Intelligent Transportation Systems

Rolland Vida, BME TMIT

The Fifth Element (1997) ☺

Car pooling

- The problem of public transportation is that it doesn't reach the individual homes
  - Especially in the agglomeration and the outskirts of the cities
  - You have to reach the first bus/metro stop, on foot or by car

- In the same time, most of the people commuting from the agglomeration ride alone in their car

- **Solution: car pooling**
  - More people in the same car, fewer cars, lower pollution, cheaper rides
  - Many solutions, but hard to do the matchmaking of drivers and passengers, questionable reliability, flexibility

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Dedicated Lanes - HOV

- HOV – High Occupancy Vehicles

  - Can be used only if at least 1 passenger next to the driver

    - Sometimes its use is restricted to rush hours

  - Buses, electric vehicles, bikes can also use it

  - Even cars, with a single person, if he/she pays for it

    - HOT (High Occupancy Toll) Lane

    - Adaptive pricing, based on demand

- The goal is to motivate people for car pooling

  - Lower pollution, fuel saving

- First bus lane in the USA between Washington and its beltway (1969)

  - From 1973 HOV 3+

  - In 2005, during morning rush hours from 6.30 to 9.30, 31.700 people in 8.600 cars (3.7 ppl/car in average), 29 minutes

  - In traditional lanes 23.500 people in 21.300 cars (1.1 ppl/car in average), 64 minutes ride

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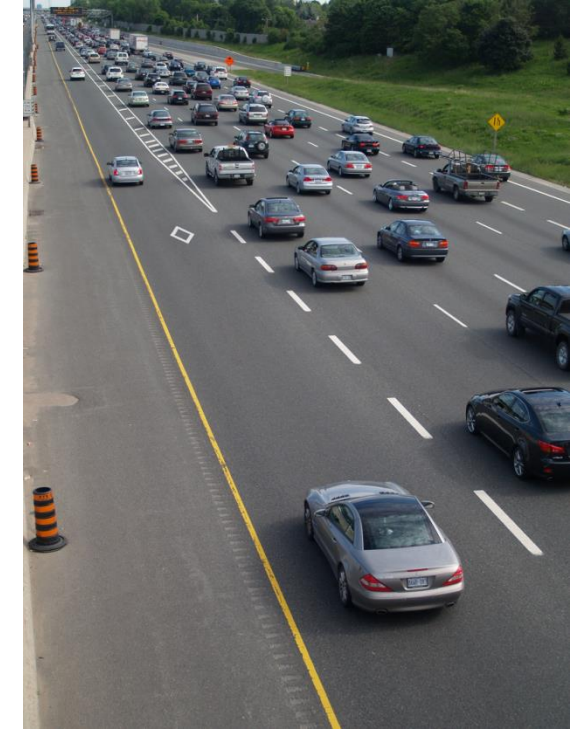
Bus and CarPool lanes (HOV)

- ## Controlling the HOV lanes with cameras
  - Fooling the system with inflated dolls
  - Against the law

- ## **Drawback – lanes are often sparsely used**

- ## Trial system in Lisbon in 2007 already
  - Used as bus lane only if a bus is approaching (based on data from sensors, schedule or GPS)
  - The other cars are alerted with light and sound signals

- ## Some HOV lanes in Australia transformed back to normal lanes
  - **If few cars are using it, it increases pollution**
    - Fewer normal lanes, slower traffic, higher fuel consumption
  - **If many cars are using, it has the same effect…**
    - Fast traffic encourages more people to travel by cars

Not respecting dedicated lanes

Intelligent Transportation Systems

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Uber

- Mobile application to matchmaking between passengers and private drivers
  - Started in 2009, in San Francisco. Today present in more than 500 cities in 60 countries

  - Not a peer-to-peer service, but rather a traditional taxi service
    - I do not take you, because I am around, but because you pay me
  - **Surge pricing** – adaptive pricing, based on demand and offer
    - Many cases caused big scandals
      - 2011 New Year's Eve, 7x price
      - Hostage drama in Sydney, Westminster Bridge attack in London

- **Advantages**
  - Simple and fast to call a cat (below 5 minutes)
  - Simple payment, with your credit card number
  - Usually cheaper than traditional taxi
  - Rating drivers and passengers

Uber

- Critics
  - Serious competition for traditional taxi companies
  - For many, not a fair competitor
    - Does not respect the requirements for **car equipment**
    - Fears for passenger **safety**
    - Drivers do not pay **taxes**, insurance
  - **Protests** in many cities (including Budapest)
    - Banned totally or partially in many cities/countries
  - **Aggressive business and marketing policies**
    - Private investigators to dig into personal lives of journalists
    - Publishing the personal contact information of judges, asking users to harass them
    - Sabotage against competitors

Uber in the world

Where Uber operates, and where it's been shut down

● Cities where Uber operates   ● Cities or countries where Uber is banned or is being challenged

Portland, Ore.
Dec. 8
Sues Uber, says it violates city laws

Nevada
Nov. 26
Statewide ban

Los Angeles, San Francisco
Dec. 9
Prosecutors sue over consumer protection issues

Colombia
Nov. 22
Car-booking apps that don't belong to registered taxi firms are prohibited

