Webinar
13 May 2020

# *Functionalities of GoToWebinar Participants*

*S. Govender, Rupprecht Consult, Cologne, Germany*

# WELCOME!

Interreg CENTRAL EUROPE
European Union European Regional Development Fund
EfficienCE

# WEBINAR

Interreg CENTRAL EUROPE
European Union European Regional Development Fund
LOW-CARB

# TRANSNATIONAL WORKSHOP

13 MAY 2020 // WEBINAR

*Data-based planning of energy-efficient public transport services and infrastructure*

EfficienCE

LOW-CARB

## AGENDA

09:00 **WELCOME**

09:15 **INTRODUCTION**
*Marlene Damerau, Rupprecht Consult*

- Workshop Objectives
- EfficienCE and LOW-CARB projects

**Topic 1: DATA-BASED PLANNING OF ENERGY-EFFICIENT PUBLIC TRANSPORT SERVICES AND INFRASTRUCTURE**

09:30 The value of data for the public transport sector
*Hilia Boris Iglesia, UITP*

09:50 The "Leipzig Open Data Strategy" and the integrated urban data platform with application to a specific public transport development use case
*Tilman Schenk and Sebastian Graetz, City of Leipzig (LOW-CARB & EfficienCE)*

10:10 Data-based mobility and PT planning in Szeged
*Ádám Németh, SKZT (LOW-CARB) and Vilmos Bilicki, Uni of Szeged (UIA SASmob)*

10:30 Discussion, questions and wrap-up of topic 1

11:00 Coffee Break

**Topic 2: HOW TO PLAN FOR ENERGY-EFFICIENT TROLLEYBUS INFRASTRUCTURE?**

11:15 Project presentation: Trolley 2.0
*Wolfgang Backhaus, Rupprecht Consult*

11:30 Introduction to in-motion charging and the self-learning bus
*Erik Lenz, Kiepe Electric*

11:50 Data-based trolleybus network planning
*Ádám Németh, SZKT, Szeged (LOW-CARB)*

12:05 Digital "twinning"– a method for trolleybus data collection and analysis for better planning
*Jan Röhl, Kruch*

12:20 Teaser: How to decide on vehicle technology infrastructure for local investments in Budapest (e-bus or trolley)?
*Balázs Fejes, BKK, Budapest (EfficienCE)*

12:25 Teaser: Why Pilsen decided to widen the trolleybus network
*Jiří Kohout, PMDP, Pilsen (EfficienCE)*

12:30 Discussion, questions and wrap-up of topic 2

13:00 Closing remarks and feedback options

This webinar is part of a series of events in the LOW-CARB Follower City Programme. To become a Follower City, please contact s.govender@rupprecht-consult.eu

# THE CO-ORDINATION TEAM

**Marlene Damerau**

**Wolfgang Backhaus**

## Your Moderators

*Video & Poll manager:*
**Saydrina Govender**

*Question manager:*
**Ana-Maria Baston**

*Technology manager:*
**Wolfram Buchta**

## Your Techies

Webinar
15 May 2020

# Data-based planning of energy-efficient public transport services and infrastructure

*M. Damerau, Rupprecht Consult, Cologne, Germany*

# Welcome!

Planning for **sustainable Public Transport**

in **LOW-CARB:**

- … for better accessibility of FUA‘s (e.g., new mobility services for remote business areas)

In **EfficienCE:**

- … for PT infrastructure and better energy performance

Public transport

Pilot demonstrations

SUMP

Planning for sustainable Public Transport

New mobility offers

in **LOW-CARB:**

- … for better accessibility of FUA‘s (e.g., mobility services for remote business areas)

Stakeholder cooperation

Collecting, sharing, analysing data

In **EfficienCE:**

- … for PT infrastructure and better energy performance

Governance

Planning tools

# INTRODUCTION



## Collecting, sharing, analysing data

How to make use of data …

… for planning of better Public Transport services and energy infrastructure?

… for better investment decisions in public transport?

# LOW-CARB: Capacity building for integrated low-carbon mobility planning in functional urban areas

**Programme Specific Objective:**
To improve capacities for mobility planning in functional urban areas to lower $CO_2$ emissions

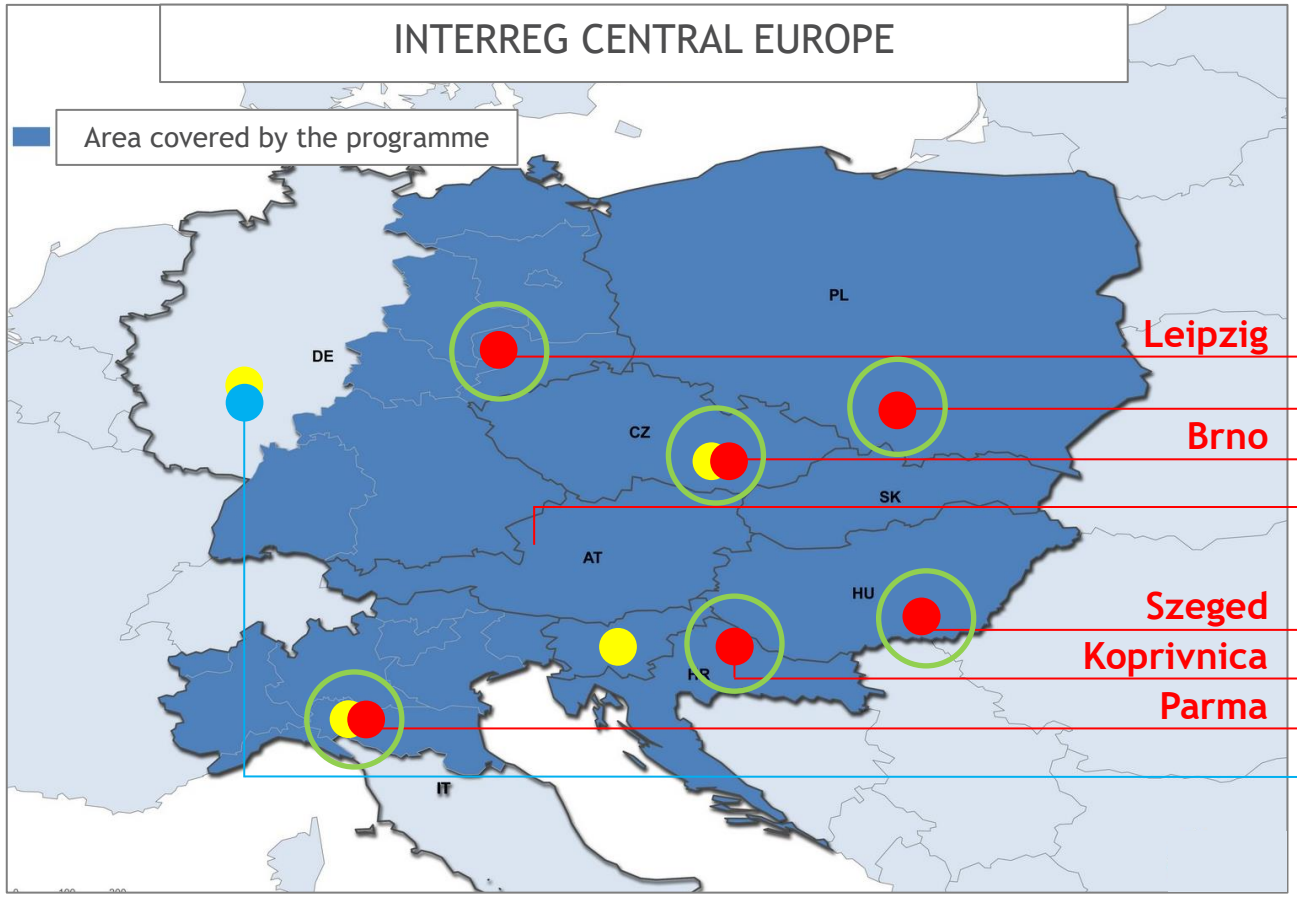
**Project Main Objective:**

LOW-CARB project aims to enhance capacities for integrated low-carbon mobility planning for functional urban areas in Central Europe.

**Project Specific Objectives – with a focus on public transport:**

- *Integrated low-carbon mobility planning* for functional urban areas
- *Capacity building* for integrated low-carbon mobility planning in FUAs
- *Pilot actions* for low carbon mobility in FUAs

# INTERREG CE PROJECT LOW-CARB: MAP OF PARTNERS



| | |
|---|---|
| Leipzig | LVB,MDV,Leipzig + UIRS, VRS, WY |
| | Skawina + City of Krakow |
| Brno | City of Brno + DPMB, IDS JMK |
| Szeged | Szeged Transport Company |
| Koprivnica | City of Koprivnica, UNIN |
| Parma | TEP + City of Parma |
| | Rupprecht Consult |

