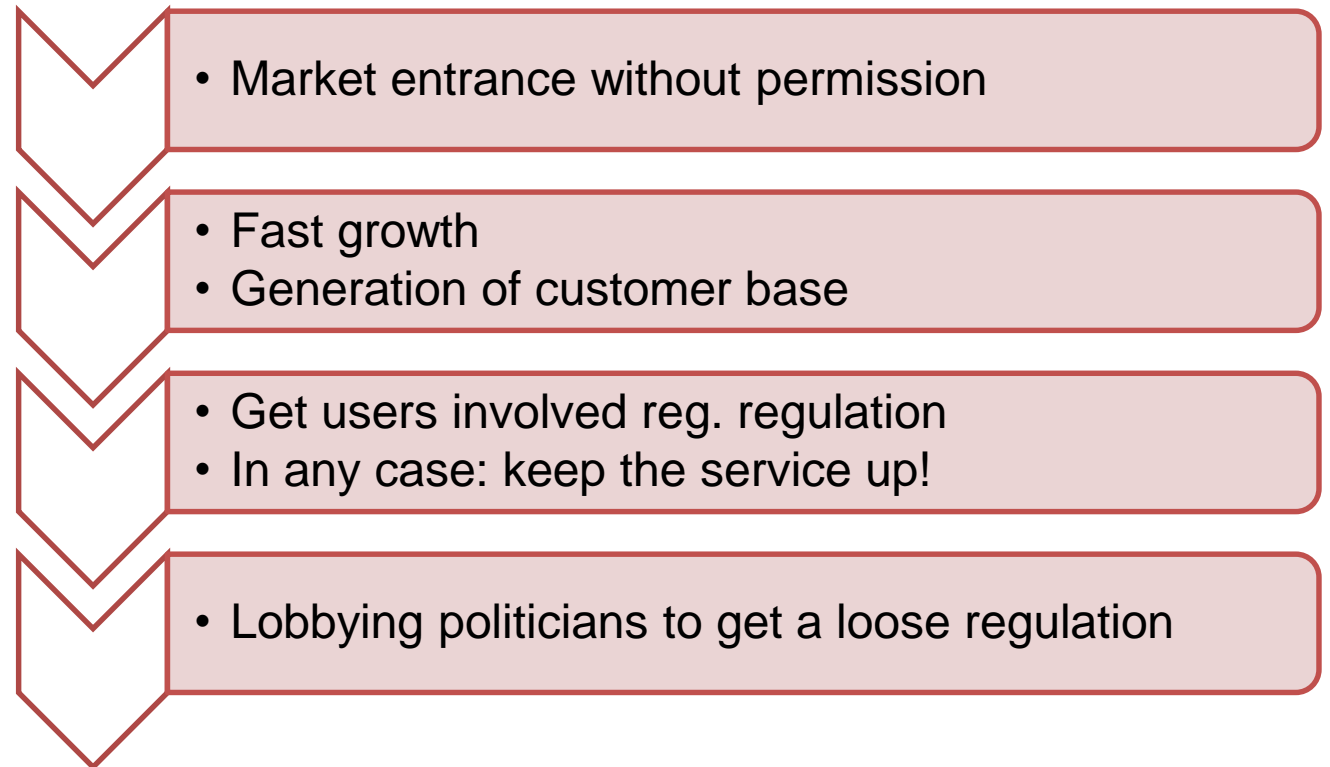
Photo: Google Earth

Source: Own research

# San Francisco: Benchmark for the regulation of Transportation Network Companies (TNC)

„The city where you couldn't get a cab.“ (Flores/TUT-Pol, 2016)

- Regulation starts 2013, shortly after Uber and Lyft started their services
- TNC are an official mode of transportation
- TNC: *a company that uses an online-enabled platform to connect passengers with drivers using their personal, non-commercial Vehicle* (California Public Utilities Commission 2013)
- Lyft starts aggressive market entrance, uber responds and refines this system to expand globally



