FUTURE TRENDS OF MOBILITY

JUKKA-PEKKA PITKÄNEN

WASALINE 28.10.2021

INADEQUATE CITY DEVELOPMENT AND LACK OF TRANSPORT CAPACITY = CONGESTION AND REDUCED PRODUCTIVITY

Top 10 most congested cities: each commuter wastes 65 hours in traffic a year

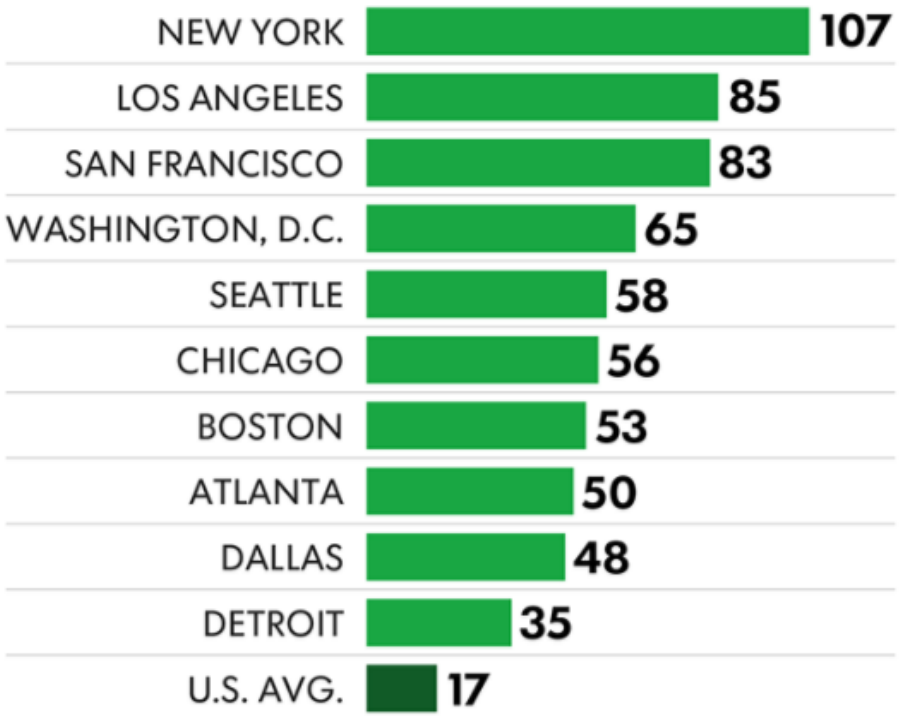
Sources: Inrix, 2013
Reuters, 2010

USA TODAY

PARKING IS PAINFUL

Motorists spend an average of 17 hours and about $97 per year searching for places to park, according to a recent study. Cities with highest parking costs:

Top 10 cities and U.S. average for annual search time, hours per driver:

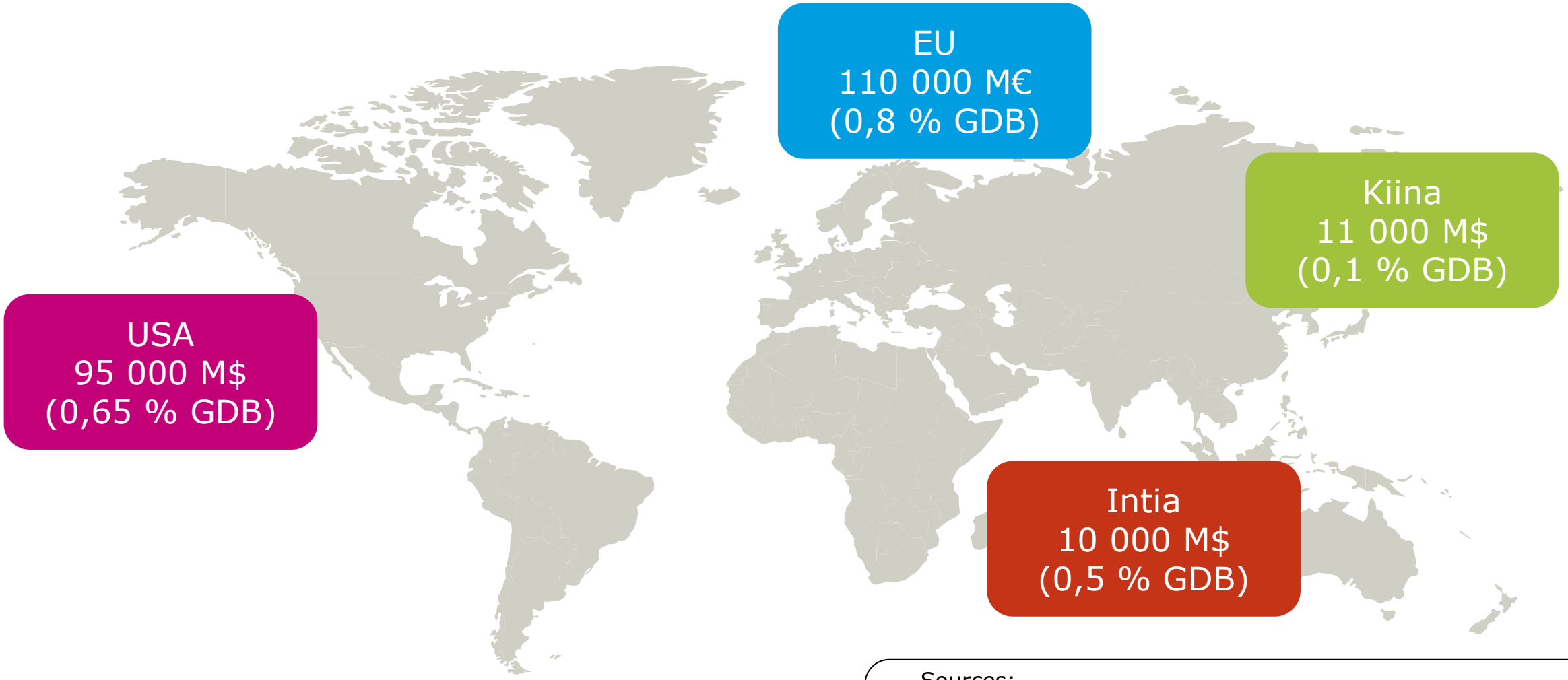


GLOBALLY THERE ARE ~1,2 BILLION PRIVATE VEHICLES, WHICH MOST OF THE TIME ARE NOT MOVING (UP TO 95 % OF TIME CARS ARE PARKED)