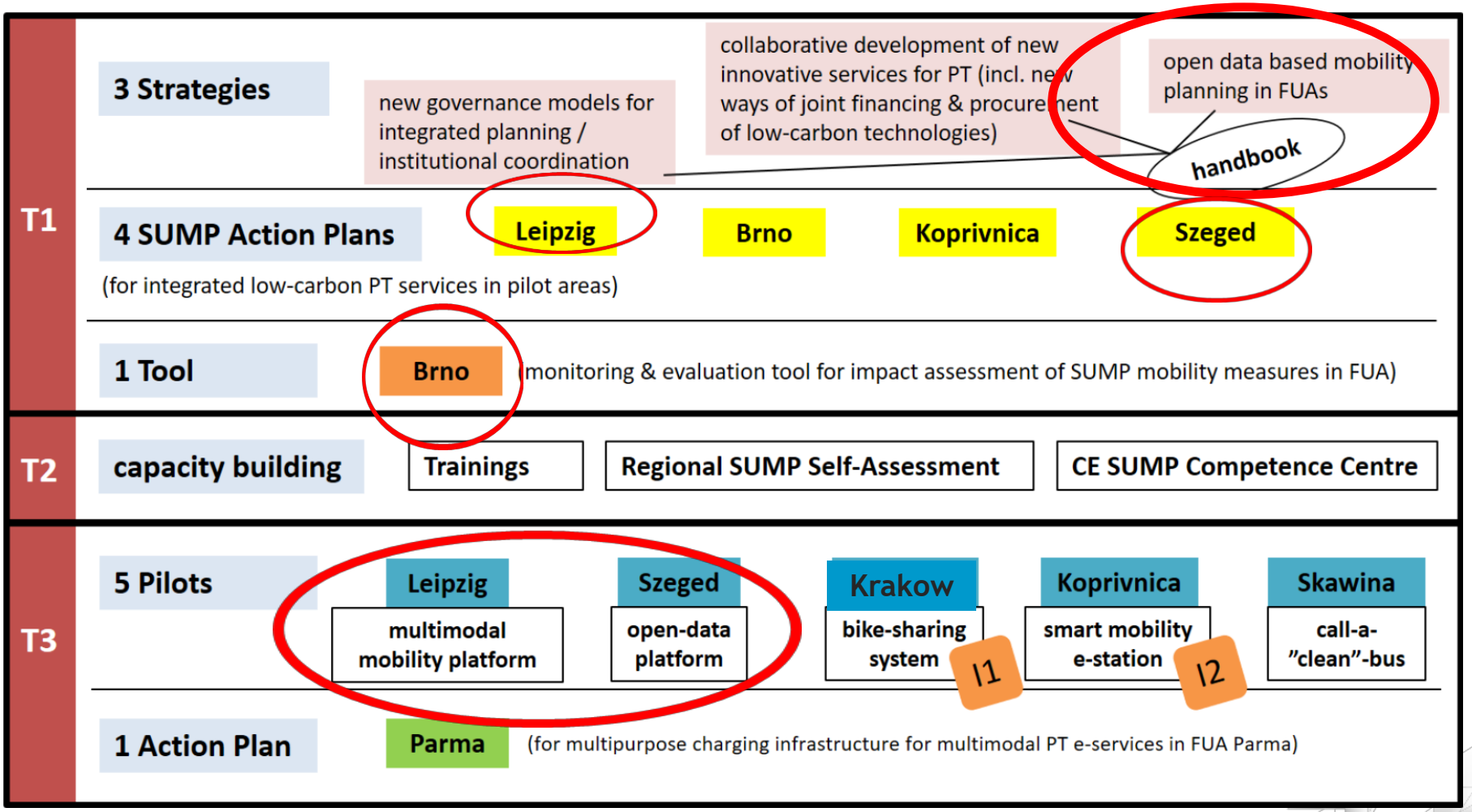
**10** project partners

**7** associated partners

**6** FUAs

**6** CE countries

# INTERREG CE PROJECT LOW-CARB: WORK PACKAGE STRUCTURE



# LOW-CARB: OPEN DATA STRATEGIES IN LEIPZIG AND SZEGED

## Sustainable urban mobility planning with open data

December 2019 @ Chaos Communication Congress, Leipzig

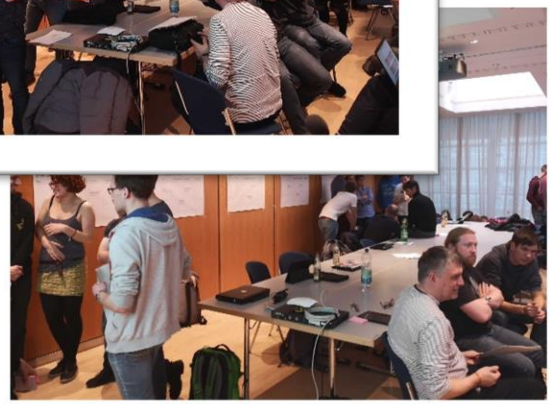
Duration 2,5h

With interesting additional data sets

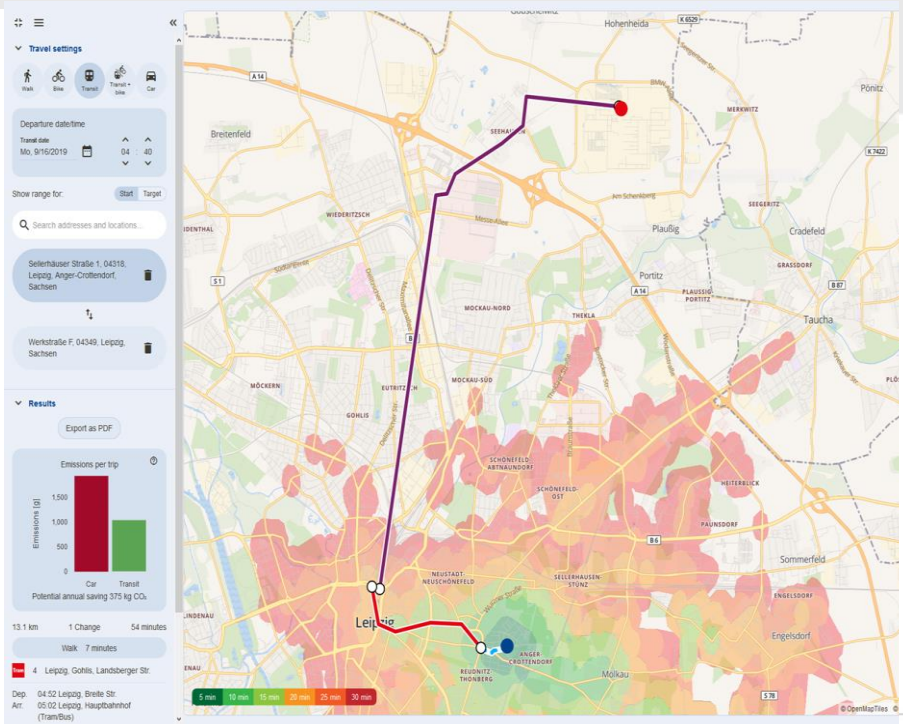
PT Chatbot by OKLab Leipzig

Telegram

March 2019 Szeged Boost (2 days)



# LOW-CARB: MOBILITY AND SERVICES IN LEIPZIG



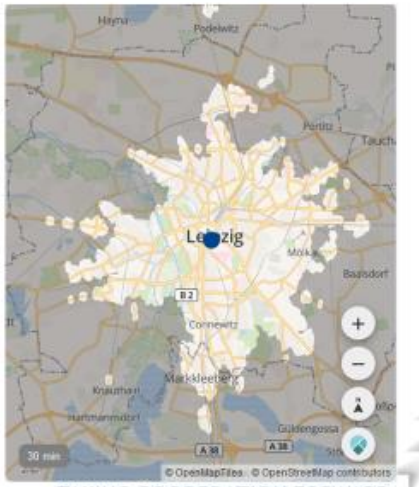

## ACCESSIBILITY MAP: „REACHIE“

Clever mobil im Leipziger Nordraum

- Travel range by time budget across different travel modes
- Cross-platform (mobile)
- Multi- & Intermodal
  - Pedestrian
  - Bike
  - PT + pedestrian
  - PT + bike
  - Car
- Itinerary
- CO2-calculator
- Coloured mode

Targomo

www.mdv.de/reachie





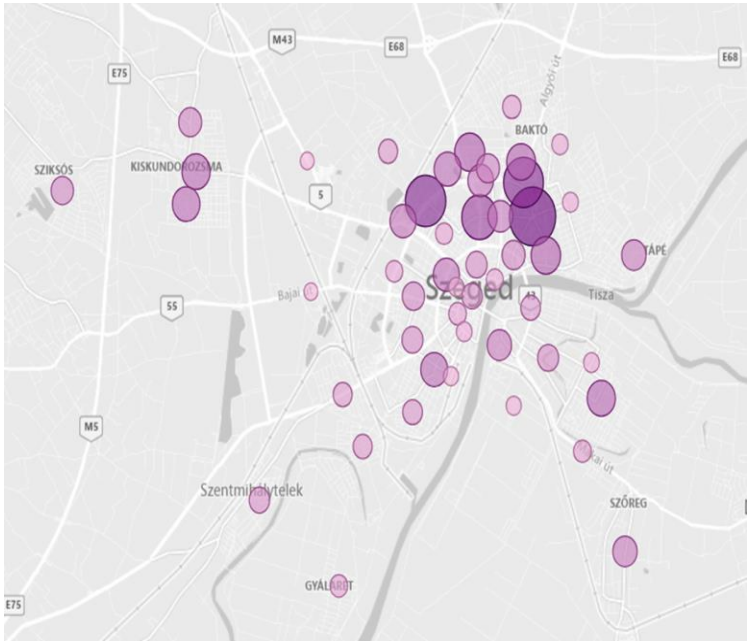

**Sharing data for amending accessibility of remote business area**

- Accessibility map
- Masterplan Leipzig Nordraum

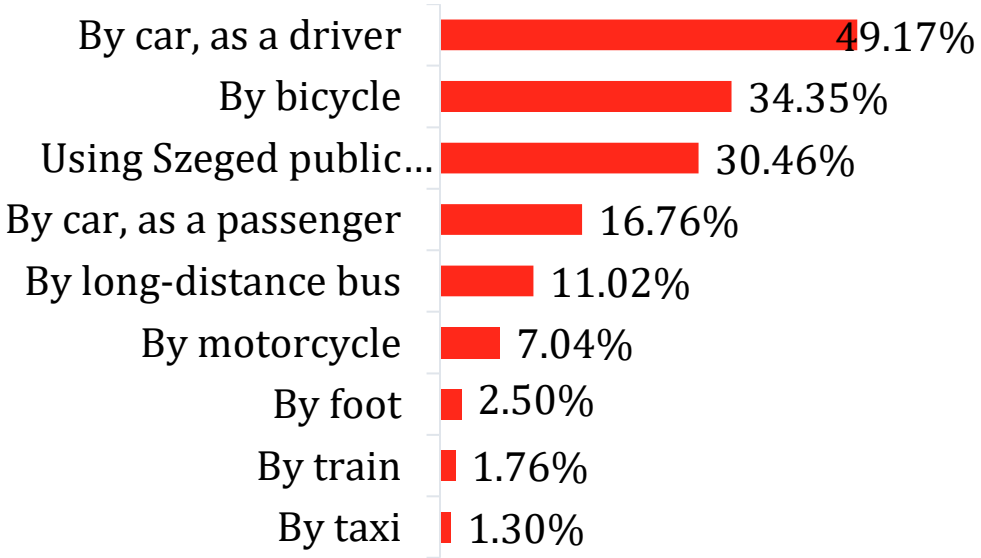
# LOW-CARB: MOBILITY AND SERVICES IN SZEGED

Interreg CENTRAL EUROPE LOW-CARB

**Place of departure of responders living in Szeged, by district**




**Distribution of means of transport by the number of respondents citing them as their preferred means of travelling to work**




## Developing a city-wide open data platform

- Action plan for company-based mobility management
- WIFI passenger counting system
- Application for CO2-emissions calculation

# EfficienCE: Energy Efficiency for Public Transport Infrastructure in Central Europe

**Programme Specific Objective:**
To develop and implement solutions for increasing energy efficiency and renewable energy usage in public infrastructures

**Project Main Objective:**

EfficienCE aims at reducing CO2 emissions and integrating RES in the PT sector in CE by reducing energy consumption in PT infrastructure.

**Project Specific Objectives – with a focus on public transport:**

- *Strategies and managerial approaches for improving energy efficiency in Public Transport infrastructures*
- *Capacity building, evaluation and development of toolkits*
- *Pilots for testing and implementing novel energy saving and RES-integration technologies*

BKK BUDAPESTI KÖZLEKEDÉSI KÖZPONT

MOBILISSIMUS

Leipziger Verkehrsbetriebe

Redmint

GDAŃSK UNIVERSITY OF TECHNOLOGY

WIENER LINIEN

Plzeňské městské dopravní podniky PMDP

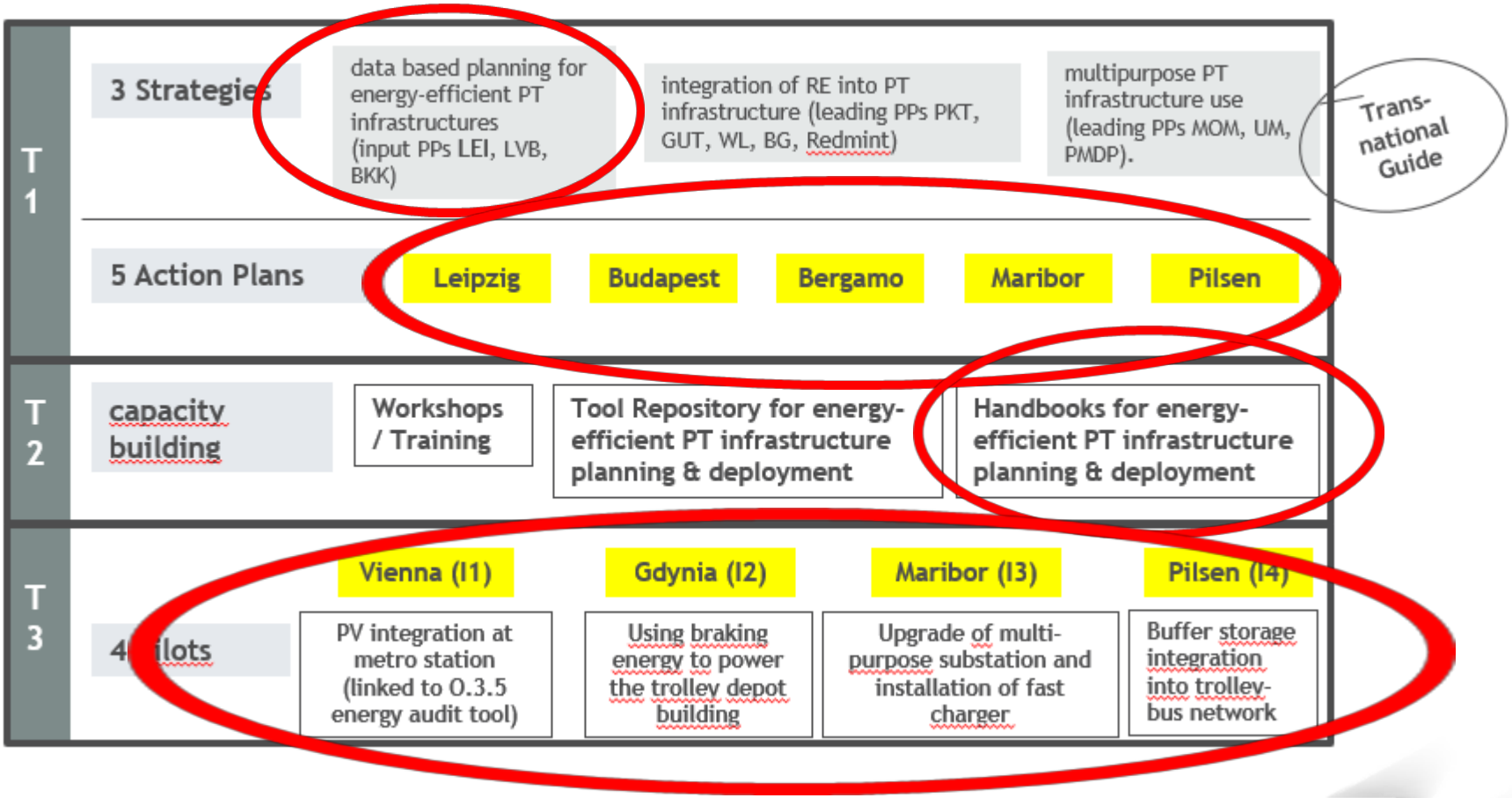
City of Leipzig

University of Maribor
Faculty of Civil Engineering, Transportation Engineering and Architecture

BERGAMO CITTÀ DEI MILLE
COMUNE DI BERGAMO

PRZEDSIĘBIORSTWO KOMUNIKACJI TROLEJBUSOWEJ Sp. z o.o. PKT GDYNIA

# INTERREG CE PROJECT EFFICIENCE:
## WORK PACKAGE STRUCTURE



## EfficienCE

- 5 action plans on data-based PT planning & financing
  - City Leipzig & LVB: application of urban data platform for e-mobility station planning
  - BKK: prepare investment decision (trolley or e-buses)
  - PMDP, Gdansk university of Technology: buffer storage in PT infrastructure for in-motion charging concepts
  - …

## Municipality of Maribor: Action plan for multipurpose PT infrastructure use for fast-charging e-buses

Mitja Klemenčič, Marijan Španer, Matej Moharić (University of Maribor): Data needed for planning of fast-charging infrastructure