Toronto
Nov. 19
Asks court to shut down Uber, citing safety concerns

Rio de Janeiro
Dec. 8
Says Uber is illegal and threatens to take drivers' cars

Brussels
Apr. 15
Says UberPop is illegal

Paris
Aug. 4
Court says Uber can't charge by the kilometer

Netherlands
Dec. 8
Halts UberPop service

Spain
Dec. 9
Country-wide ban

Berlin, Hamburg
Sept. 26
Says Uber drivers lack required license

New Delhi
Dec. 7
Bans Uber after a driver is accused of raping a passenger

Thailand
Nov. 28
Regulator says car-booking apps face fines

Sources: Uber, Bloomberg reporting

GRAPHIC: ALEX TRIBOU / BLOOMBERG GRAPHICS

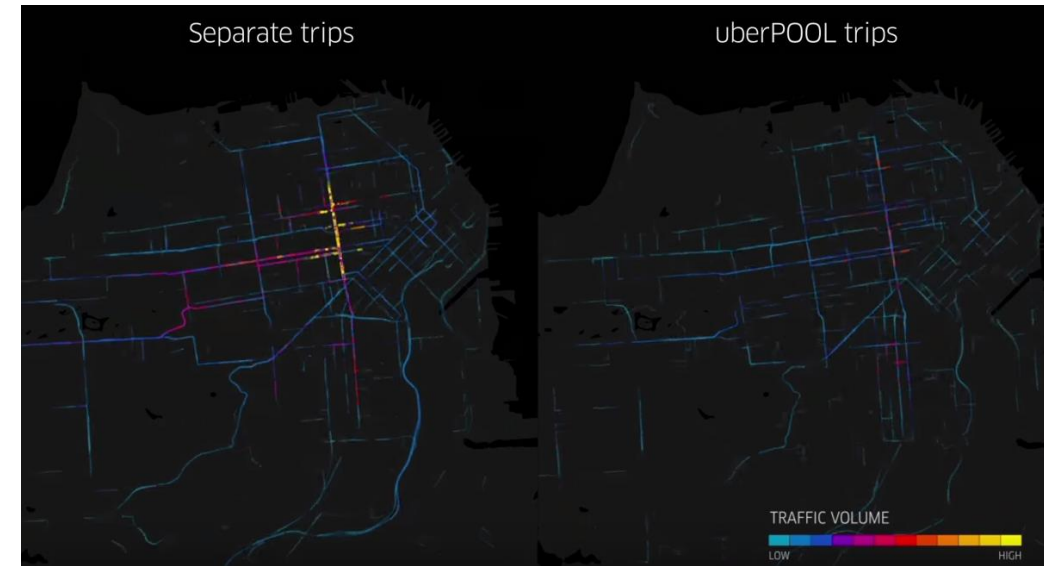# UberPool

- **Carpooling** service
  - If two rides start from roughly the same area, and go in roughly the same direction, pool them together

- **Advantages**
 - Cheaper, decreases traffic, decreases pollution

- **Drawbacks**
  - Drivers do not like it, as it generates lower income than two separate rides
    - Additional headache is the second passengers is late, or hard to find
  - Passengers do not like it, as it is unpredictable in terms of price and time
    - Another passenger can jump in during the ride
    - Look at it as a taxi service, for which this is not usual
      - In case of a pure car pooling service it would be acceptable

Separate trips   uberPOOL trips

TRAFFIC VOLUME
LOW   HIGH

Google

$4.15
SHARE YOUR CAR
1-2 PEOPLE

OR

$6.09 & UP
GET YOUR OWN CAR
UP TO 4 PEOPLE

👤 1 ⌄

Request uberPOOL

PICKUP TIME IS APPROXIMATELY 4 MINUTES

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Is owning private cars sustainable?
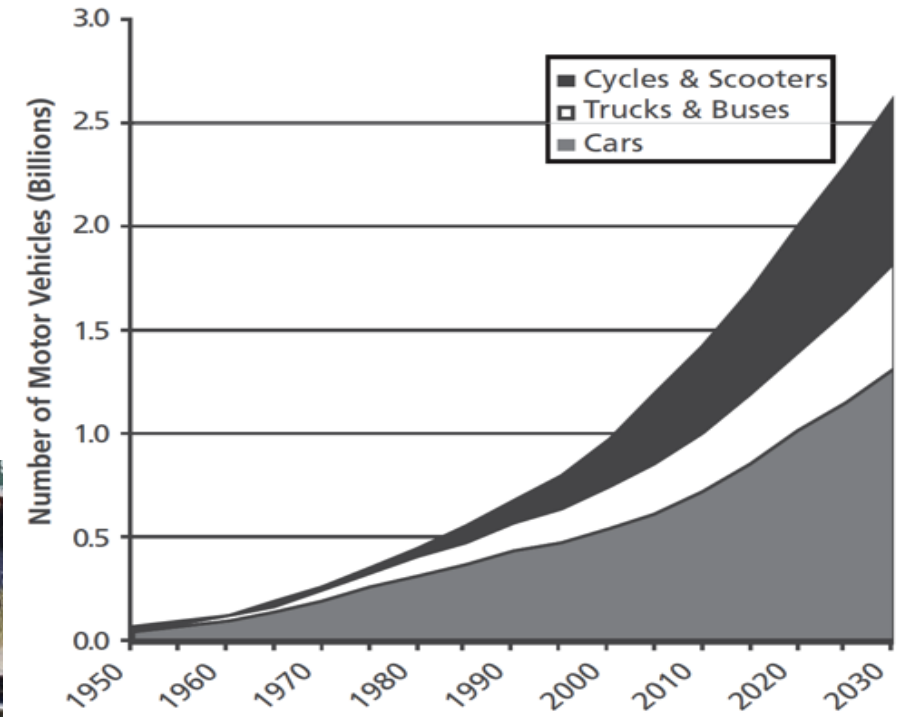
In many cities they think about banning private cars…