Source: Uber, 2017
Image: Outi Jokela, 2017

AFTERNOON RUSH HOUR IN GURUGRAM (INDIA) 18.4.2018

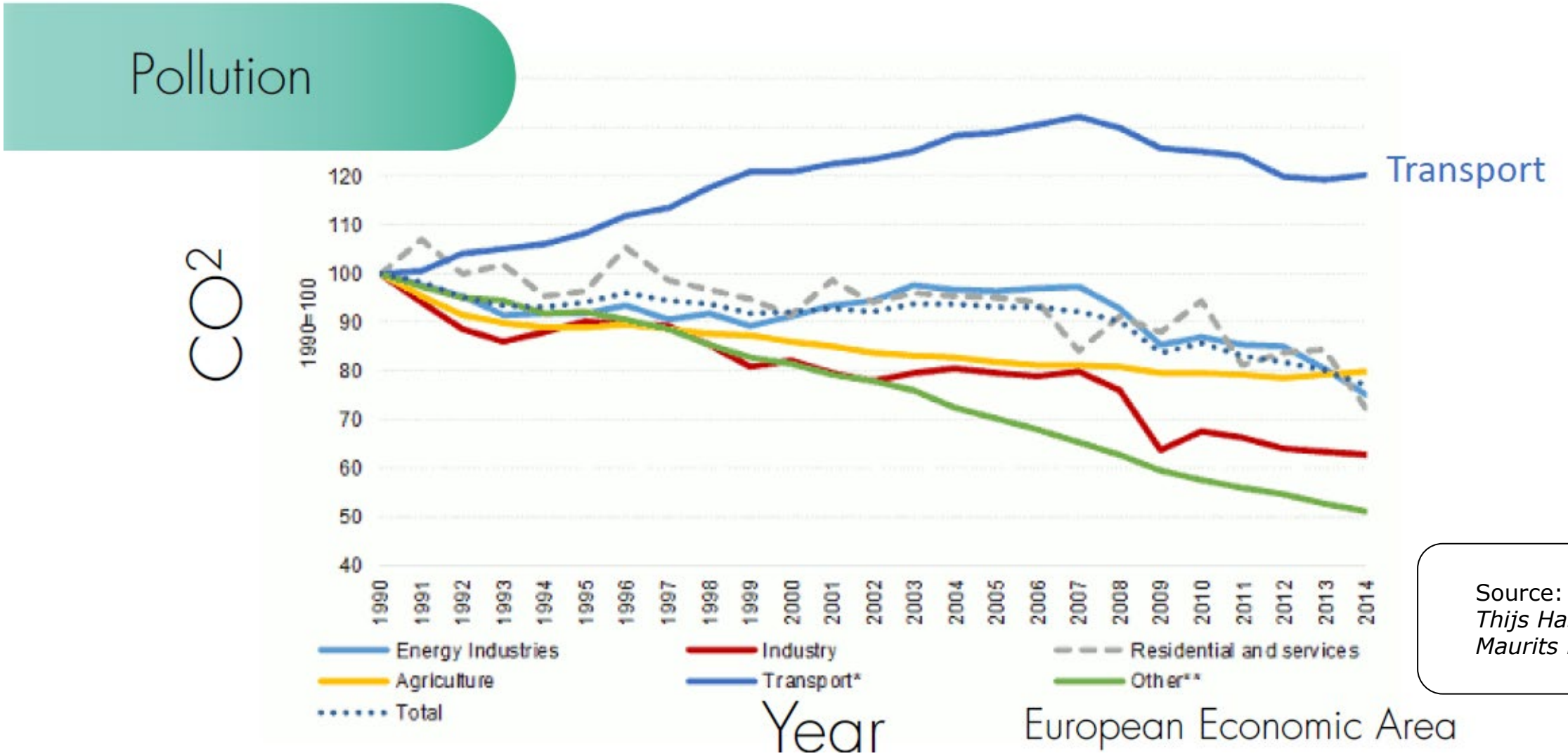
THE COST IMPACT OF RUSH HOURS IS HUGE



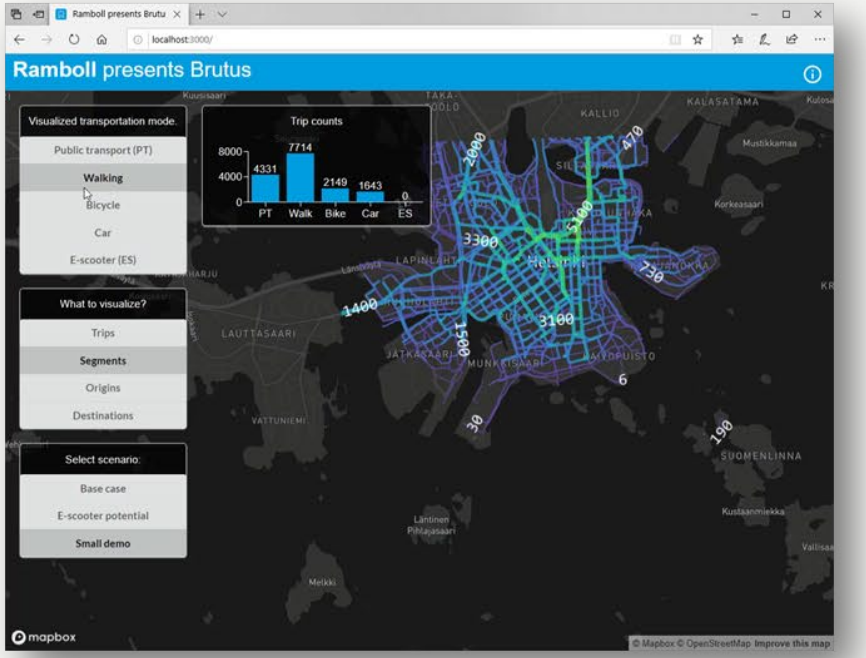
Sources:
EC, 2012
Texas A&M University, 2011
Beijing University National Development Research institute, 2014
Josef A Czako, 2017

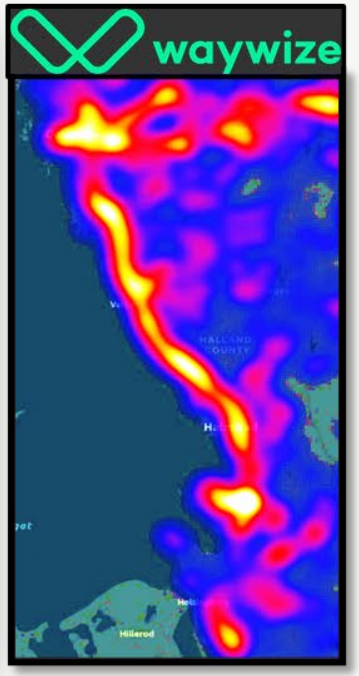
RAMBØLL

...AND THE COST OF TIME IS NOT THE ONLY CHALLENGE...