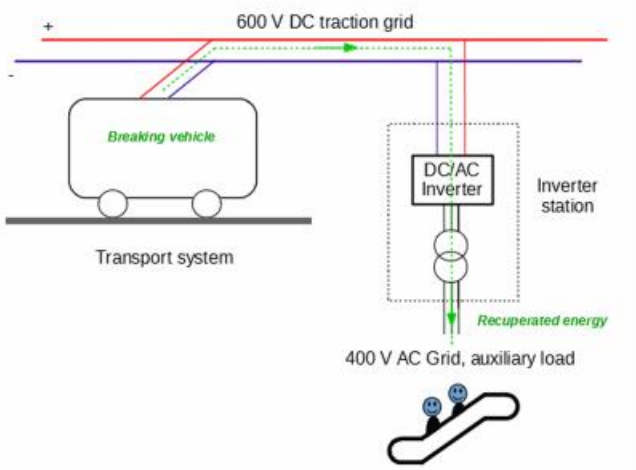
| Data Category | Indicator | Data needed | Method and data availability |
|---|---|---|---|
| Spatial planning / infrastructure | Number of exposed inhabitance to negative effects of buses along the PT route (noise, emissions)<br>Priority of bus lanes for electrification | Number of inhabitance living 100 m along the bus route<br>Number of bus cycles per route sectors per day. | GIS Model (UM)<br>GIS data - Maribor Data center<br>Timetable - Marprom |
| | Number of locations of the charging facilities for possible multipurpose use | Existed and charging plans for all modes (e-cars, e -car sharing, Park and ride, e-bike sharing, Railways, e-bus) | GIS model |
| Energy (PT) | Energy consumption of an e-bus on selected bus route (kWh/km)<br>Power of e-bus charger (kW) | Driving cycle per bus per route, (speed, acceleration, dwell time, route elevation)<br>Daily timetable of all buses on route<br>Temperature<br>Passenger load<br>Bus characteristics (battery capacity, weight, resistance, traction power, recuperation ratio, auxiliary traction) | Matlab model (UM)<br>Driving real life cycle data - tachographs, Timetable , Bus characteristics, Passenger load - (Marprom)<br>Temparature (ARSO) |
| | PT vehicles in the future | Passenger demand - OD Matrix<br>Headway per route<br>Load factor<br>PT network | Transport model, Marprom |
| Economy | TCO - €/pkm<br>LCC<br>LCOC | Worst case scenario energy consumption of e-bus (kWh/km), cost for investments in vehicle, infrastructure, battery, cost for operation (energy), passenger load, km per day, external costs | Excel model (UM)<br>Marprom, Best practices |

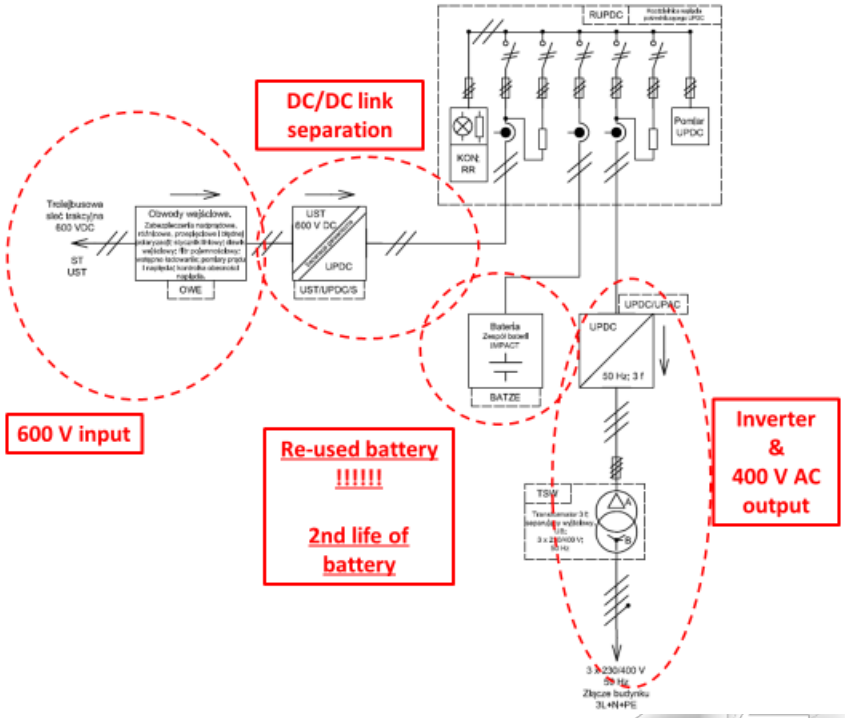
# INFRASTRUCTURE PLANNING IN EFFICIENCE

## Municipality of Bergamo, Redmint: Action plan for the integration of RES into charging infrastructure

## Pilot action by PKT Gdynia and GUT Gdansk: recuperation of breaking energy

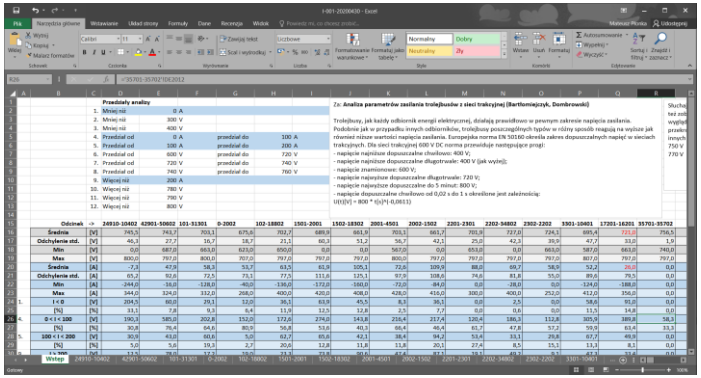
**EfficienCE**: Mini inverter station (PKT)



# Pilot buffer storage station by PMDP for in-motion charging concepts: Analysis of tachograph data by Gdansk University of Technology

„We have started to aggregate the data and got preliminary results. For this moment, we feed our database with the data generated from the source files.“



„When we finish this, we can run the program ar ere adequate and, if not, correct them accordingly.“

# Photovoltaic foil on top of a metro station in Vienna

- In regular operation since 14. January 2020
- At peak times, 50% of the station's electricity is already generated from solar energy!
- The PV system currently produces 14 hours of energy per day

# WORKSHOP OBJECTIVES

Interreg CENTRAL EUROPE European Union European Regional Development Fund
EfficienCE

## Exploration and discussion of …

- Methods
- Applications
- Data
- Stakeholder cooperation …

## …support

- sound infrastructure and vehicle investments
- potential future use cases

# Thank you for your attention!

**Coordination teams:**


**Ronald Juhrs (LOW-CARB)**
Leipziger Verkehrsbetriebe (LVB) GmbH

**Nadja Riedel & Sebastian Graetz (EfficienCE)**
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EfficienCE

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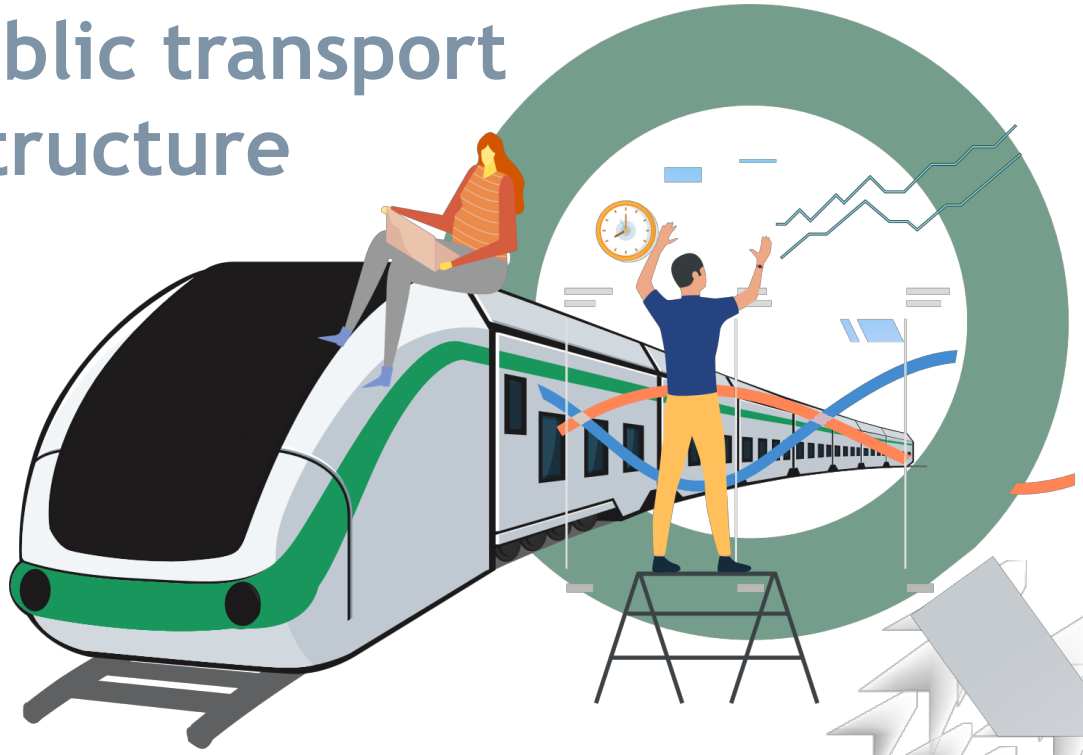
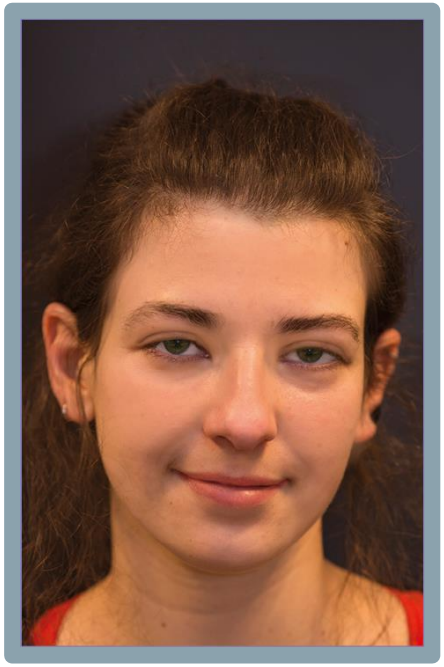
# TOPIC 1:

## Data-based planning of energy-efficient public transport services and infrastructure





# Hilia Boris Iglesia

*UITP*

**The value of data for the public transport sector**

12/05/2020

# THE VALUE OF DATA FOR THE PUBLIC TRANSPORT SECTOR

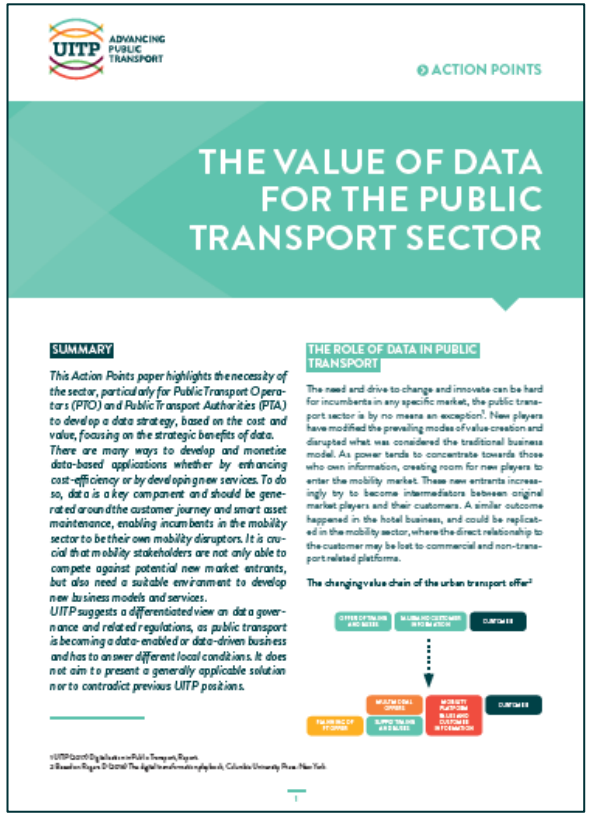
Hilia Boris Iglesia
Manager
UITP – International Association of Public Transport

# KEY MESSAGE

This UITP Action Point paper highlights the necessity of the sector, particularly for Public Transport Operators (PTO) and Public Transport Authorities (PTA) to **develop a data strategy**, based on the cost and value, focusing on the strategic benefits of data.

UITP suggests a **differentiated view on data governance** and related regulations, as public transport is **becoming a data-enabled or data-driven business** and has to answer different local conditions.

It does not aim to present a generally applicable solution nor to contradict previous UITP positions.


UITP ADVANCING PUBLIC TRANSPORT

ACTION POINTS

THE VALUE OF DATA FOR THE PUBLIC TRANSPORT SECTOR

SUMMARY

*This Action Points paper highlights the necessity of the sector, particularly for Public Transport Operators (PTO) and Public Transport Authorities (PTA) to develop a data strategy, based on the cost and value, focusing on the strategic benefits of data. There are many ways to develop and monetise data-based applications whether by enhancing cost-efficiency or by developing new services. To do so, data is a key component and should be generated around the customer journey and smart asset maintenance, enabling incumbents in the mobility sector to be their own mobility disruptors. It is crucial that mobility stakeholders are not only able to compete against potential new market entrants, but also need a suitable environment to develop new business models and services.*
*UITP suggests a differentiated view on data governance and related regulations, as public transport is becoming a data-enabled or data-driven business and has to answer different local conditions. It does not aim to present a generally applicable solution nor to contradict previous UITP positions.*

THE ROLE OF DATA IN PUBLIC TRANSPORT

The need and drive to change and innovate can be hard for incumbents in any specific market, the public transport sector is by no means an exception[1]. New players have modified the prevailing modes of value creation and disrupted what was considered the traditional business model. As power tends to concentrate towards those who own information, creating room for new players to enter the mobility market. These new entrants increasingly try to become intermediators between original market players and their customers. A similar outcome happened in the hotel business, and could be replicated in the mobility sector, where the direct relationship to the customer may be lost to commercial and non-transport related platforms.