Helsinki's ambitious plan to make car ownership pointless in 10 years

Finland's capital hopes a 'mobility on demand' system that integrates all forms of shared and public transport in a single payment network could essentially render private cars obsolete

● Should we ban cars in city centres?

Rosalind Readhead Wants To Be Mayor of London And Ban Private Cars

Will the next mayor of London ban private cars?

Mayoral candidate **Rosalind Readhead** wants to

Paris Aims to End Its Pollution Misery by Cutting Out Cars

To emerge from its toxic fug, Paris is enacting what could be the most drastic anti-pollution measures seen in any major world city.

FEARGUS O'SULLIVAN | 🐦 @FeargusOSull | Dec 9, 2014 | 💬 22 Comments

5.6k Shares | f Share on Facebook | 🐦 Tweet | in | ✉ | 🖨

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Car sharing

- Sharing cars, shifted in time
  - Like car rental, but for much smaller time intervals (hours, minutes)
- Features
  - The client is driving the car, not a taxi service
  - „Occasional" rides
    - Not following a regular schedule
  - Random car allocation, not always the same car
  - Each sharing event is independent from the others
  - Flexible solution, although not as flexible as a taxi

Car sharing

- Habits are just being formed
  - Urban and suburban rides (shopping, city break)
  - Also for longer rides (e.g., a weekend)

- Usually few passengers in the same time, but this was not the goal

- On midterm, the usage of the car increases, although demand is not at all uniform throughout the day
  - „Everyone" needs the car in the morning and the afternoon, to go to work and back
  - During working hours „only retired elderly people" are traveling in the city

Car-sharing

- Cars are not used in 94% of the time, and occupy parking slots
  - If more people would share cars, we could decrease the number of cars considerably

- We have everything today for a very simple service
  - Reservation over the Internet, via a smartphone, immediately
  - Opening the car with the smartphone, using the NFC technology
  - Renting for short periods (e.g., an hour)

- If prices really decrease, it will not be worth owning a car

94%

Would You Rent Your Car? You May Have No Choice
2015 CAR Management Briefing Seminars
Bill Visnic | WardsAuto   Aug 5, 2015

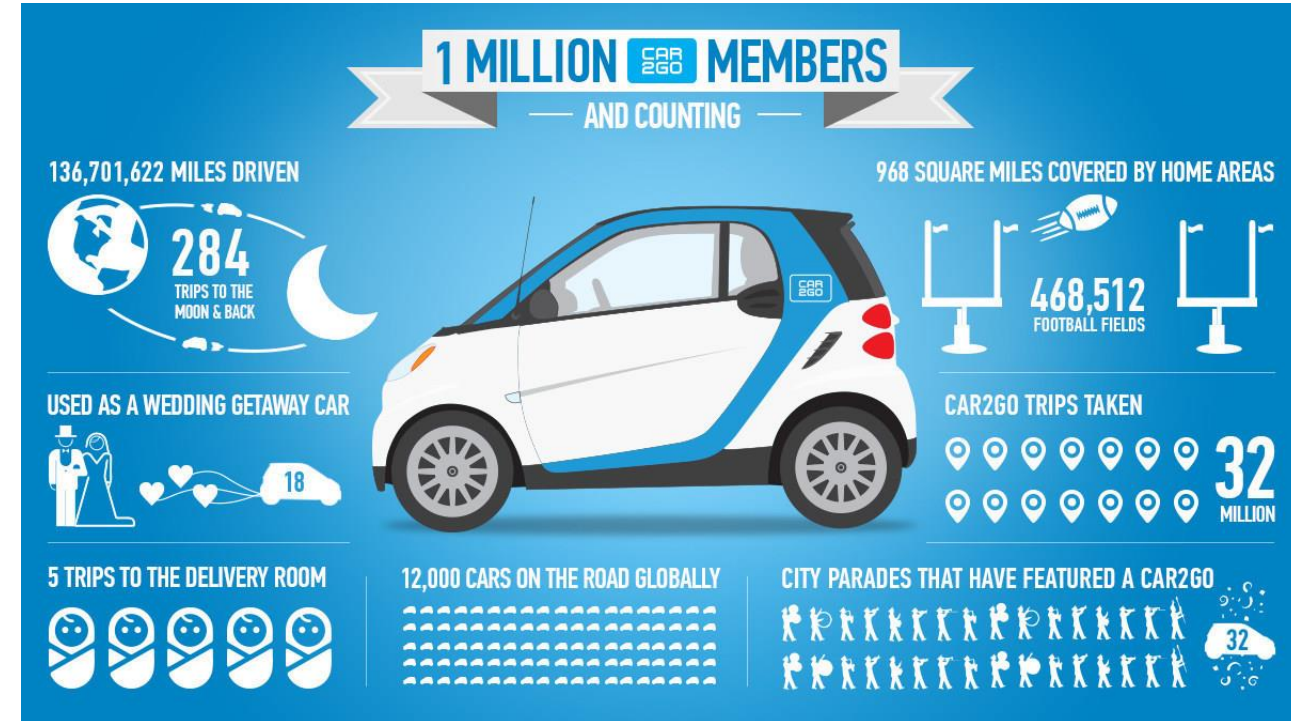✉ EMAIL   Tweet   g+1   f Recommend   2   COMMENTS 0