Source:
Thijs Haselhoff & Maurits Houck, 2017


Ramboll presents Brutus
Visualized transportation mode
Public transport (PT)
Walking
Bicycle
Car
E-scooter (ES)
What to visualize?
Trips
Segments
Origins
Destinations
Select scenario:
Base case
E-scooter potential
Small demo
Trip counts
4331
7714
2149
1643
0
PT
Walk
Bike
Car
ES
mapbox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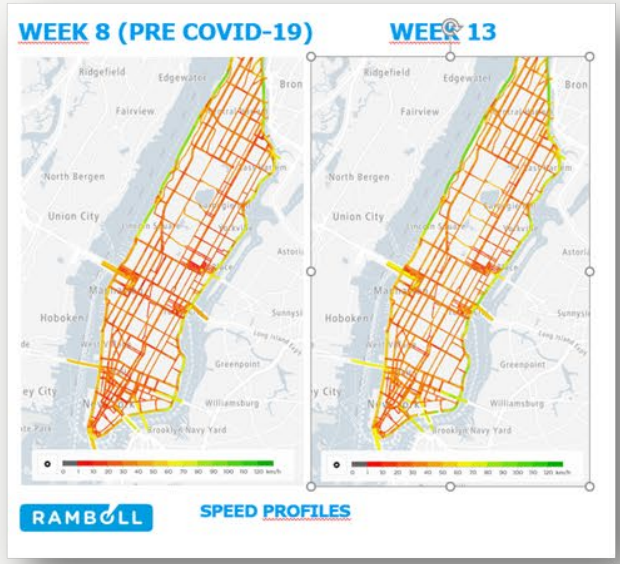
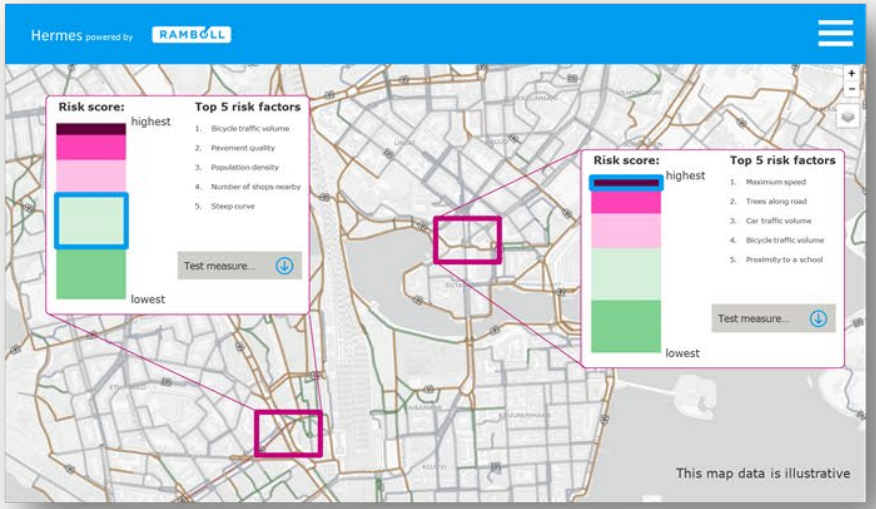
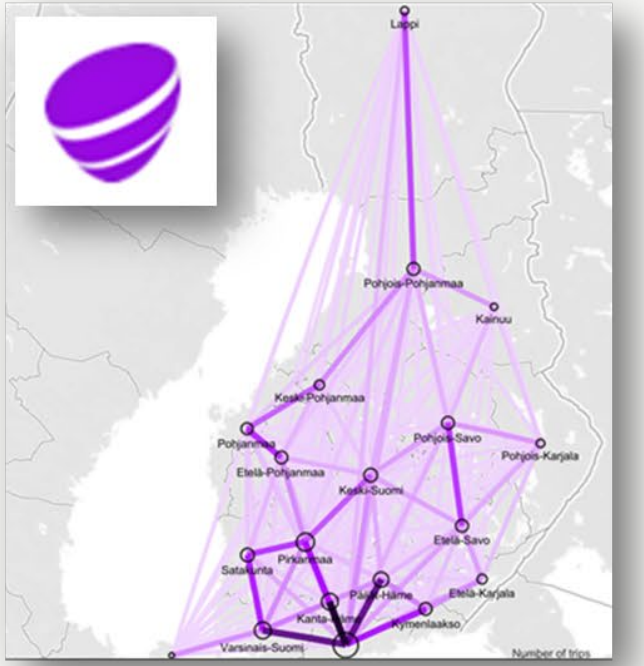

WEEK 8 (PRE COVID-19)
WEEK 13
RAMBØLL
SPEED PROFILES


INRIX
TOMTOM
Speed
Historic average speed
Travel time
Buffer time
Planning time
Bottleneck attributes & archive


Hermes powered by RAMBØLL
Risk score:
highest
lowest
Top 5 risk factors
1. Bicycle traffic volume
2. Pavement quality
3. Population density
4. Number of shops nearby
5. Steep curve
Test measure...
Risk score:
highest
lowest
Top 5 risk factors
1. Maximum speed
2. Trees along road
3. Car traffic volume
4. Bicycle traffic volume
5. Proximity to a school
Test measure...
This map data is illustrative


person 0.77
2019-09-18 06:30:00


Lappi
Pohjois-Pohjanmaa
Kainuu
Keski-Pohjanmaa
Pohjanmaa
Pohjois-Savo
Pohjois-Karjala
Etelä-Pohjanmaa
Keski-Suomi
Etelä-Savo
Pirkanmaa
Satakunta
Päijät-Häme
Etelä-Karjala
Kanta-Häme
Kymenlaakso
Varsinais-Suomi
Number of trips

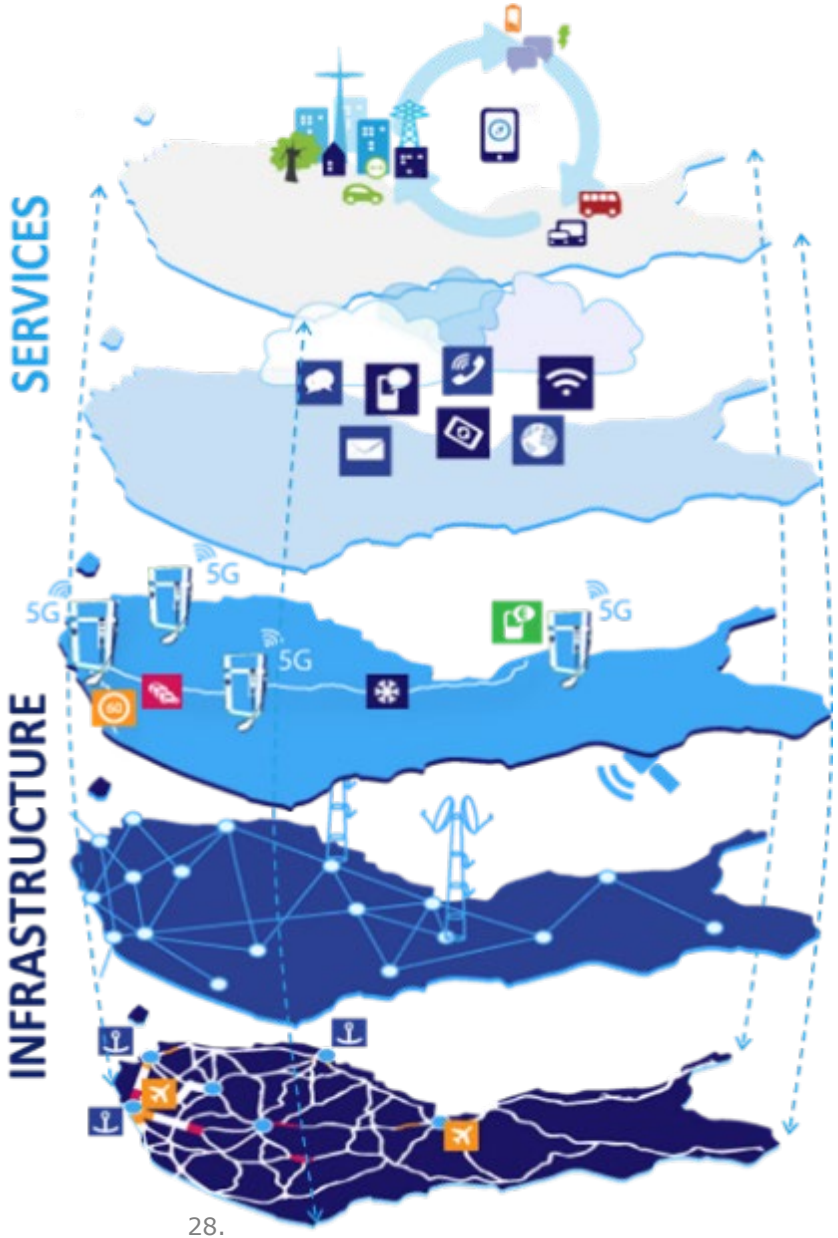
WHAT DOES SMART MOBILITY MEAN TO YOU?

Smart (/smɑːt/):
adjective
1. People's needs are the priority
2. Holistic planning approach
3. Choices are simplified by technology and new services

Mobility (/məʊˈbɪləti/):
noun
1. Sustainable movement of people and goods
2. Seamless transfer between convenient modes
3. Strong sense of safety and security


Providing access for all
Ensuring effective mobility for all
THE CORNERSTONES OF SUSTAINABLE MOBILITY
Improving safety for all
Securing green mobility for all
RAMBOLL

Transport system 2.0 – ecosystem for digital mobility



Traspnortation and mobility as a service

Several service providers
MaaS –operators, Internet of Traffic.