The changing value chain of the urban transport offer[2]

**Includes 10 recommendations**

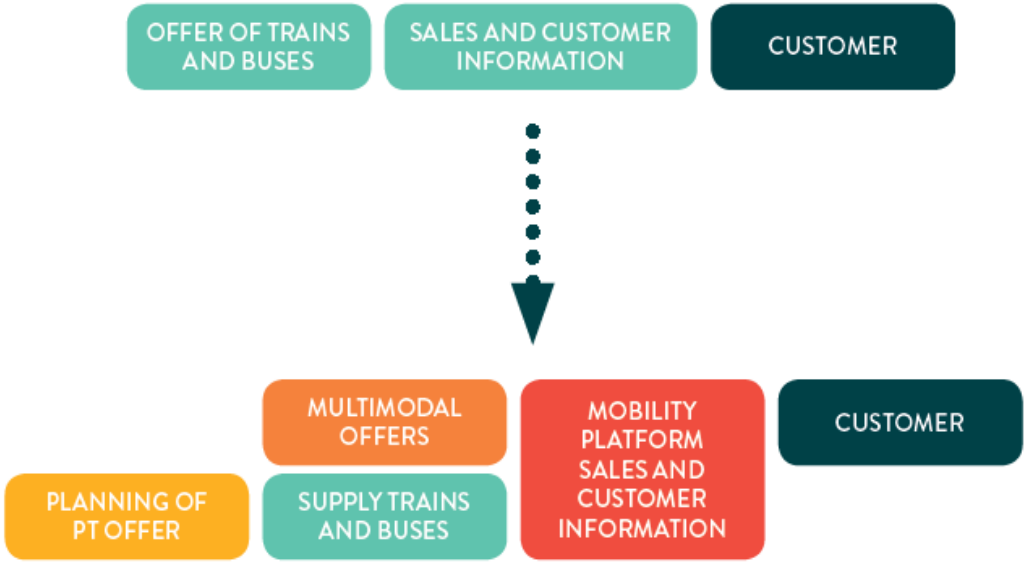
# SETTING THE TREND FOR DATA IN URBAN MOBILITY

The need and drive to change or innovate can be hard for incumbents. New entrants are increasingly seeking to intermediate between original market players and customers

Clear link of the catalytic role that PT sector plays in the development of cities and economic, showcased by a clear preference towards open data.

Mobility operators must now compete on two fronts: private car transport and digital market

Main question highlights **how to align different priorities concerning the use of data** for the mobility ecosystem and towards operators.

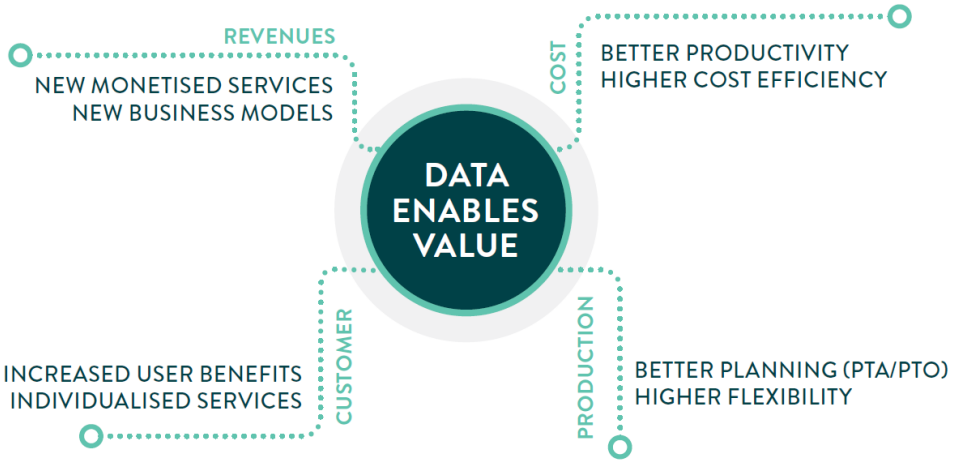



**The public transport sector should be the backbone and integrator of mobility. Integrating mobility services and keeping the customer relationship is a data business**

# BECOMING A DATA ENABLED COMPANY

Transport companies must evolve into **data-enabled businesses**:

- Awareness and know-how to harness value from data
- Develop data strategies and a clear vision on collecting, storing, analysing and using data
- Awareness of privacy and data stewardship, cybersecurity and faster competitors
- Understanding of the value of data and the potential risk of publishing them openly
- Recognition when data should be opened or closed, shared or sold, depending on the potential benefits
- Open up internal data silos and improve data analytics




Advanced business analytics support decision-making by **turning relevant data into valuable insights** to improve business performance

**PTOs and PTAs should become a data-enabled business and have a clear strategy on data**

**Platform economics strengthens the need for the digital transformation of the sector**

UITP

# FIGURING DATA OUT

In its raw form, data needs to be shaped, processed and interpreted to provide added-value

The ecosystems has provided fertile grounds to thrive, due to:

- Increasing interconnectivity of people and objects
- Great levels of data created, stored and analysed
- Enabling complex analysis of data

| Different types of data in PT | |
|---|---|
| Customer data | All data on the customer itself, as well as passenger preferences and their use of the system |
| Operational data | Data produced by operators' assets for the delivery of public transport services |
| Mobility data | Data which provides information of urban mobility patterns |
| Exogenous data | Data from third parties which can have an impact on mobility |

**Data has and brings value. Customer data, operational data and the knowledge of the market are of strategic and commercial value**

**Data is as an asset and should be treated like such, one can generate revenue or save costs out of it and put it at risk**

# COST OF DATA

All activities around data concur expenses to the operator and authority, such as:

- Upfront infrastructure
- Establishment of suitable system capable to perform
- Variable costs
- Potential upgrades/expansions (including technological innovations and evolving needs)

**Key requirements**:

1. Investing in networks
2. Strengthen and expand operator capabilities

**Data has a cost. The process of collection, storage, analytics, security and privacy and elimination needs permanent attention, budgeting expenses and investments.**

# CAPTURING THE VALUE OF DATA

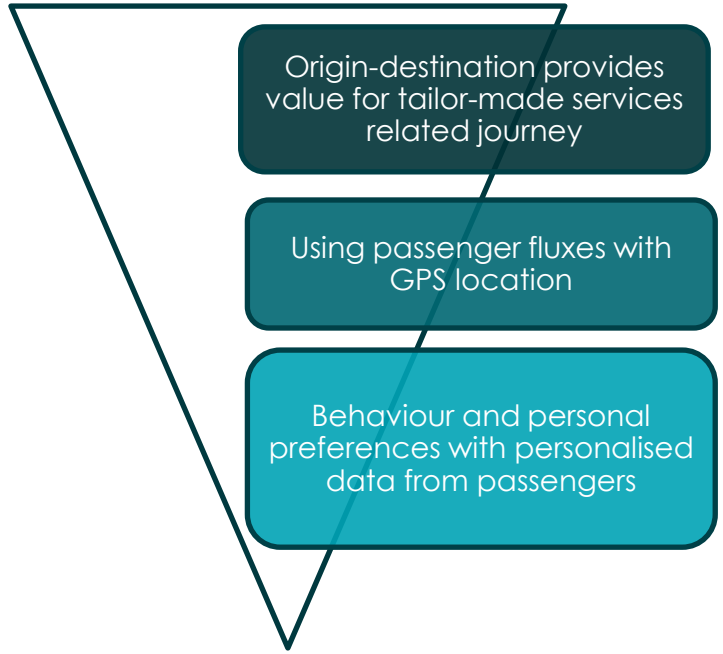
Broad range of types of data with varying degrees of granularity and potential commercial value

Awareness of how to quantify the value of data, can be done by:

- Importance in the balance-sheet
- Ability to compete
- Lifetime customer value
- Operational capabilities

Inability to do so or forecast evolution, may impact/undervalue the need to invest and financial provisions in the annual budget

Different regulatory regimes exist on the appropriate or acceptable use of data, protecting privacy rights and data breaches.




**PTOs and PTAs are collecting a lot of data especially as issuer of apps, they can use it and control it within their privacy and contractual constraints.**

# DIFFERENTIATED USES OF DATA

A general tendency can be observed in the opening of information and datasets for urban mobility activities.

The use and boundaries of data for PTOs and PTAs must weight benefits and losses with relation to all stakeholders.

Key criteria for **data framework**:

- The importance of a fair and level-playing field
- The cost of producing and disseminating data
- The imperious necessity to preserve proprietary and commercial data

| General interest of different stakeholders in public transport | |
|---|---|
| Customers | Benefit from a rich and complete network of mobility options with an easy interface |
| Transport Operators | Provide mobility service in the most cost-effective and efficient way |
| Information/Platform providers | Provide resources and expertise in the management of data |
| Infrastructure owners/Operators | Provision of car/vehicles sales and maintain control of data (including automotive and vehicle owners) |
| Transport Authorities | Creation of a suitable and economic sustainable mobility network |
| Governments | Benefit from opened data to foster economic development with the development of apps from third parties |

UITP

# CREATING A DATA-SHARING STRATEGY

PTOs and PTAs should define locally a **data-sharing strategy** based on reciprocity and partnership

PTOs should be allowed to define:

1. Which types of data is a strategic asset in the relationship to the customer, for the market and for efficient production
2. Which types of data is costly to produce, store, maintain or is of high commercial value for the other parties
3. Which types of data could improve customer experience or create efficiency gains

**PTOs are enterprises in a competitive market, this should be reflected in its relevant data legislation**
**The public transport sector can and shall share data for innovation and good customer service within itself**

# POTENTIAL GOVERNANCE OUTCOMES

Local clarification on the concept of free vs open data

Each dataset must be categorised and each stakeholder must be identified

The price of data can later be discussed based on either identified value or production cost

| POSSIBLE CORPORATE GOVERNANCE OF DATA WITH RESPECT OF THE VALUE OF DATA | | | |
|---|---|---|---|
| CATEGORY OF DATA / DATA USERS | STRATEGIC PARTNERS | COMMERCIAL VENTURES | PUBLIC INTEREST OR NON-PROFIT ORGANISATIONS |
| PRIVATE DATA | (If within strategy) Reciprocally exchanged under privacy restraints | (If within strategy) Reciprocally exchanged under privacy restraints | Not openable |
| STRATEGIC DATA | (If within strategy) Reciprocally shared | (If within strategy) Reciprocally exchanged | Not openable |
| COMMERCIAL DATA | Reciprocally shared, exchanged or sold | Reciprocally exchanged or sold | Not openable for commercial use |
| OPENABLE DATA | Shared | Shared | Open |

**Data is becoming more and more regulated. The regulation has to be differentiated by the type of data and by the strategic value of the data to the public transport sector.**

# RECOMMENDATIONS

- Data has and brings value. Customer data, operational data and the knowledge of the market are of strategic and commercial value.
- Data is as an asset and should be treated like such, one can generate revenue or save costs out of it and put it at risk.
- PTOs and PTAs should become a data-enabled business and have a clear strategy on data.
- The public transport sector should be the backbone and integrator of mobility. Integrating mobility services and keeping the customer relationship is a data business.
- Platform economics strengthens the need for the digital transformation of the sector.
- Data has a cost. The process of collection, storage, analytics, security and privacy and elimination needs permanent attention, budgeting expenses and investments.
- PTOs and PTAs are collecting a lot of data especially as issuer of apps, they can use it and control it within their privacy and contractual constraints.
- PTOs are enterprises in a competitive market, this should be reflected in its relevant data legislation.
- The public transport sector can and shall share data for innovation and good customer service within itself.
- Data is becoming more and more regulated. The regulation has to be differentiated by the type of data and by the strategic value of the data to the public transport sector.

# QUESTIONS?

# Tilman Schenk

*City of Leipzig (LOW-CARB & EfficienCE)*

**The “Leipzig Open Data Strategy” and the integrated urban data platform with application to a specific public transport development use case**

13.05.2020
Transnational Webinar „Data-based planning of energy-efficient public transport infrastructure“

# LOW-CARB – Open Data Strategy

*. Jummrich, T. Schenk, R. Schillke, C. Schuldt / LVB, City of Leipzig, MDV / Leipzig, Germany*