The growth in megacities and likely resulting restrictions on automobile access could force consumers into car sharing, a Ford official predicts.

Ford's Holland: Young buyers much more open to car sharing.
Full View Photography

Car-sharing modes

- Who owns the car?
  - **Centralized solution** – a renting company (ZipCar, Autolib, Car2Go)
  - **P2P car sharing** – people share their personal cars (Buzzcar, drivy, OuiCar, Koolicar)

- From where to where?
  - **One-way sharing** – Car2Go (EV)
  - **Round-trip sharing** – cars have to be returned to their original place (usual model for P2P sharing)

1 MILLION **CAR2GO** MEMBERS
AND COUNTING

136,701,622 MILES DRIVEN
284 TRIPS TO THE MOON & BACK

USED AS A WEDDING GETAWAY CAR
18

5 TRIPS TO THE DELIVERY ROOM

968 SQUARE MILES COVERED BY HOME AREAS

468,512 FOOTBALL FIELDS

CAR2GO TRIPS TAKEN
32 MILLION

12,000 CARS ON THE ROAD GLOBALLY

CITY PARADES THAT HAVE FEATURED A CAR2GO
32

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Car sharing support

- **Owner**: can be a private person, a community or a company

- **Client:** usually a private person

- **Service provider**: secures the operation, assumes the financial risk

  - The owner and the client are connected through the service

  - Many different models, depending on the ownership and the business model

  - Expensive investment from the owner, if a large pool of cars then usually the service provider is the owner as well