Cloud based services, data, platforms, APIs

Open source data, cloud based sotuions source codes, open interfaces
Internet of Things

Smart Infrastructure

Digital payments & clearing
Pricing of transport services
Real time & GPS data
Interoperability - roaming

Tele communication & electric network

Mobile data 4G/5G
Broad band connections
Smart grids, charging stations

Governance, research and infrastructure

Roads, Rails, Harbors, Airports
Transport modes – investments for eMobility, innovation
Maintenance and Management

Next practices of Mobility

- Fast & affordable door 2to door services
- Integrated ticketing and vehicles
- Autonomous driving
- Shared vehicles and services
- Using travel itme for working and enterinment
- Emerging technologies and services – drones, hyperloop, hover-boards, smart goggles, micro mobility…
- Autonomus harbors and maritime vessels
- Mobility as a service
- Predective traffic control
- PAYD- & PHYD-insurance services
- SMART Parking
- Ecosystem services for eMobility
- Predictive maintenance
- Services on top of augmented reality
- Cycling 2.0

Sencors → (Open) data → 5G → IoT → AI → Platfor ms → Mobilie

3 MAIN TRENDS OF MOBILITY

Automation

Electrification

Shared services

Sources:
Gereon Meyer, 2017
Images: Outi Jokela & Volkswagen

1. AUTOMATION

Volkswagen

IT IS NOT JUST THE TECHNOLOGY
– COMPREHENSIVE KNOWLEDGE IS REQUIRED

Vehicle technologies
- sensors, especially LiDAR
- C-ITS: cellular or 802.11p?
- HD maps

Circumstances
- rain/snow/leaves/dust seen as obstacles
- Operational Design Domain

Robot bus
- operation, practical arrangements
- impacts to PT planning

Physical infrastructure
- requirements to road operators

EUEIP European ITS Platform

Traffic environment
- mixed with motor traffic?
- mixed with pedestrians and cyclists?

Security
- cyber threats
- (user) data protection

Digital infrastructure
- national road database
- municipal open data

Digiroad

Planning
- city planning
- transport system planning

Legislation
- national/EU restrictions
- changes to traffic act
- ethical questions

§

Active domains with Ramboll expertise

RAMBØLL

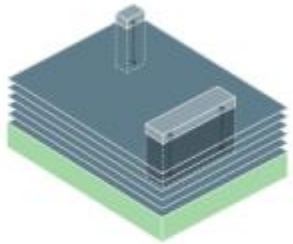

VOLOCOPTER


LN-0700AF
RAMBØLL
PHANTOM

AUTOMATION BRINGS NEW POSSIBILITIES FOR URBAN PLANNING

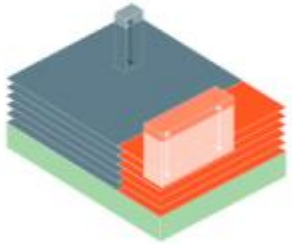
01 SMALLER STALLS
02 NARROWER AISLES
03 NO VERTICAL CONNECTIONS
04 OPTIMIZED STRUCTURE
05 STALL STACKING
06 SMART CONTROL UNIT

01 TRADITIONAL PARKING STRUCTURE



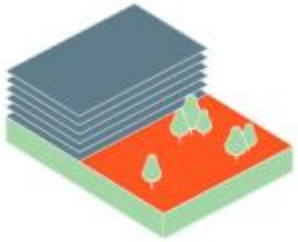
0% OPTIMIZATION

02 GEOMETRICAL OPTIMIZATION



26% OPTIMIZATION

03 FULL OPTIMIZATION



62% OPTIMIZATION

Source: Audi

3 MAIN TRENDS OF MOBILITY

Automation

Electrification

Shared services

Sources:
Gereon Meyer, 2017
Images: Outi Jokela & Volkswagen

3 MAIN TRENDS OF MOBILITY

Standardisation

Optimized energy system

Reduced operational cost

New use cases

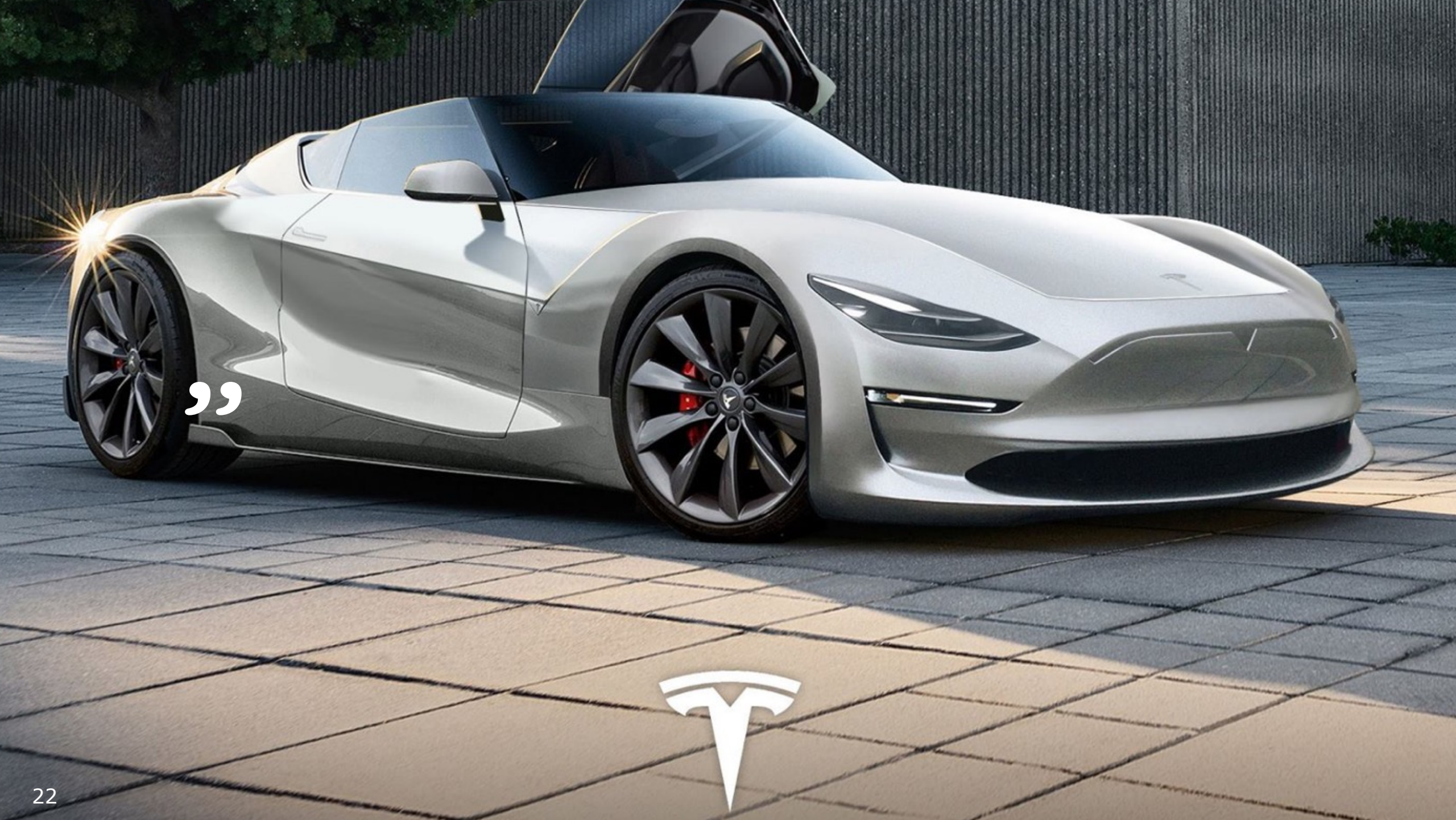
Automation

Electrification

Shared services

Sources:
Gereon Meyer, 2017
Images: Outi Jokela & Volkswagen

2. E-MOBILITY



”

CONCEPT STUDY IN-MOTION-CHARGING BUSES IN OSLO

The municipalities of Oslo and Akershus county have committed to ambitious goals of reducing CO2 emissions by 50 % within 2030 hence a large proportion buses to be emission free. Electrification of the bus fleet in the capitol area is the main strategy.