# POLL

# AGENDA

Project Results Leipzig Partners

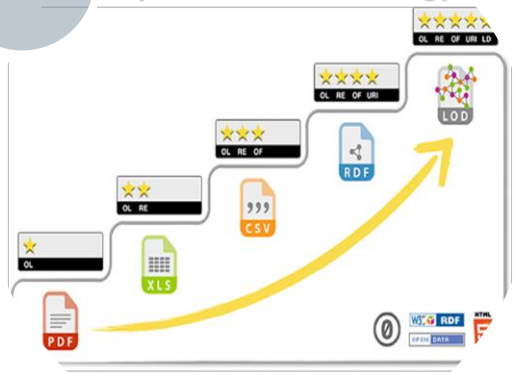
Open Data Strategy

Open Innovation Slam - Hackathon

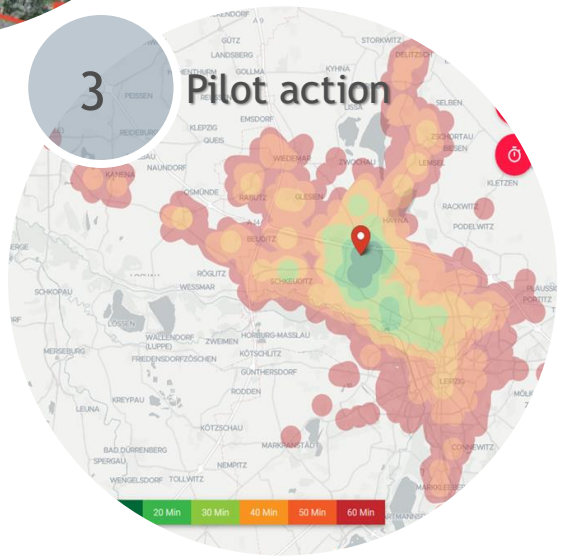
# PROJECT RESULTS LEIPZIG PARTNERS

1 Actionplan mobility „Nordraum Leipzig“

2 Open-Data strategy




3 Pilot action



# AGENDA

Project Results Leipzig Partners

Open Data Strategy

Open Innovation Slam - Hackathon

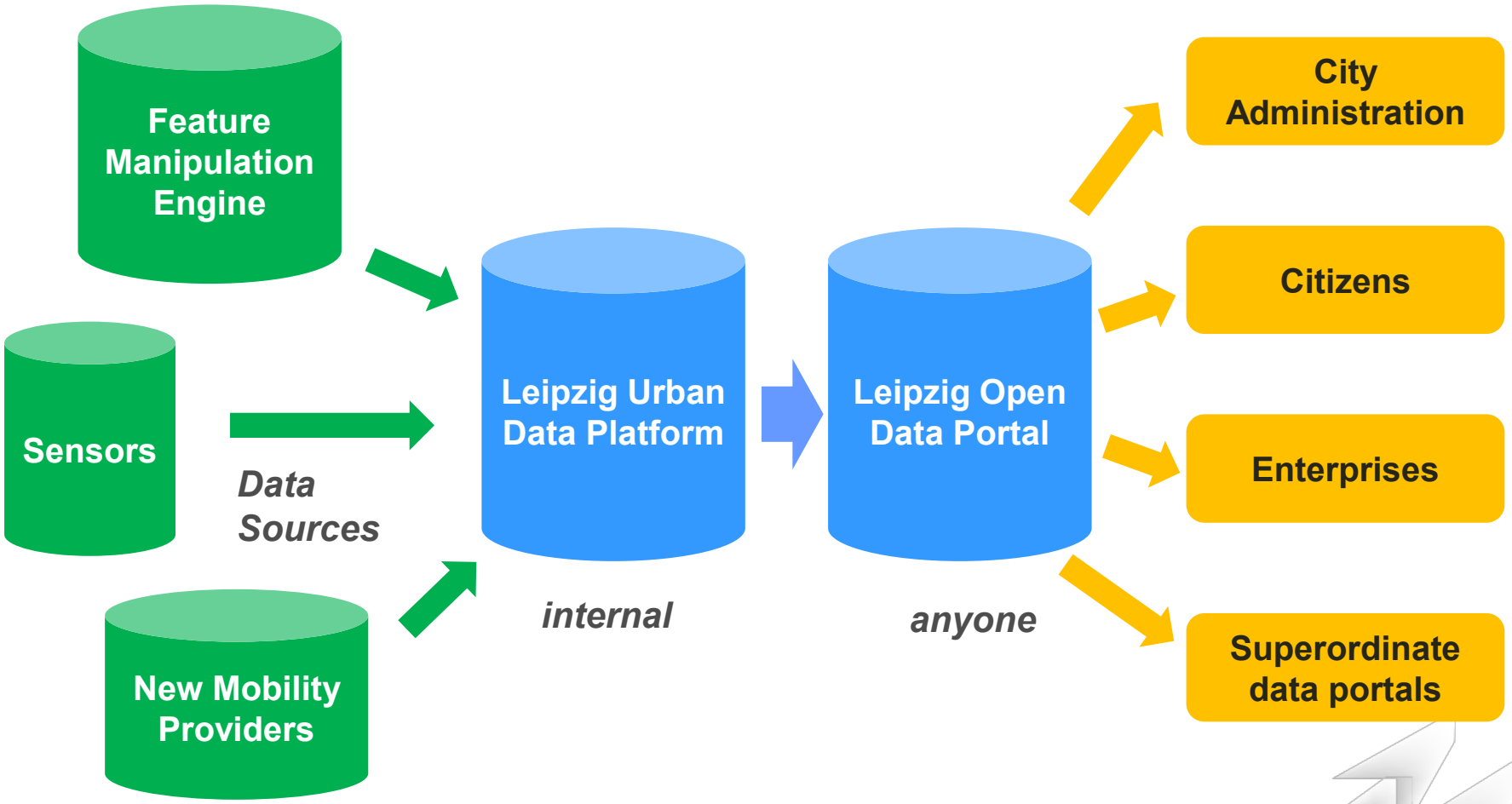
# OPEN-DATA STRATEGY (1/2) - DOCUMENT

Open Data Strategy Document finalized in March 2020

Main Recommendations:

- „Open by default“: Leipzig will publish all data, documents and data services free of charge and machine readable – unless confidentiality required
- Establishing „Mobility data as a service“ (starting by opening data from traffic count systems)
- Establishing an „open data culture“ and „culture of experiments“ by providing creative space for citizen science
- Follow an iterative path to these goals.

# OPEN-DATA STRATEGY (1/2) - THE „LEIPZIG WAY“ TO OPEN TRANSPORT DATA



# AGENDA

Project Results Leipzig Partners

Open Data Strategy

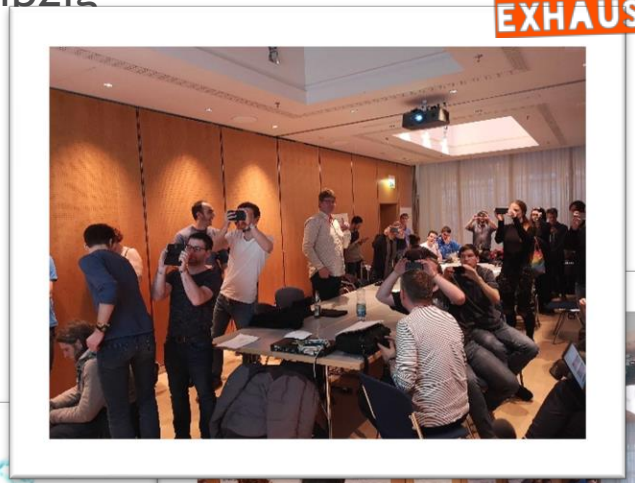
Open Innovation Slam - Hackathon

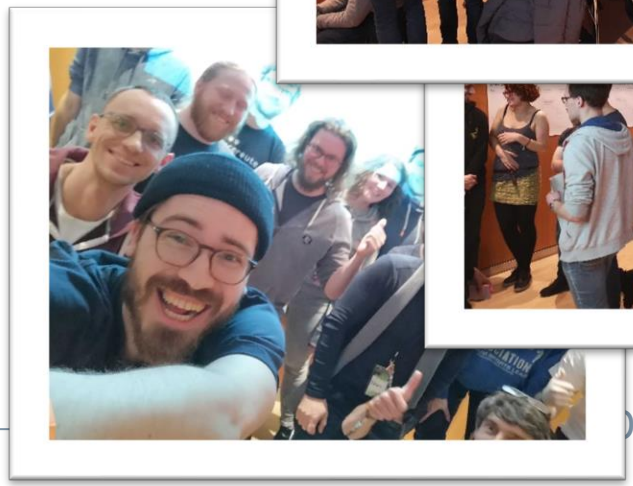
# OPEN-DATA STRATEGY (2/2) - HACKATHON

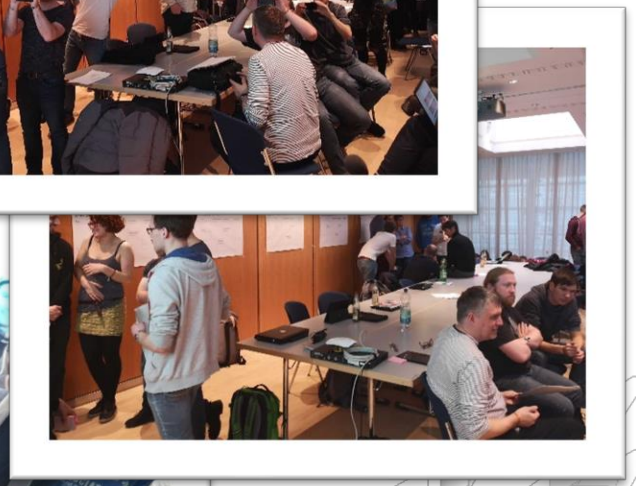
## Sustainable urban mobility planning with open data

27.12.2019 @ Chaos Communication Congress, Leipzig
Duration 2,5h
With interesting additional data sets

>50 participants, design thinking technique
Group workshops designed and presented posters
„open data canvas“



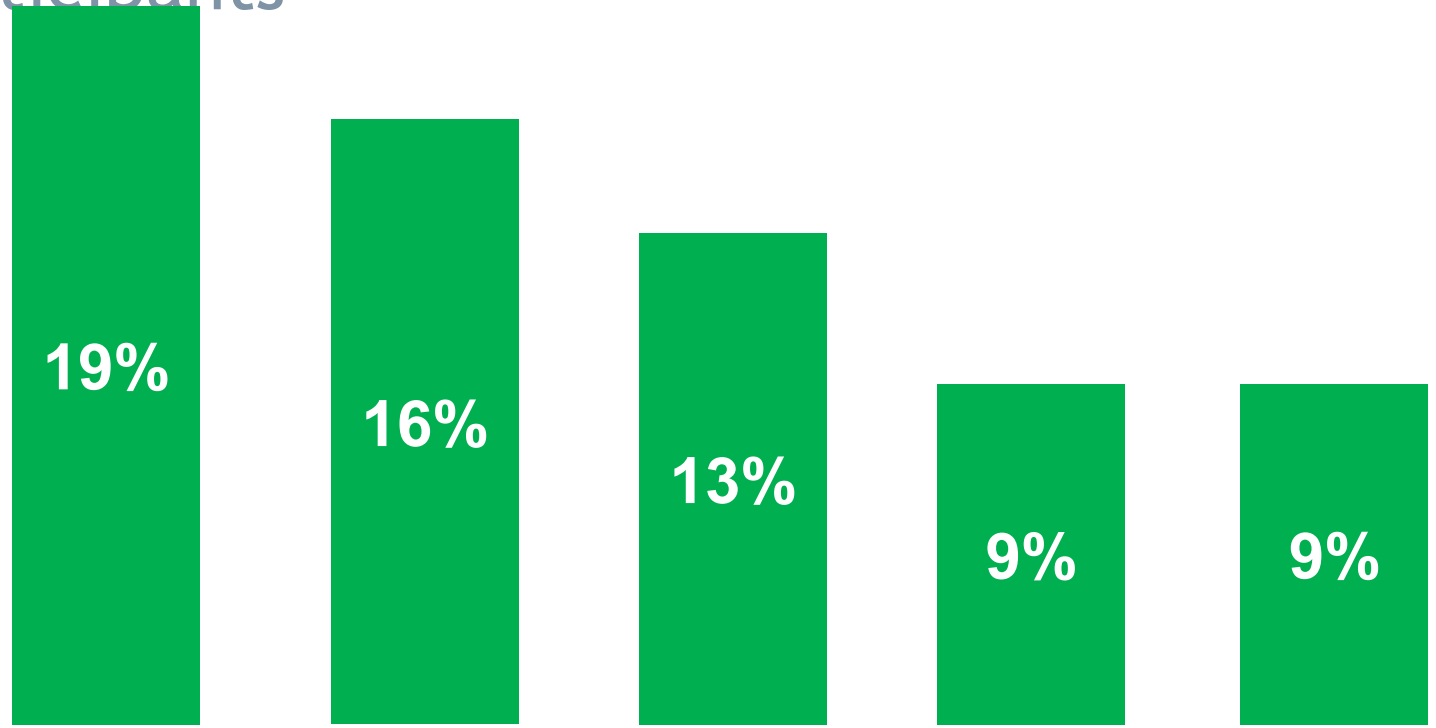




Telegram

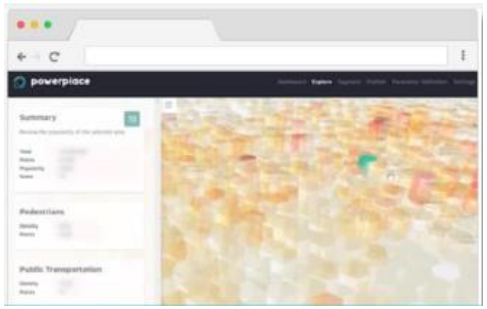
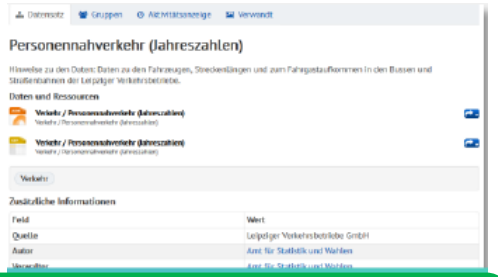
PT Chatbot
by OKLab Leipzig

# Preferred New Mobility Data by Workshop Participants



# OPEN-DATA STRATEGY (2/2) - HACKATHON

## Main Recommendations

| | FROM | TO |
|---|---|---|
| **Urban Planners**<br>…like to analyse data visually before downloading and integrating into own system (e. g. GIS) | Interactive online mapping |  Dynamic visualisation of open data |
| **Data Scientists**<br>…like to download raw data into own system (e. g. development kit) to build new data products |   Separate subdomains with stand-alone data files | Programmable data interface for efficient data integration |