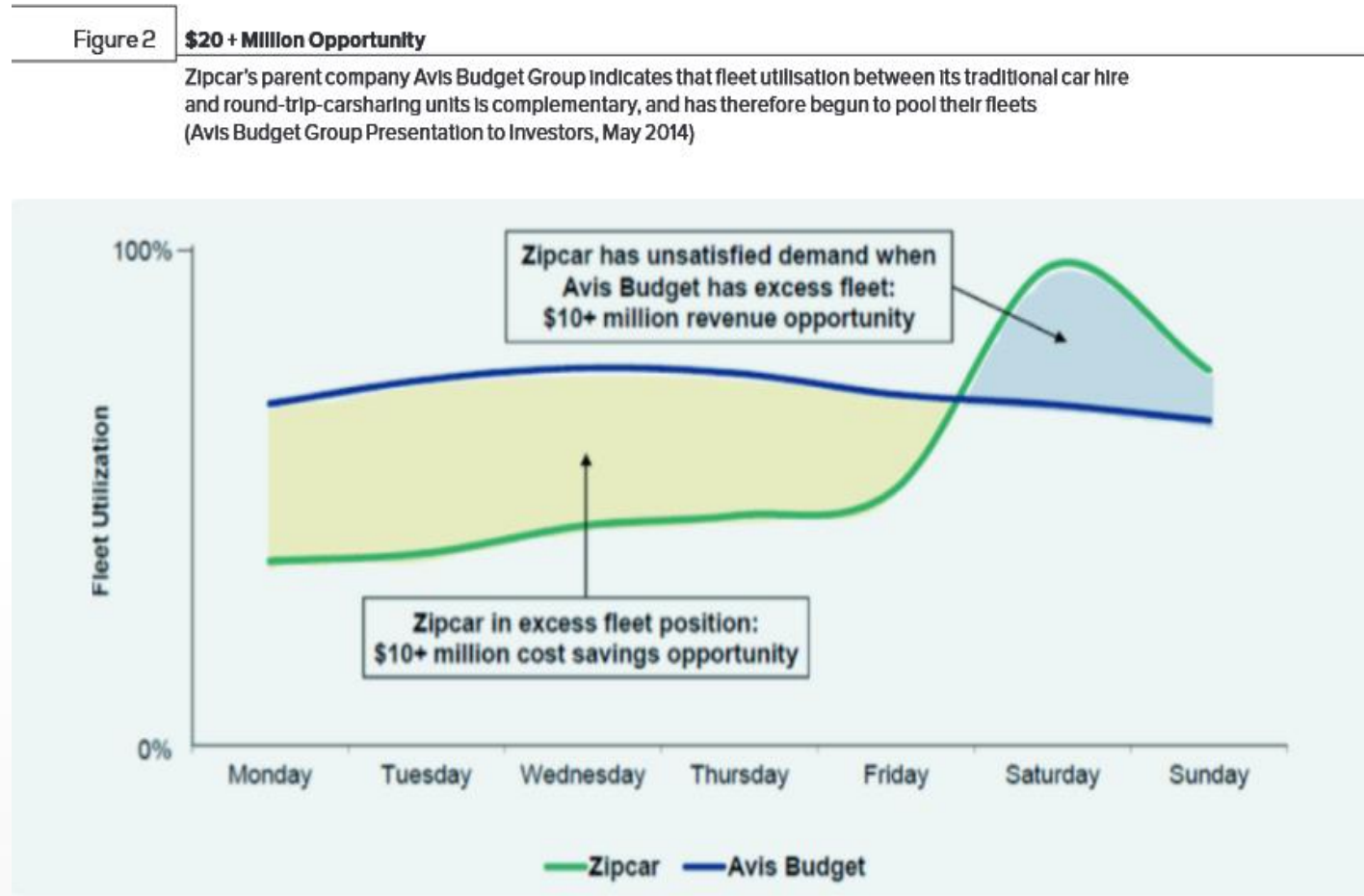Analogy: MOL BUBI bike sharing

(1) MOL bubi operations center
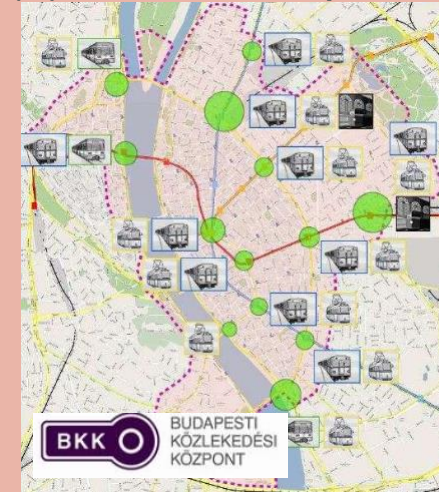
(2) The module of the bike

(3) Docking station

Car sharing vs. Car rental

- Car sharing + Car rental
  - Opposing cycles
  - Rent-a-car during the week
    - Business clients
  - Car-sharing during the weekend
    - Spare time activities
- Advantageous business model
  - For a car-rental company
  - Initial investment significantly lower
- Drawback: handicap for newcomers to the market

Figure 2 | **$20 + Million Opportunity**

Zipcar's parent company Avis Budget Group indicates that fleet utilisation between its traditional car hire and round-trip-carsharing units is complementary, and has therefore begun to pool their fleets (Avis Budget Group Presentation to Investors, May 2014)

https://www.acea.be/uploads/publications/SAG_Report_-_Car_Sharing.pdf

Car sharing – responsibility and insurance

- Who is responsible in case of an accident?
  - In Hungary, „objective responsibility"
    - The owner of the car is responsible, unless the driver recognizes that he was driving the car
  - The owner pays the insurance
    - Does the insurance company allow car sharing?
      - The price of the insurance depends on the sex, the age, and the driving record of the owner
    - Insurance for the driver? Not usual in Hungary
    - Who pays the damages that exceed the typical threshold?

http://www.citylab.com/commute/2013/09/real-future-ride-sharing-may-all-come-down-insurance/6832/
http://www.nytimes.com/2012/04/14/your-money/relayrides-accident-raises-questions-on-liabilities-of-car-sharing.html?_r=0
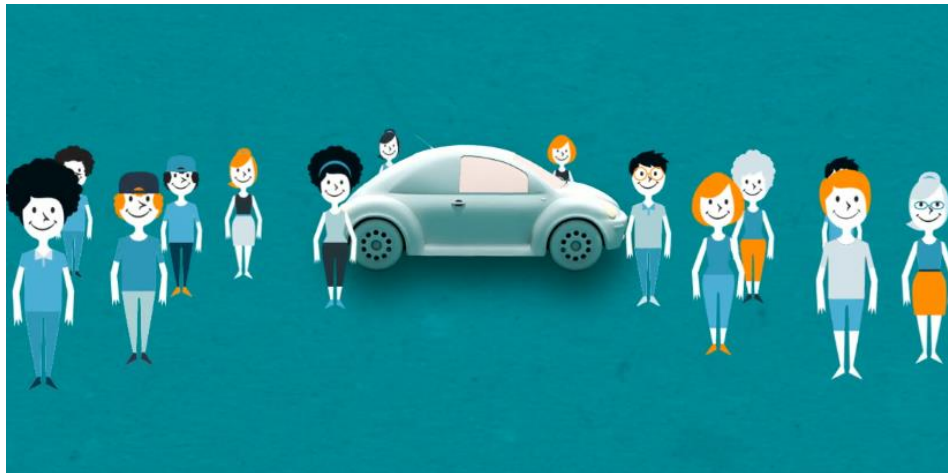
P2P car sharing

- **BeeRides** – Hungarian startup company

- Leave your car at the airport parking, let others use it while you are traveling