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GARBAGE TRUCK POWERED BY GARBAGE

3 MAIN TRENDS OF MOBILITY

Standardisation

Optimized energy system

Reduced operational cost

New use cases

Automation

Electrification

Shared services

Sources:
Gereon Meyer, 2017
Images: Outi Jokela & Volkswagen

3 MAIN TRENDS OF MOBILITY

Standardisation

Optimized energy system

Automation

Reduced operational cost

New use cases

Electrification

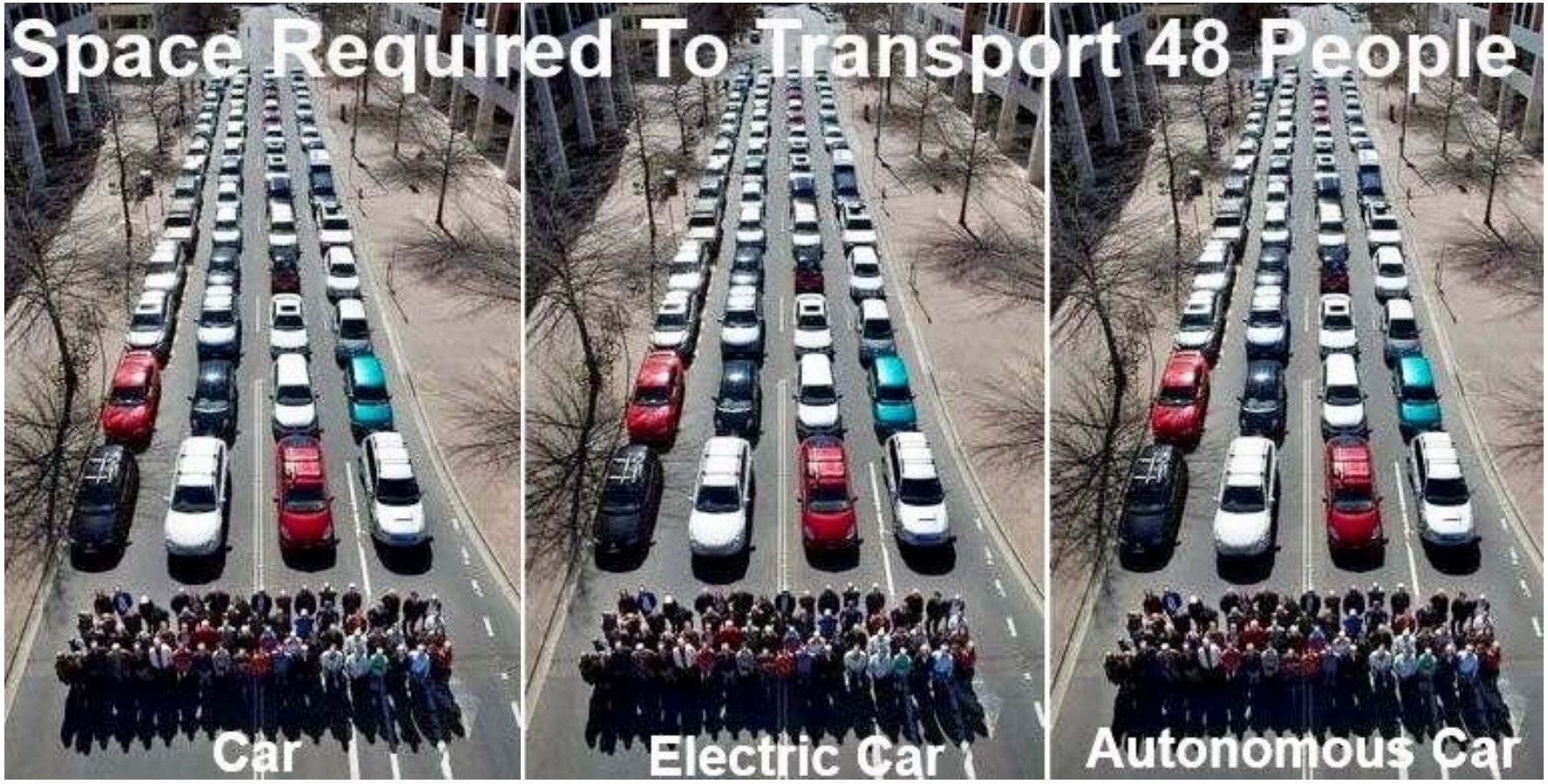
Reduces total cost

New concepts for recharging

Shared services

Sources:
Gereon Meyer, 2017
Images: Outi Jokela & Volkswagen

THE SPACE REQUIREMENTS OF DIFFERENT MOBILITY OPTIONS



Source:
Door2door, 2017

3. SHARED SERVICES

UBER SOLVES THE PROBLEMS OF URBAN TRANSPORTATION!?!?

UNSUSTAINABLE?

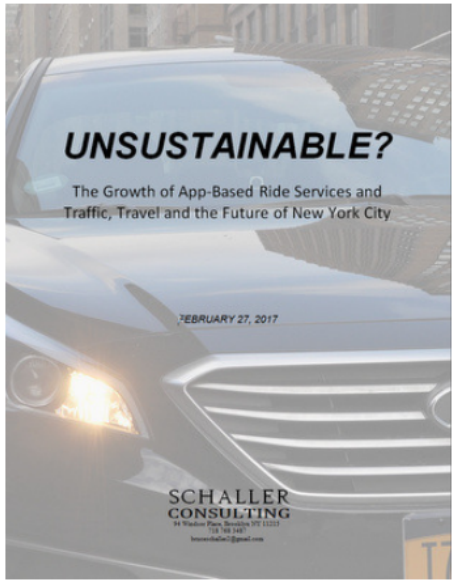
The Growth of App-Based Ride Services and Traffic, Travel and the Future of New York City

Over the last four years, Uber, Lyft and other app-based ride services have put 50,000 vehicles on the streets of New York City. Customers embraced these new services as offering a prompt, reliable and affordable option for traveling around town. Their growth also raises questions about their impact on traffic congestion and on public transit and taxi services that are essential components of urban transportation networks. A dearth of factual information has made it difficult, however, to assess their role in the city's transportation network or decide whether a public policy is needed.

This report presents a detailed analysis of the growth of app-based ride services in New York City, their impacts on traffic, travel patterns and vehicle mileage, and implications for achieving critical City goals for mobility, economic growth and environmental sustainability in New York and other major cities.

Findings are based on trip and mileage data that are uniquely available in New York City, providing the most detailed and comprehensive assessment of these new services in any U.S. city.