# VIELEN DANK!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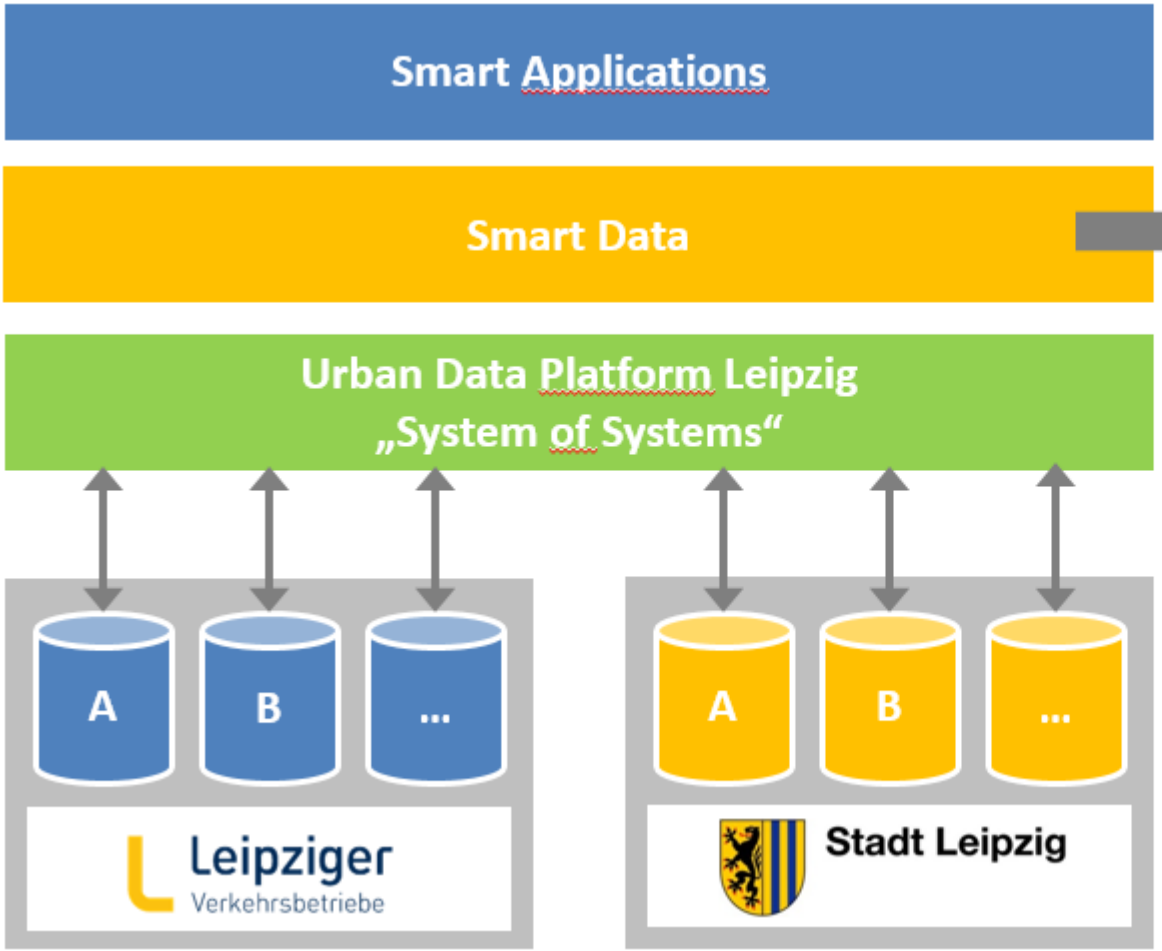
# Sebastian Graetz

*City of Leipzig (LOW-CARB & EfficienCE)*

**The “Leipzig Open Data Strategy” and the integrated urban data platform with application to a specific public transport development use case**

# Added value of Urban Data Platform (UDP) Leipzig




Public transport infrastructure planning

- Open and connect data silos
- enrich and connect data from different systems and sensors (IoT)
- Create benefits and new applications
- to inform, to assist and to decide

# Added value of Urban Data Platform (UDP) Leipzig

a) Smart city management

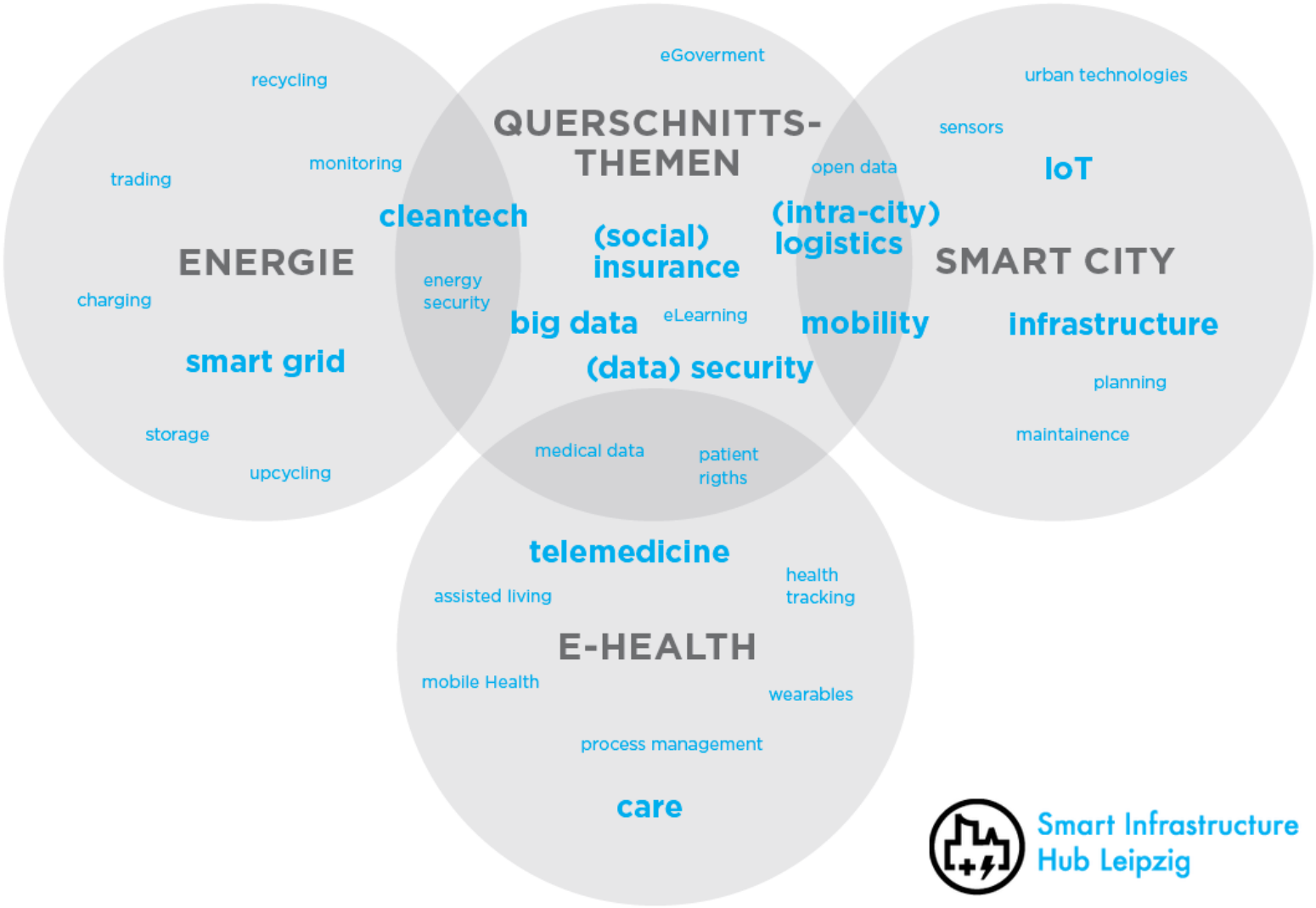
- Use, maintenance, further development of city-relevant resources, infrastructures, processes
- Development of comprehensive processes (companies, public administration, science, research, urban society)
- Support as an information, planning and control instrument (administration, economy, citizens)
- Effective management and analytics; i.e. user-centered dashboards for policy making and decision support, strategic goal review

b) Data-based innovation

- Easily accessible and connectable offer of urban data
- Access for business, public administration, science and research institutions, urban society
- Basis for urban applications
- Basis for data-based business model

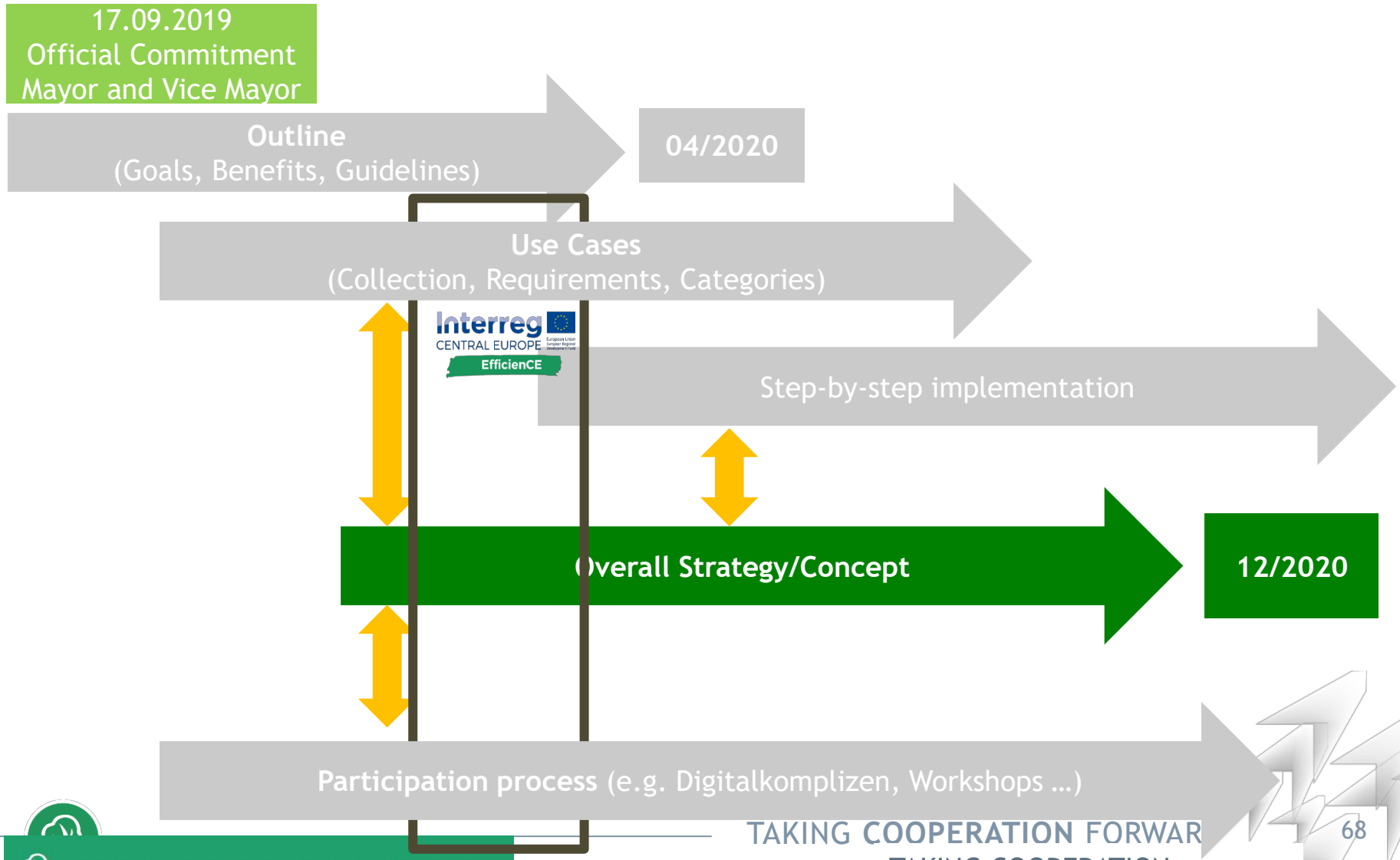
c) Citizen engagement, participation and integration of city crowd data

# Added value of Urban Data Platform (UDP) Leipzig



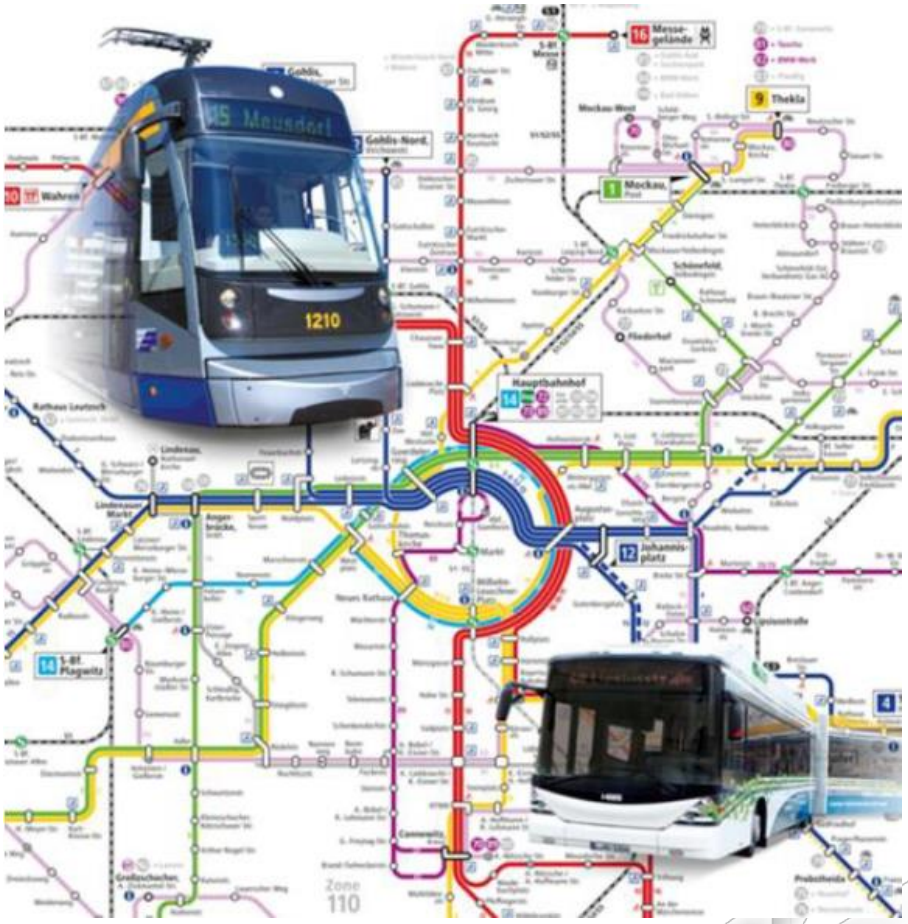

Smart Infrastructure Hub Leipzig

# Development of Urban Data Platform - Schedule



# Use Case – Data based planning of public transport stops

- Optimization of the planning process for stops and the surrounding area
- Linkage to other types of traffic, mobility stations, mobile points including the integration of charging infrastructure, connection of new mobility services
- Consolidation of planning data between City  and Leipziger Verkehrsbetriebe
- Raise attractiveness of public transport and support transformation process from public transport to mobility service provider