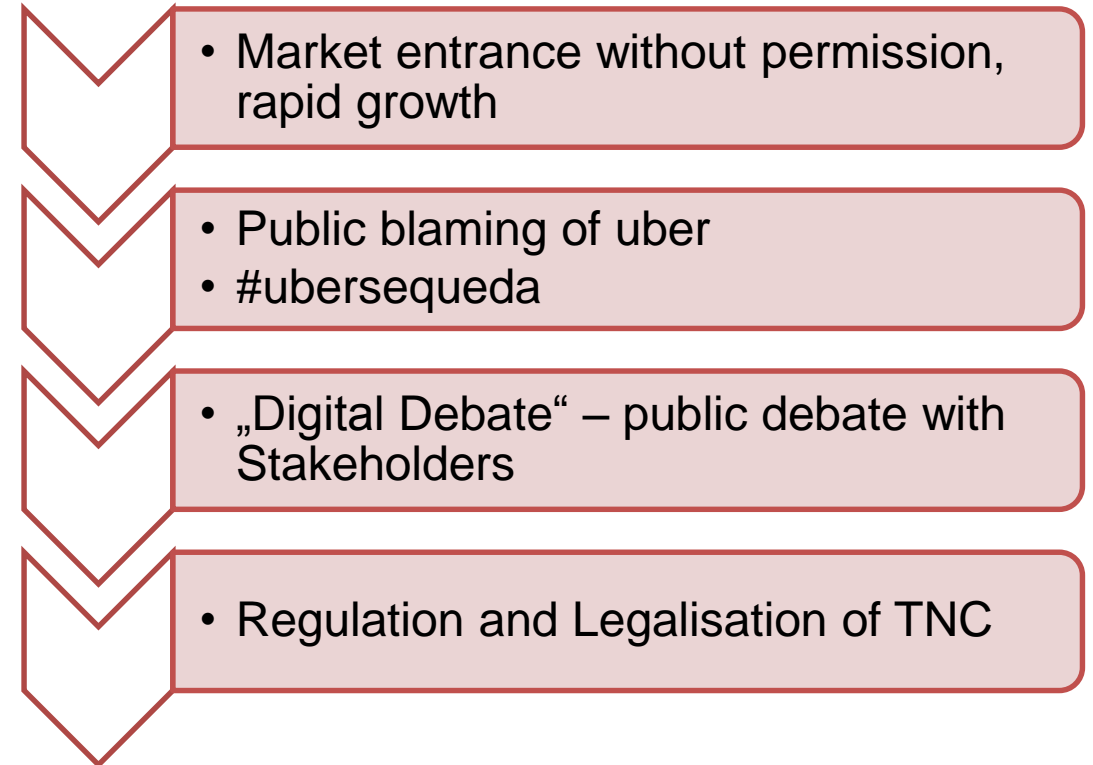
Source: Flores/TUT-Pol 2016, own field research 2018



## Mexico-City: Paradigmatic for Latin American cities

*„The regulation was made to satisfy all, especially the existing lobby groups of taxistas and minibus-drivers, but also the upper middle class riders that got used to uber in short time.“ – Employee of a NGO*

- Regulation of TNC since 2015, the first regulation in Latin America
- Uber follows a similar strategy to San Francisco
- Regulation:
  - TNC have been regulated to become quite expensive
  - They are an option for the upper middle-class
  - Market is a Duopol (uber & Cabify) – something very common in other cities



Source: Own research





## Paris: VTC Regulation

*„In Paris, Uber and co. are just one option amongst many. They mainly take ridership from Taxi, but also from public transport.“* Public servant from Paris

- TNCs are legal
- TNC are relatively similar to a taxi service in terms of service, slightly lower cost allow for a cheaper service
- Drivers and vehicles need to register as VTC („*Vehicle Transport avec Chauffeur*“)
- Quite strict requirements regarding drivers and vehicles
- Registration cost: 1000€ (vs. Taxi license that are ~200.000€)
- In future, taxi and VTC requirements will be harmonized
- TNC drivers in Paris are only professional drivers (certified, full-time workers)

Source: Own field research



## Regulation of TNC in case cities

	California	Paris	Mexiko
<b>Regulator</b>	State	National	City authority
<b>Status of drivers</b>	Private	Professional	Registered, private
<b>Vehicle registration</b>	Not public, but with TNC	Yes, as with authority	Yes, with authority
<b>Vehicles standards</b>	By TNC	Min. standard by regulation (size)	Min. price by regulation (~10.000 US\$)
<b>Regulated tarif</b>	No	No	No
<b>Data sharing</b>	Yes (but not being done)	No (in planning)	No
<b>Mobility fund</b>	Yes, 1,5% of Revenue	No	Yes, 1,5% of Turnover
<b>Vehicle cap</b>	No	No	No

Source: Own field research



## Intermediate Summary

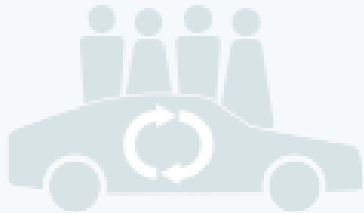
- Ride sourcing has become a global market in short time
- Our case study research provides insides into different markets and regulatory frameworks and shows that TNCs can adopt quickly into different environments
- Ride sourcing is not profitable nowadays
- TNCs are involved in a deficitary expansion process with the goal to become market leader
  
- This brings up immediate questions
  - a. How can this aggressive market expansion be explained with respect to the outlook for this business?
  - b. How to deal with TNC from a perspective of the *regulator*?
  