  - Free parking

  - Free cleaning of the car

  - … and you get some money as well…

- **Would you give your car?**
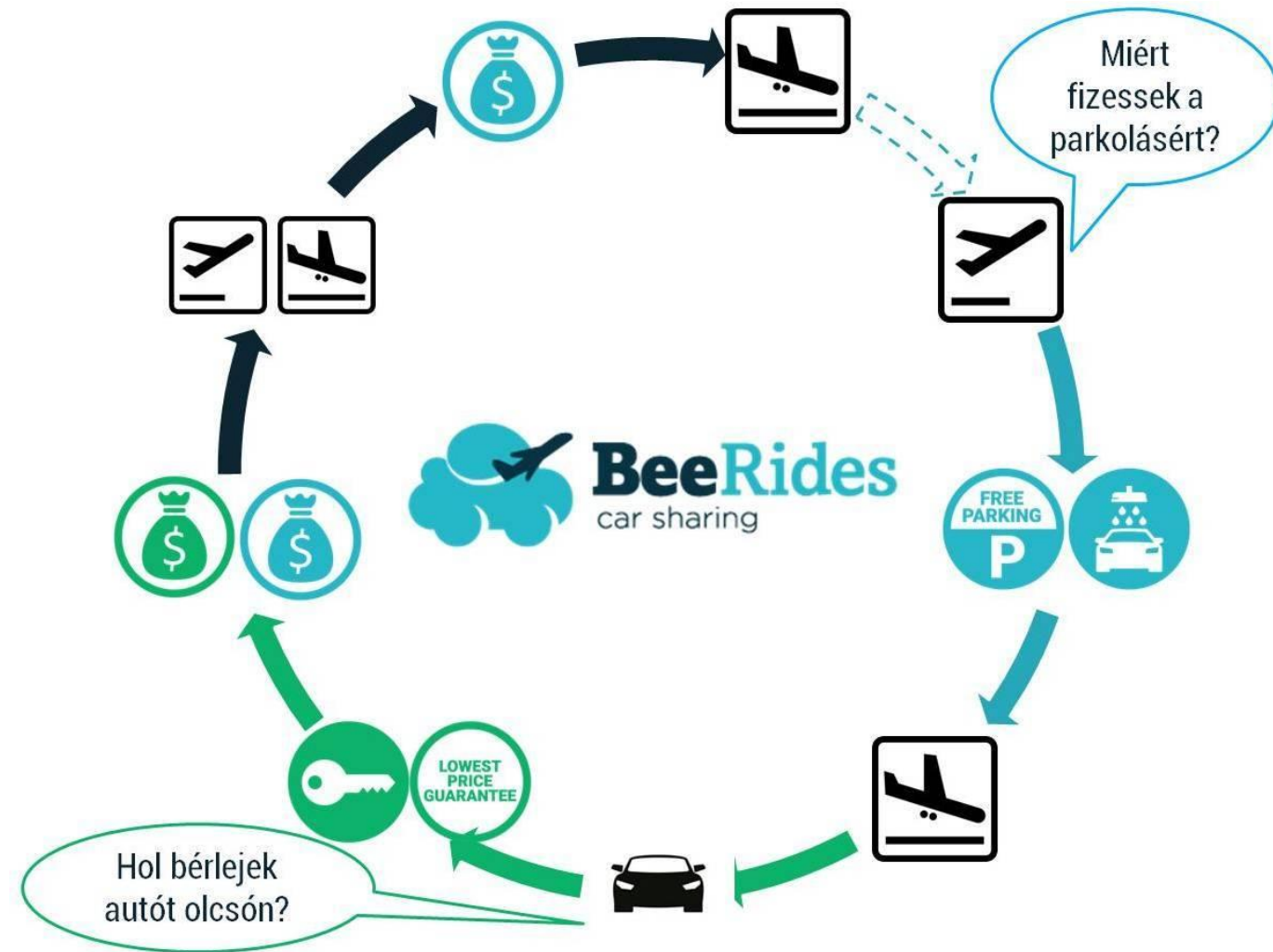
Marketing actions to increase popularity
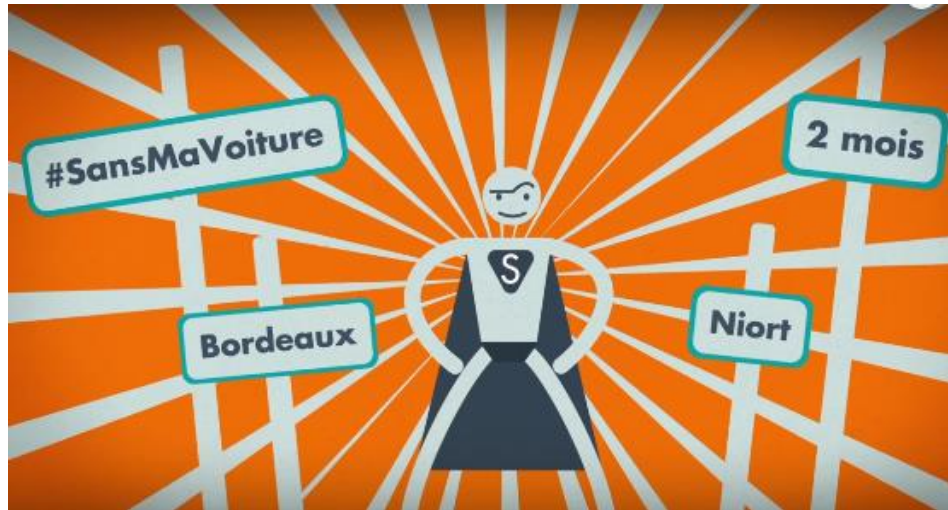
**Break free from your car
and save your city**