# LEIPZIG PARTNERS

Stadt Leipzig

Digital City Unit
- Lead Partner, overall Project Management
- Management of local working process

Office for Geoinformation and Land Management
- Concept of Urban Data Platform and implementation

Leipziger Verkehrsbetriebe

Leipziger Verkehrsbetriebe
- Development of use cases for public transport infrastructure planing with the help of Urban Data Platform
- Development of curriculum for energy managers


TAKING COOPERATION FORWARD

# Thank you for your attention!

City of Leipzig, Digital City Unit

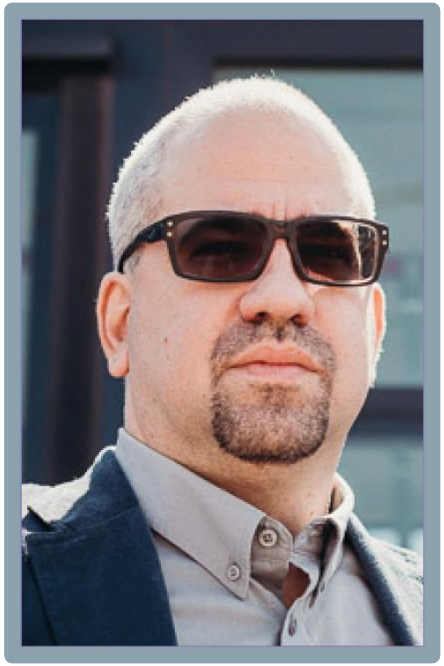
Sebastian Graetz

sebastian.graetz2@leipzig.de
www.leipzig.de



TAKING COOPERATION FORWARD

# Questions?



# Ádám Németh, *SKZT (LOW-CARB)*

## Data-based mobility and PT planning in Szeged

Low-Carb and EfficienCE Transnational Workshop – 13 May 2020 Webinar

# Data-based mobility and PT planning in Szeged

dr. Zoltán Ádám Németh – Szeged Transport Company – chief of public transport and railway safety

# SZKT data sources

Public transport

- Timetable
- Planned timatable compliance
- **Passenger counting**
- Vehicle telemetry data
- Ticket validation
- Ticket and passes sale

Parking

- Ticket and passes sale

# Wi-Fi based passenger counting system

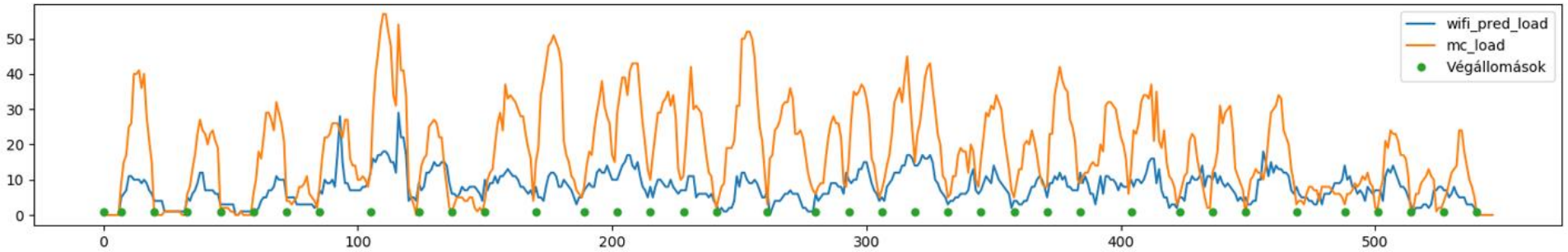
- In relation with Low-Carb project
- Counting based on MAC ID
- Ensure a wide range of options for improved planning, optimisation and evaluation of the entire traffic network.

Other counting options:

- Manual passenger counting: not generalizable, shows only the current situation
- Check in – check out system: expensive infrastructure
- Cameras: resource requirements, GDPR

# Wi-Fi based passenger counting system

- Wi-Fi device appearance data validated by axle load dataset




- Launched by Low-Carb project
- Supplies researchers by valuable data →
  Pilot equipment installed during the period of manual counting
  →
  Development of algorithm →
  Research riport completed →
  Software development →
  Final test on 15 vehicles →
  Now the equipment is able to correctly record data

# Wi-Fi based passenger counting platform

Home > SZKT > WifiScanReports > WifiScanReport

| | | | |
|---|---|---|---|
| DateFrom | 2020. 04. 10. NULL | DateTo | 2020. 05. 10. NULL |
| GetOn | True False NULL | TaskRef | NULL |
| SeenCounter >= | NULL | ClientMacAddress | NULL |
| VehicleJourneyPrivateCode | NULL | VehicleRegNumber | NULL |
| TaskItemRef | NULL | LineName | NULL |

1 of 1352 Find | Next

| Task Ref | Task Item Ref | Stop Point Name | Line Name | Route Name | Vehicle Journey Private Code | Vehicle Reg Number | Estimated Departure Time | Estimated Arrival Time | Observed Departure Time | Observed Arrival Time | Get On | Event Time | Seen Counter |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5346101 | 3 | Fecske u. | 10 | Tarján, Víztorony tér - Klinikák | 2274729 | T452 | 4/12/2020 3:48:00 PM | 4/12/2020 3:48:00 PM | 4/12/2020 3:47:51 PM | 4/12/2020 3:47:31 PM | True | 4/12/2020 3:48:26 PM | 9 |
| 5345624 | 6 | Attila u. (Mars tér) | 7A | Bakay Nándor u. - Széchenyi tér | 2277928 | T812 | 4/12/2020 11:23:00 AM | 4/12/2020 11:23:00 AM | | 4/12/2020 11:24:07 AM | True | 4/12/2020 11:24:59 AM | 3 |
| 5345624 | 7 | Bartók tér | 7A | Bakay Nándor u. - Széchenyi tér | 2277928 | T812 | 4/12/2020 11:24:00 AM | 4/12/2020 11:24:00 AM | | 4/12/2020 11:28:43 AM | False | 4/12/2020 11:27:00 AM | 3 |
| 5345498 | 2 | Csanádi utca | 5 | Újszeged, Gyermekkórház - Körtöltés utca | 2278000 | T706 | 4/12/2020 2:09:00 PM | 4/12/2020 2:09:00 PM | 4/12/2020 2:09:25 PM | 4/12/2020 2:08:55 PM | True | 4/12/2020 2:09:06 PM | 9 |
| 5345498 | 6 | Mars tér (Aut. áll.) | 5 | Újszeged, Gyermekkórház - Körtöltés utca | 2278000 | T706 | 4/12/2020 2:14:00 PM | 4/12/2020 2:14:00 PM | 4/12/2020 2:18:12 PM | 4/12/2020 2:17:15 PM | False | 4/12/2020 2:17:05 PM | 9 |
| 5345498 | 5 | Tisza Lajos krt. (Mikszáth K. u.) | 5 | Újszeged, Gyermekkórház - Körtöltés utca | 2278000 | T706 | 4/12/2020 2:12:00 PM | 4/12/2020 2:12:00 PM | 4/12/2020 2:15:15 PM | 4/12/2020 2:15:03 PM | True | 4/12/2020 2:15:12 PM | 2 |
| 5345498 | 7 | Hétvezér utca | 5 | Újszeged, Gyermekkórház - Körtöltés utca | 2278000 | T706 | 4/12/2020 2:15:00 PM | 4/12/2020 2:15:00 PM | 4/12/2020 2:18:47 PM | 4/12/2020 2:18:40 PM | False | 4/12/2020 2:18:12 PM | 2 |
| 5345498 | 5 | Tisza Lajos krt. (Mikszáth K. u.) | 5 | Újszeged, Gyermekkórház - Körtöltés utca | 2278000 | T706 | 4/12/2020 2:12:00 PM | 4/12/2020 2:12:00 PM | 4/12/2020 2:15:15 PM | 4/12/2020 2:15:03 PM | True | 4/12/2020 2:15:06 PM | 2 |

# DATA-BASED PUBLIC TRANSPORT PLANNING

Cameras:

- On vehicle, at stop – passenger counting
- On the bridge – traffic counting
- Connection with SASMob project

Wi-Fi + cameras + axle load data → generate accurate passenger data

# Szeged Open Data Platform (OVAK)

Database with municipal companies data:

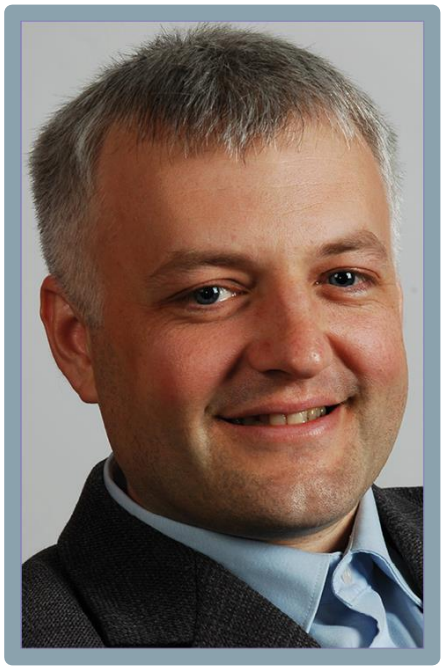
- SZETÁV – long-distance heating data
- Vízmű – water consuption data
- University – air pollution sensor data
- SZKT – public transport and parking data

Goals:

- Research
- Urban development - city level intervention
- Useful in special situations - eg. road or bridge closures

# Thank you for your attention!

# Questions?



# Vilmos Bilicki

*University of Szeged (UIA SASmob)*

## Data-based mobility and PT planning in Szeged

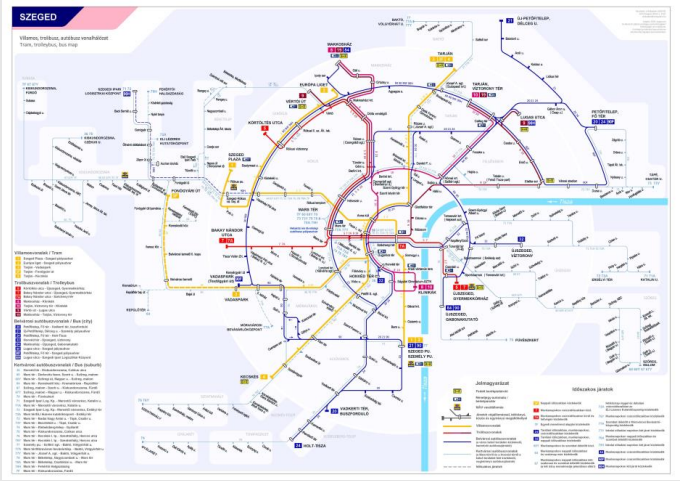
# Sasmob:
# city level traffic measurement

Vilmos Bilicki PhD
University of Szeged
Department of Sofware Engineering

2020.04.28, Szeged

EUROPEAN UNION
European Regional Development Fund

# Motivation




Analyze → Model → Simulate

What is the actual situation?

What happens if we do small changes?

What happens if we do significant changes?

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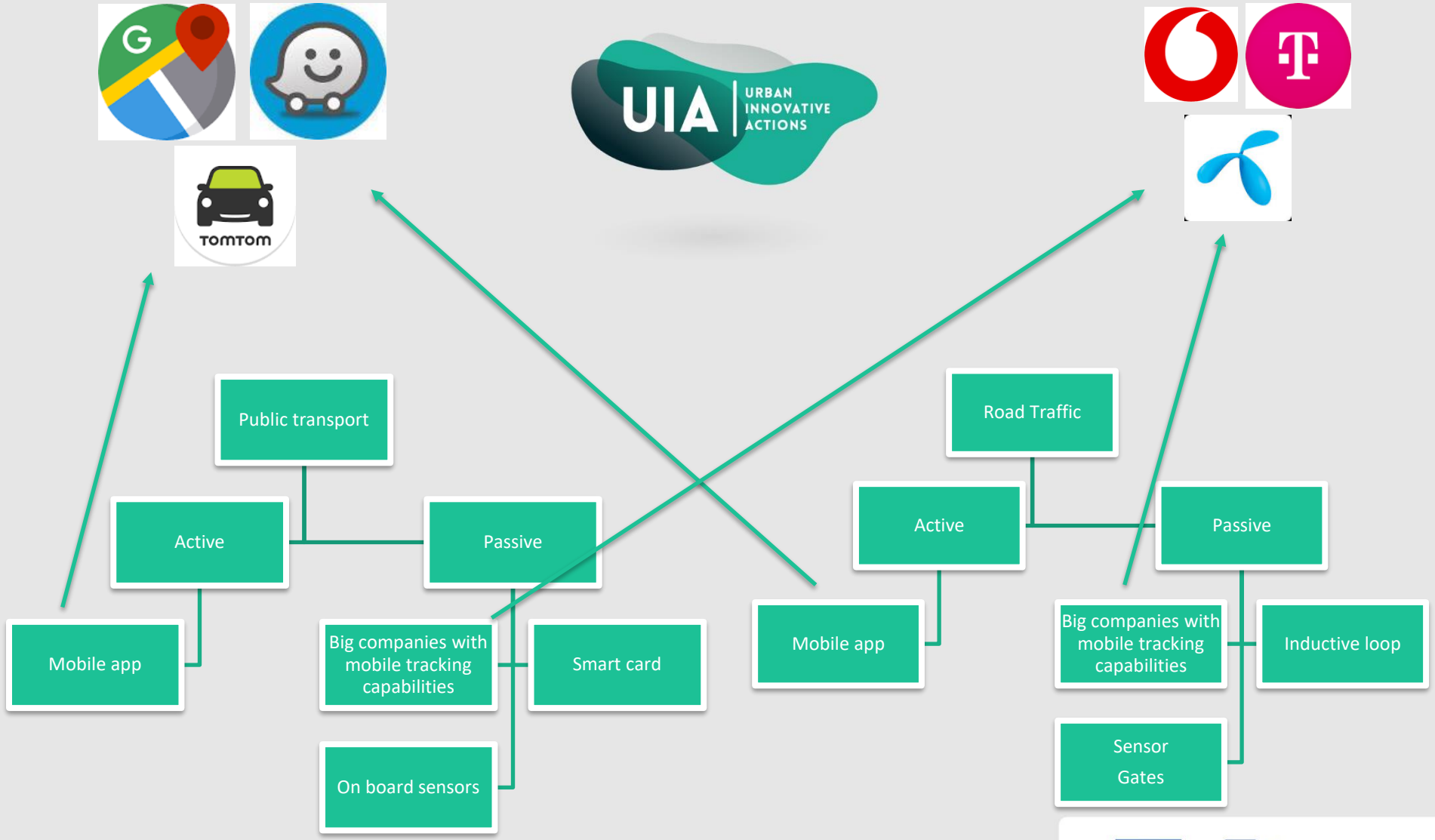
# Data collection