- Report Overview
- Full report (pdf file)



RAMBOLL

NEW YORK POST

TECH

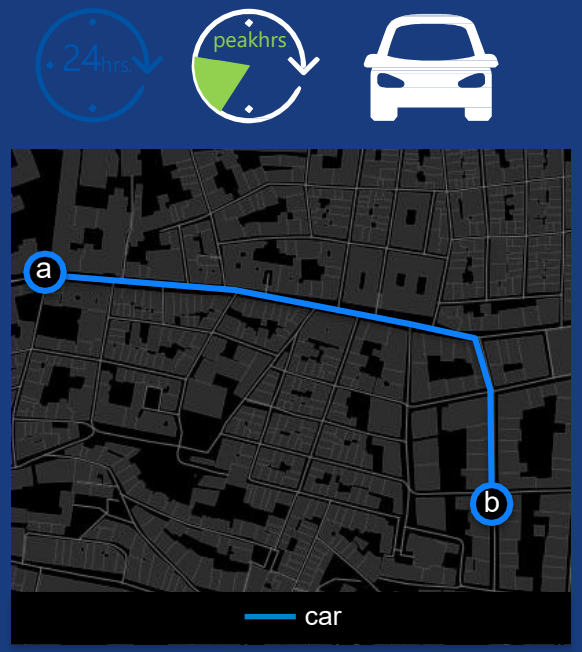
Uber, Lyft drivers are making city traffic worse, studies find

By Associated Press | February 25, 2018 | 4:21pm | Updated

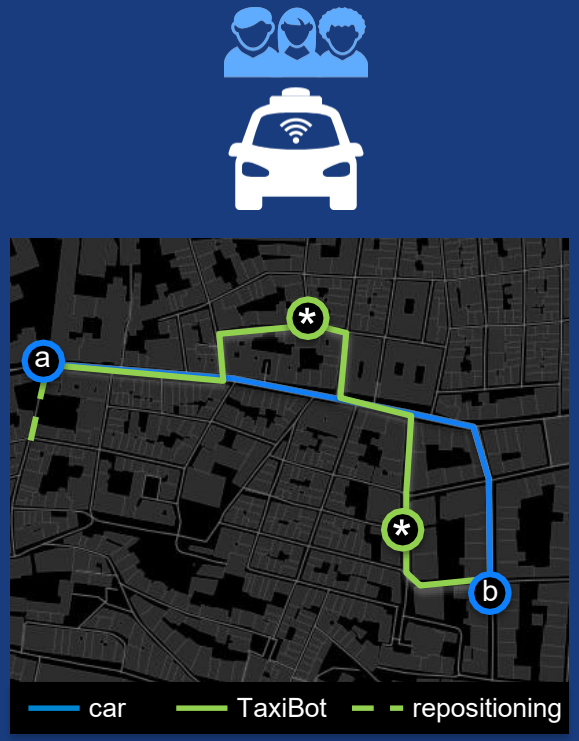
Christopher Sadowski

BOSTON — One promise of ride-hailing companies like Uber and Lyft was fewer cars clogging city streets. But studies suggest the opposite: that ride-hailing companies are pulling riders off buses, subways, bicycles and their own feet and putting them in cars instead.

And in what could be a new wrinkle, a service by Uber called Express Pool now is seen as directly competing with mass transit.

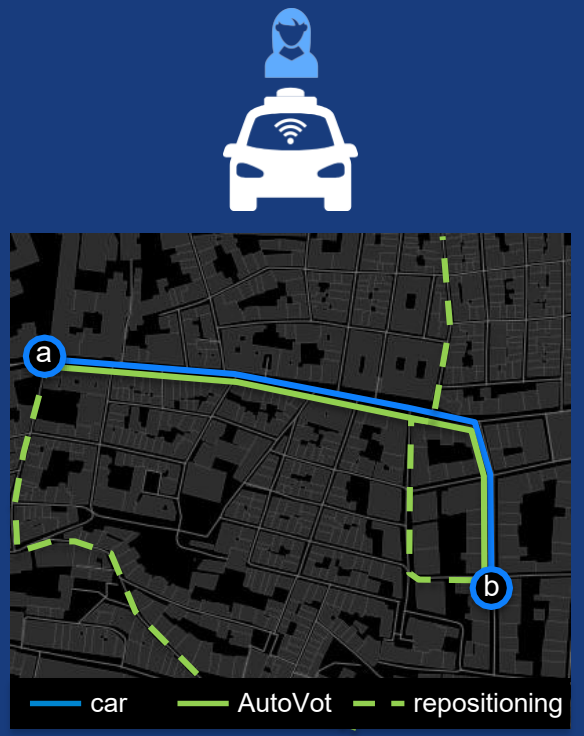


TaxiBots and AutoVots will travel more than today's cars



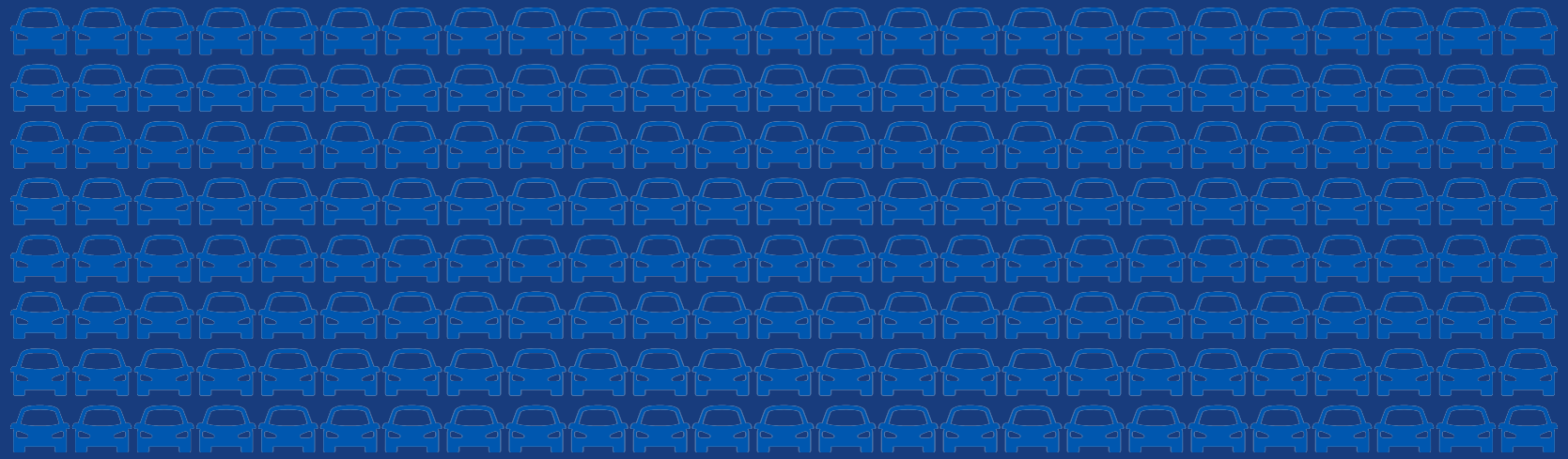
+25%

more kilometres travelled due to bus replacement, pick-ups, drop-offs and re-positioning



+103%

more kilometres travelled due to bus replacement, re-positioning



Scenario: 24 hours

TaxiBot
ride-sharing

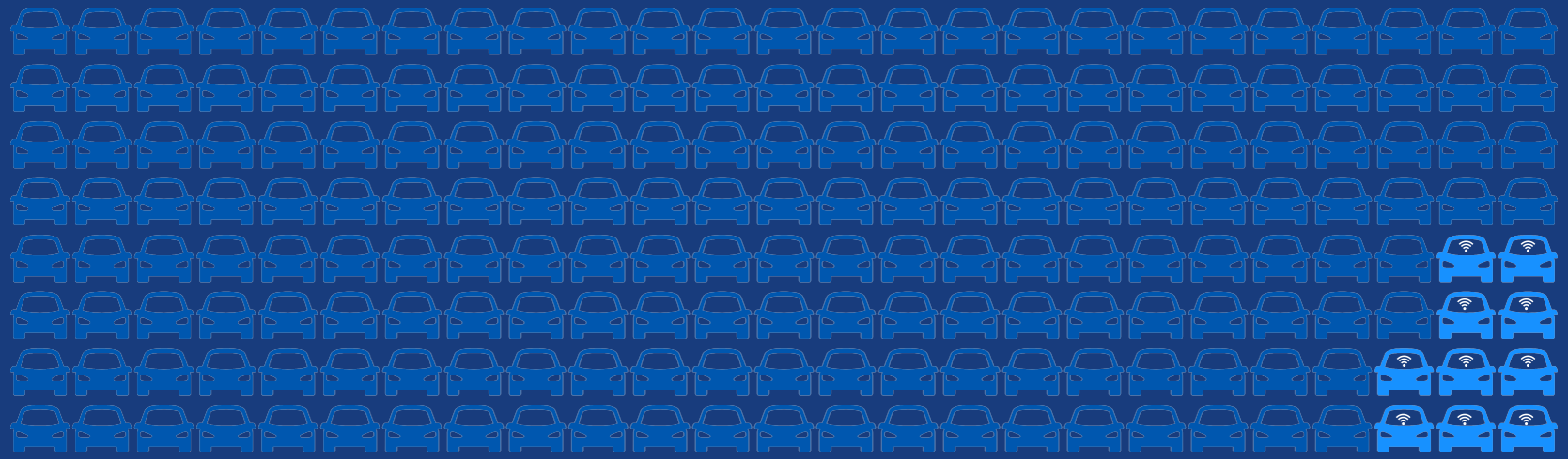
+

TaxiBus
on-demand bus

+

Public transport
high-capacity

number of cars
required to provide the
same trips as before:



Scenario: 24 hours

number of cars required to provide the same trips as before:

5%

-15%

vehicle kilometres

Scenario: 24 hours

TaxiBot
ride-sharing

TaxiBus
on-demand bus

Public transport
high-capacity

-22%

vehicle kilometres

Scenario: Peak hours

TaxiBot
ride-sharing

TaxiBus
on-demand bus

Public transport
high-capacity

-27%

CO_2 emissions

Scenario: 24 hours

TaxiBot
ride-sharing

TaxiBus
on-demand bus

Public transport
high-capacity

MAAS – MOBILITY AS A SERVICE, CASE HELSINKI

WHIM - The Netflix of transportation

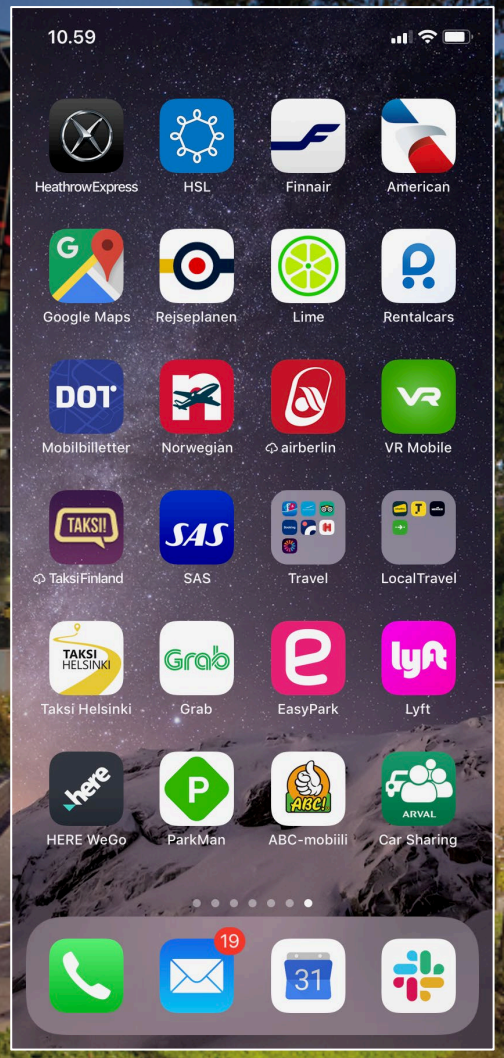
- **We offer a solution accessing all transportation modes with one intuitive app, WHIM**
- WHIM is the world's first unlimited travel package including payments
  - One app, one account
  - Bookings, tickets and in-app payments
  - Route planning, real-time information
  - Multimodality
  - Monthly subscriptions (pre-paid trips) or pay-as-you-go

maas GLOBAL

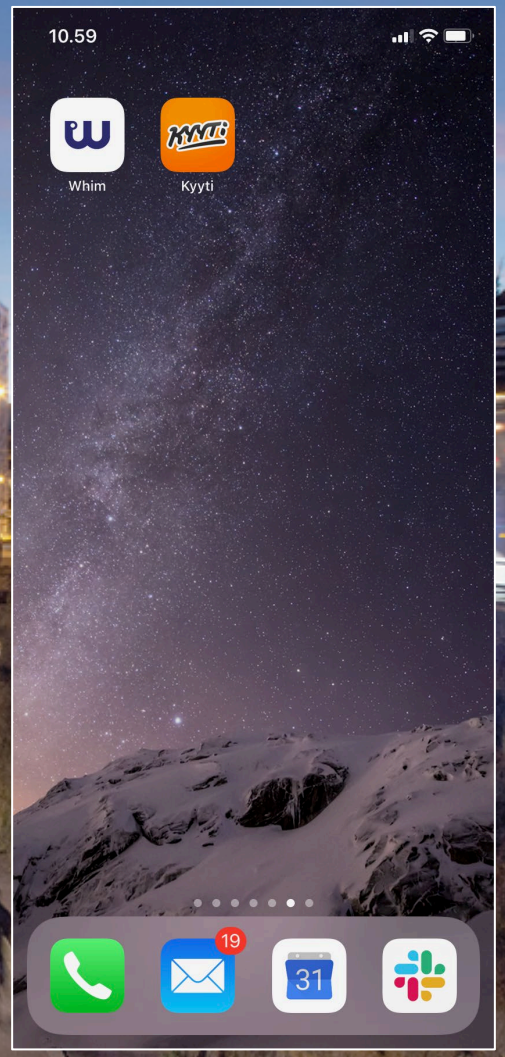
Freedom of Mobility

Location: Helsinki, Finland

Source: HSL



These TSP-specific apps I have now in my smartphone (amongst others).

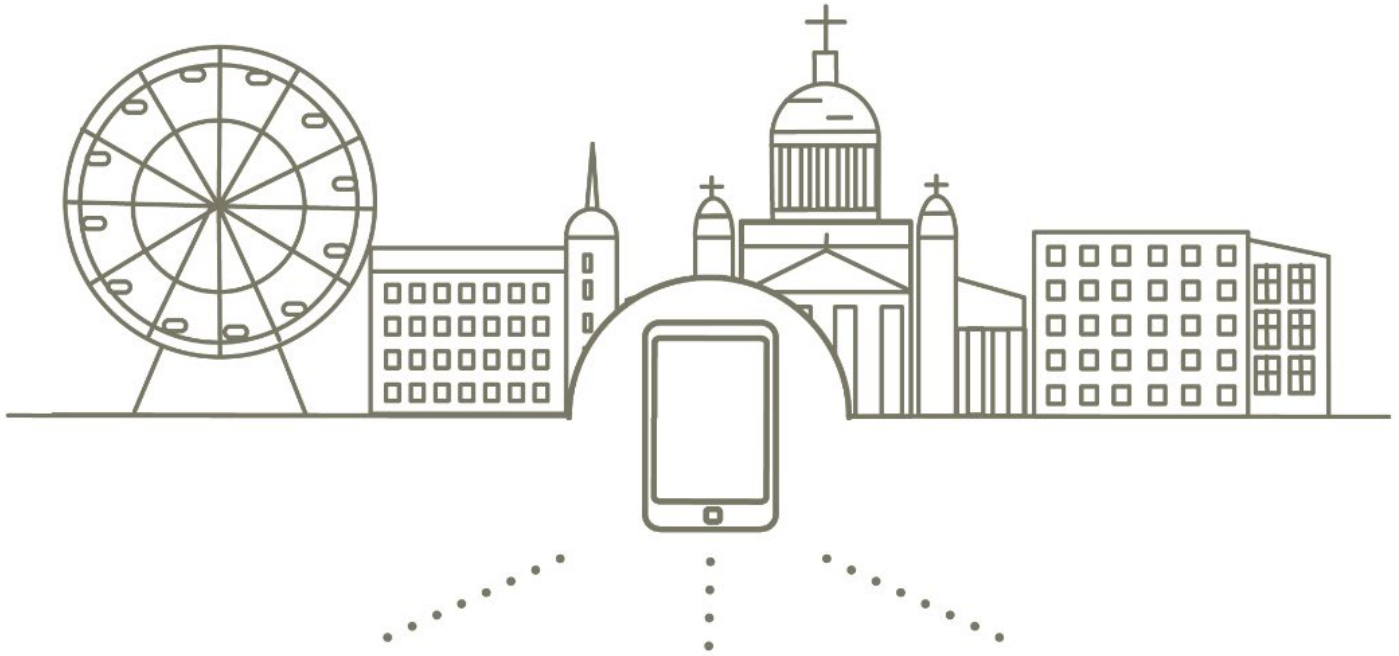


These MaaS-apps could each replace them all and make everyday travel easier.