100 participants

give up their personal vehicle for 2 months

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Marketing actions to increase popularity

No vehicle insurance

for 2 months
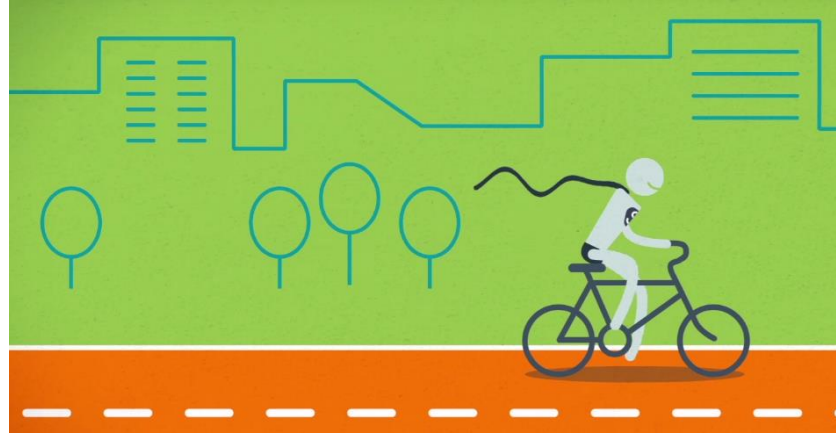
Bike sharing access

VILLO VELO

FREE Public Transport

tan

ttb
Tram et Bus de la Cub

Koolicar

Drive neighbourhood cars

Koolicar
Keyless P2P Carsharing

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Marketing actions to increase popularity

October 5th

Hand over your keys

Say good bye to your car

December 5th

Take your car back

OR

we'll buy it from you

Growth of Worldwide Carsharing

	2006	2008	2010	2012	2014
Members	346 610	670 822	1 163 405	1 788 027	4 842 616
Vehicles	11 501	19 403	31 967	43 554	104 125
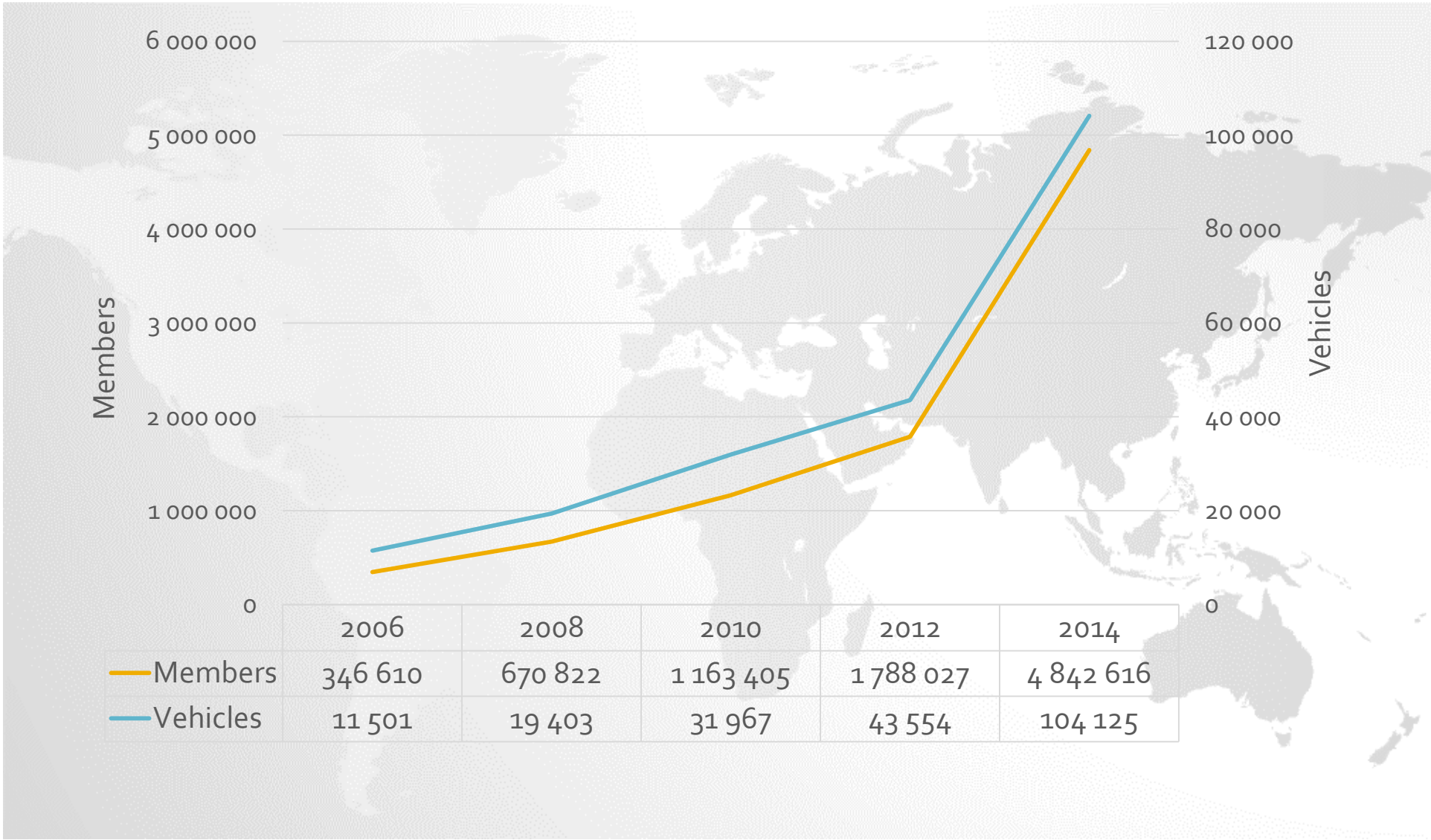
Worldwide Carsharing Trends and Research Highlights