- Aspect a) will be assessed now in the light of automation, assuming that TNC operate autonomous vehicle fleets on their own.



## Part III. Outlook and attempt for explanation

### Shared mobility and ride sourcing

- Definition and Conceptualisation
- Current state



### Case studies

- Market insights from case cities
- Paradigmatic cases



### Outlook

- Market outlook with automation



# Prospects of TNC with automation

**“„There is no pathway to profitability without automation.“ – Wissenschaftler USA**

- If TNC are not profitable yet, automation may be the key
- How can we explain this?
- Subsequently, an analytical model is presented to show the cost structures for a TNC that has an own fleet of autonomous carsharing vehicles (ACS)



## Modelling the revenue structures of a TNC with automation

$$RR = \frac{K(F, N)}{q_{\max}}$$

$$A = \frac{1}{2} \frac{N}{RR} = \frac{1}{2} \frac{N \cdot q_{\max}}{K(F, N)}$$

$$C = c \cdot K(F, N) + RR \cdot P_{veh} + M(A) \cdot K(F, N)$$

RR: replacement rate of vehicles on a yearly base

A: Average age of the fleet

C: Cost structure of TNC

F: fare per kilometer

N: no. of vehicles

K(F,N) yearly demand for km, function of F and N

qmax: max vehicle km

M(A): maintenance cost per km

c: operational cost of vehicle per km

Pveh: purchase price of new vehicle minus residual price of used vehicle arriving a qmax



## Determining Average and Marginal Cost

$$C = c \cdot K(F, N) + \frac{K(F, N)}{q_{\max}} \cdot P_{veh} + M(A) \cdot K(F, N) \quad \text{with} \quad \frac{\partial M(A)}{\partial A} > 0$$

$$AC = c + \frac{P_{veh}}{q_{\max}} + M(A)$$

$$MC = c + \frac{P_{veh}}{q_{\max}} + M(A) + K(F, N) \cdot \frac{\partial M(A)}{\partial A} \cdot \frac{\partial A}{\partial K(F, N)}$$

$$MC = c + \frac{P_{veh}}{q_{\max}} + M(A) - \frac{1}{2} \frac{N \cdot q_{\max}}{K(F, N)}$$

1. Average (AC) and marginal cost (MC) do not depend on the amount of driven kilometers:  $c$  is independent from  $K(F, N)$
2. MC will always be smaller than AC



# Summarizing the model findings

## 1. AC/MC not depended on driven kilometers:

- Different then current situation, where operational costs depend on the availability of drivers, and therefore they increase as the demand for kilometers increases (increasing wages is required to keep drivers working or, eventually, to recruit more drivers).

## 2. Marginal cost are always below average Cost: Natural monopoly

- The leading company will experience lower costs than the competition
- Delivers an explanation why it is fundamental for ride sourcing companies to secure a leading position in the market before the advent of autonomous vehicles and the consequent change in the costs structures as well as the collision with car sharing companies.

## 3. Further findings (Algebra can be seen in Goletz&Bahamonde-Birke (2019))

- TNC-ACS operators will maximize their profit, not the welfare – N of vehicles may be to high, or too low
- With decreasing marginal cost, operators will have heavy incentives for frequent users
- Equal access to the service will not hold: Power users will get better conditions then others





# Summary

## Shared mobility and ride sourcing

- Ride sourcing has established worldwide in short time
- It takes share from all modes

## Case studies

- TNC adopt quickly to various conditions
- They do not make any profit!
- TNC seek to expand quickly, bearing little capital cost

## Outlook

- With automation, TNCs can become profitable and monopolists
- Hence, regulation is a must
- Further questions arise: What will other transport actors do? What are possible cooperation partners?



# Literature

- Clewlow, R.R. & Mishra, G.S. (2017). *Disruptive Transportation: The Adoption, Utilization, and Impacts of Ride-Hailing in the United States*. Institute of Transportation Studies, University of California, Davis, Research Report UCD-ITS-RR-17-07. [Download paper](#).
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- TUT-POL/Flores (2016): How Ridesourcing went fromRogue to Mainstream in San Francisco Draft: May 2016; <https://static1.squarespace.com/static/5804efd7cd0f68e576ecd423/t/5807c550f5e231877a71a079/1476904273321/San+Francisco+Case+2016.pdf>
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# Thank you!

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