THE WHIM-FLAVOUR OF MAAS: OWN BRAND

EXAMPLE OF A MAAS SERVICE/ BUSINESS MODEL:

Whim has three subscription tiers with an option to monthly packages with varying level of service.



TIER:	WHIM TO GO	WHIM URBAN	WHIM UNLIMITED
Subscription Fee:	0 €	49 € per month (99 € for extended Helsinki Region)	499 € per month
Includes:	• No monthly free • Pay as you go • Public Transport tickets, taxi rides, and rental cars can be all bought from Whim App	• Unlimited number of public transport tickets • All taxi trips within 5 km radius for max 10 € • Fixed 49 € daily rental car fee • Unlimited city bike trips up to 30 minutes at a time	• Unlimited number of public transport tickets • Unlimited number of taxi rides within 5 km radius • Unlimited rental car use • Free to use city bikes for 30 minutes at a time

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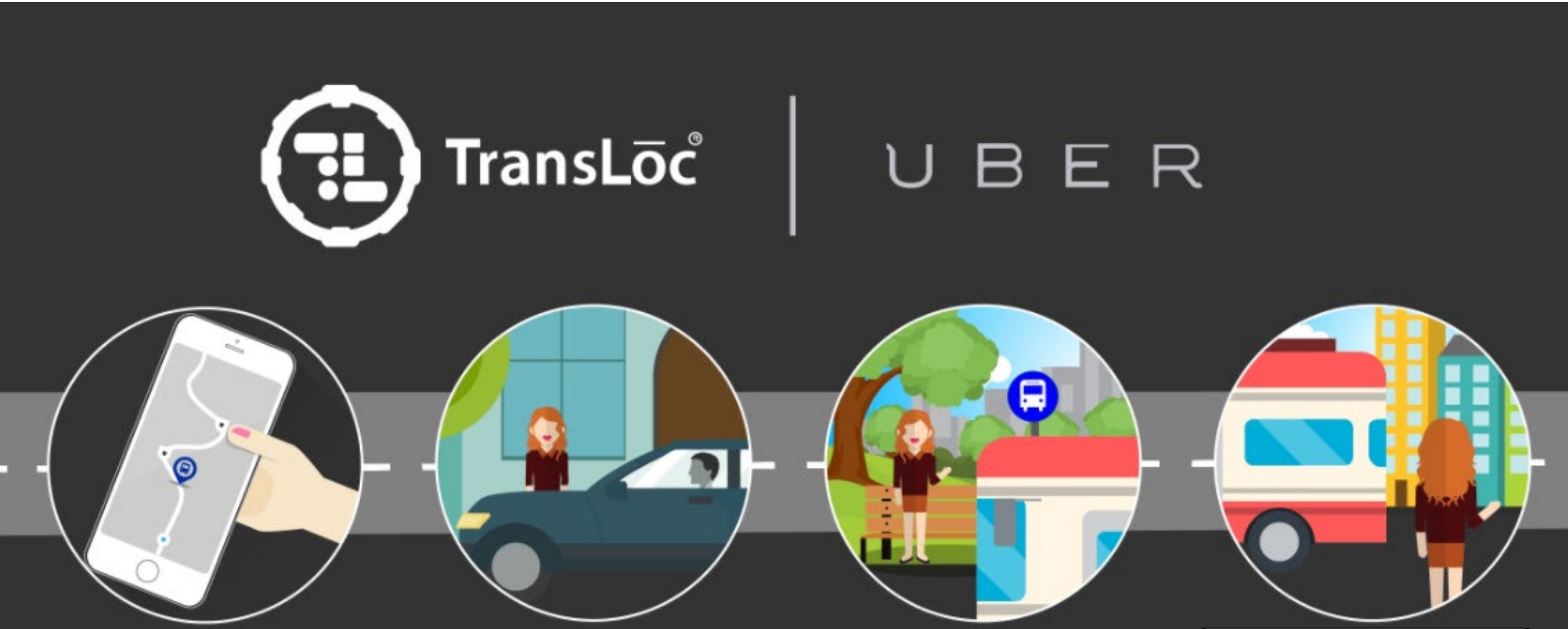
UBER, LYFT AND OTHER SHARED SERVICES AS PART OF PUBLIC TRANSPORT

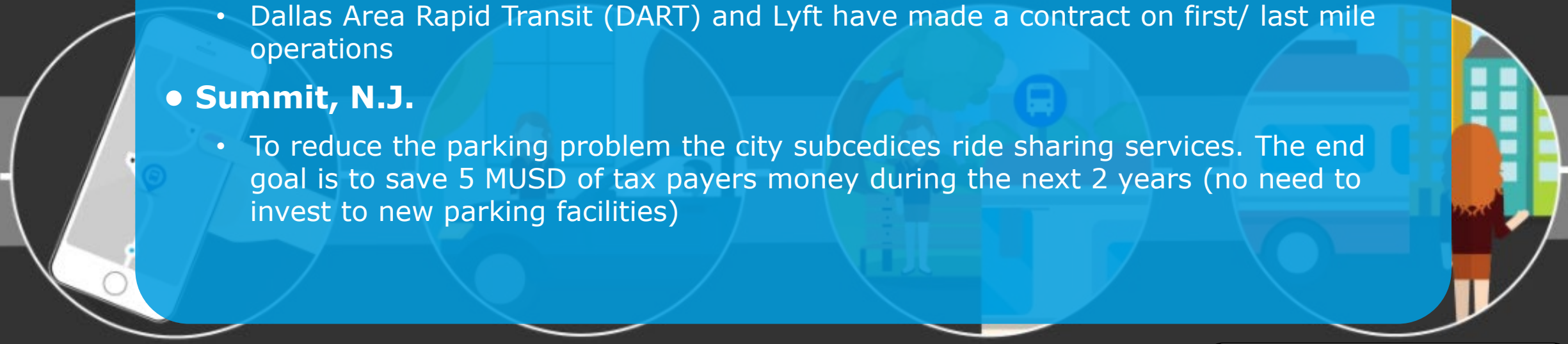


Source Business wire 2017

UBER, LYFT AND OTHER SHARED SERVICES AS PART OF PUBLIC TRANSPORT

Ride sharing is already part of public trasnport in these US cities:

- **Altamonte Springs, Florida:**
  - City supports the cost for Uber-rides to/from train station by 25%
- **Dallas, Texas:**
  - Dallas Area Rapid Transit (DART) and Lyft have made a contract on first/ last mile operations
- **Summit, N.J.**
  - To reduce the parking problem the city subcedices ride sharing services. The end goal is to save 5 MUSD of tax payers money during the next 2 years (no need to invest to new parking facilities)



Source: Business wire 2017

Bright ideas. Sustainable change.

RAMBØLL