CarSharing Association 2015 Annual Meeting

Susan A. Shaheen, Ph.D.
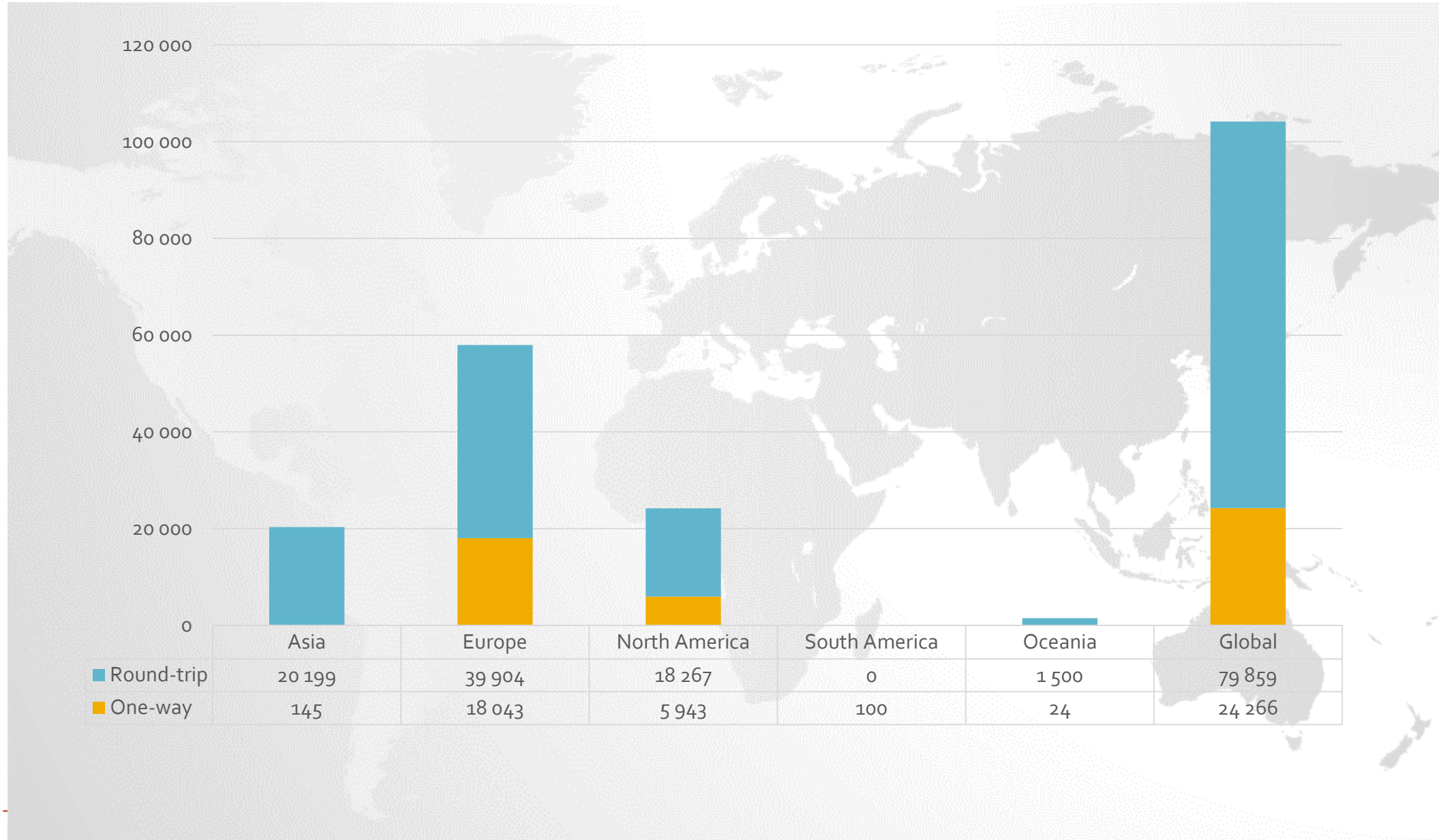
Adjunct Professor and Co-Director, Transportation Sustainability Research Center

University of California, Berkeley

September 23, 2015

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2014 Vehicles: One-Way & Roundtrip

	Asia	Europe	North America	South America	Oceania	Global
■ Round-trip	20 199	39 904	18 267	0	1 500	79 859
■ One-way	145	18 043	5 943	100	24	24 266

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2014 Membership: One-Way & Roundtrip

	Asia	Europe	North America	South America	Oceania	Global
■ Round-trip	926 280	1 834 418	1 179 930	0	50 000	3 990 628
■ One-way	29 600	372 466	445 722	3 500	700	851 988