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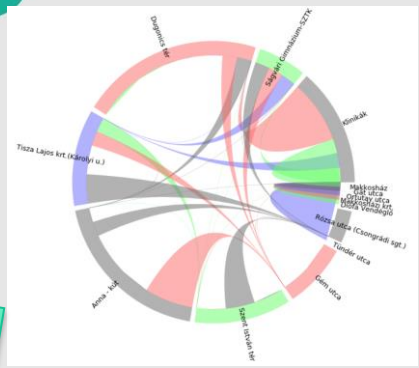
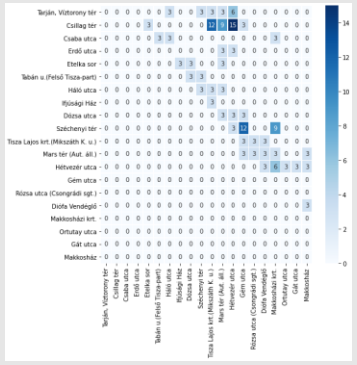
# Data levels

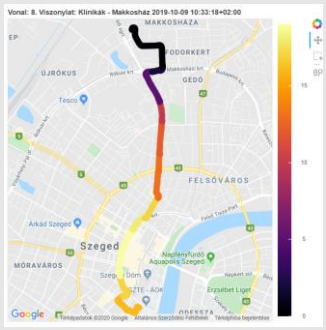
Global OD matrices

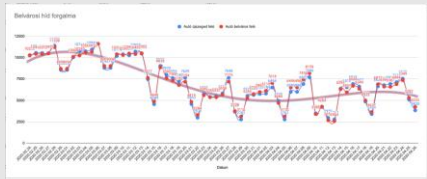
Local OD matrices

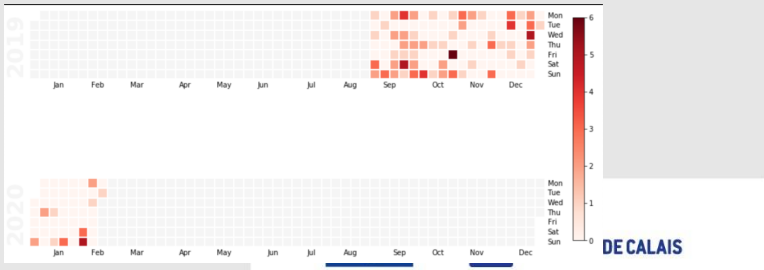
Local counting





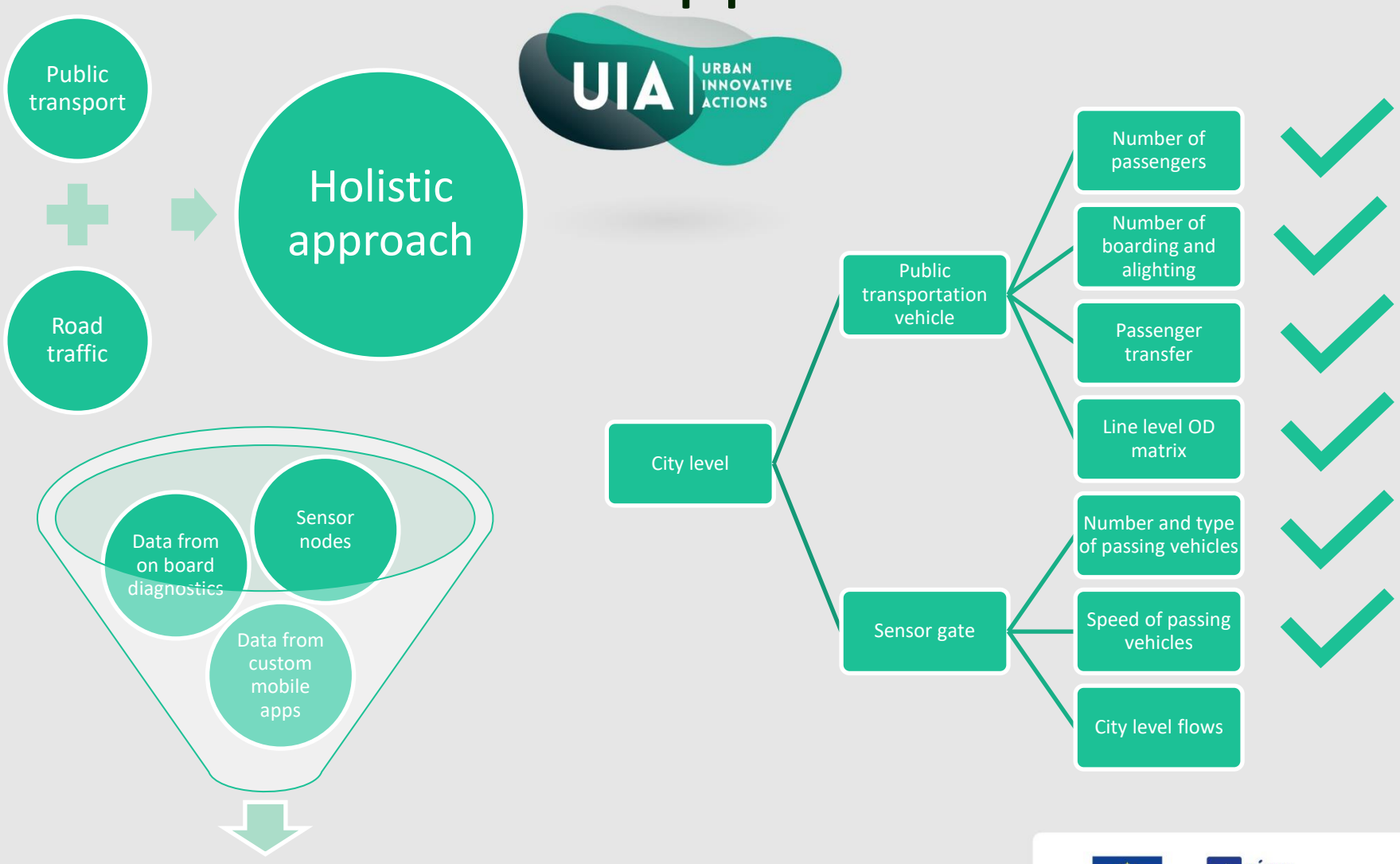





DE CALAIS
European Union
European Regional Development Fund

# High level overview of the Sasmob approach

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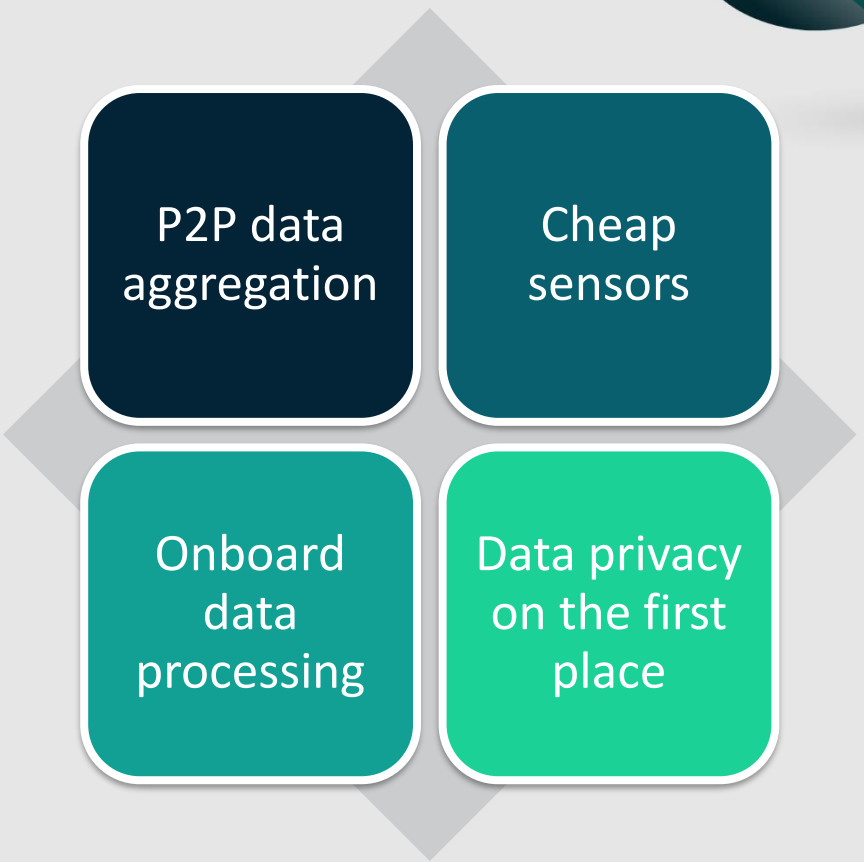
# Unique features of Sasmob approach




US and EU patented P2P WiFi based data privacy focused tracking

European Union
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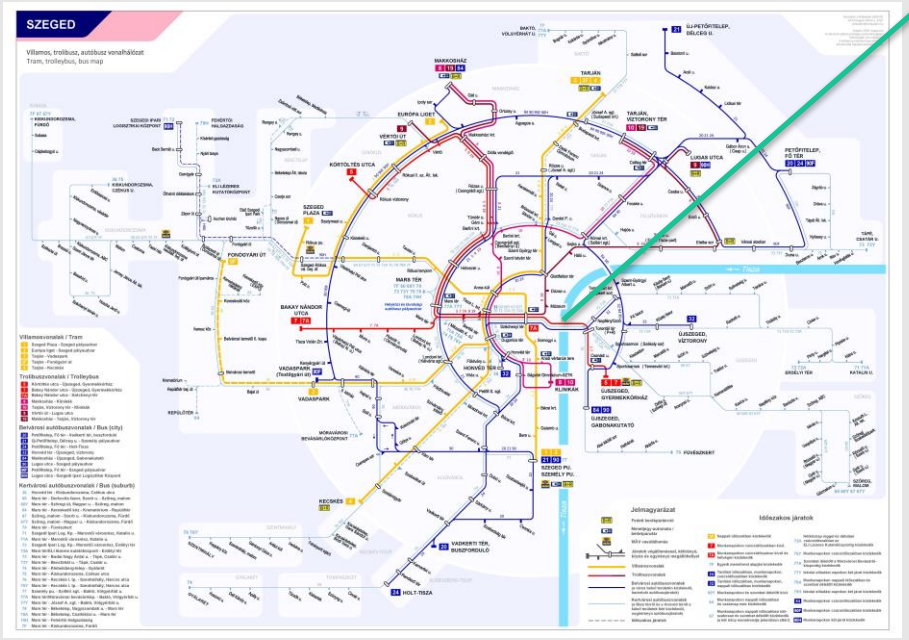
# Traffic measurement with sensor gates



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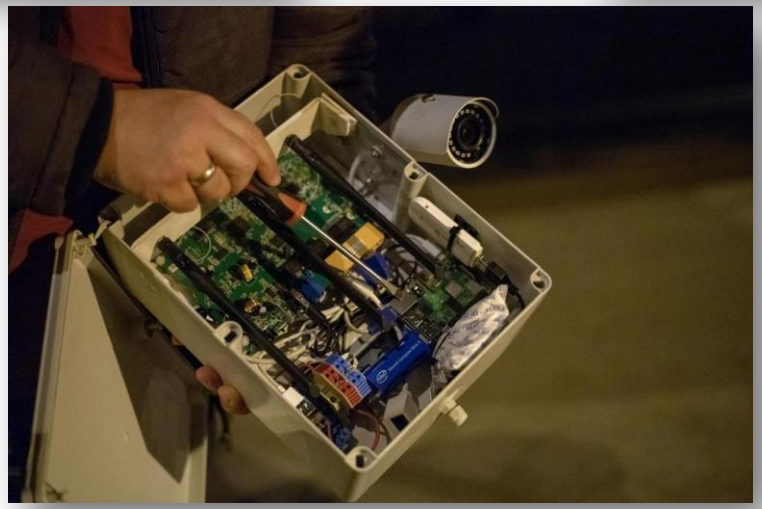
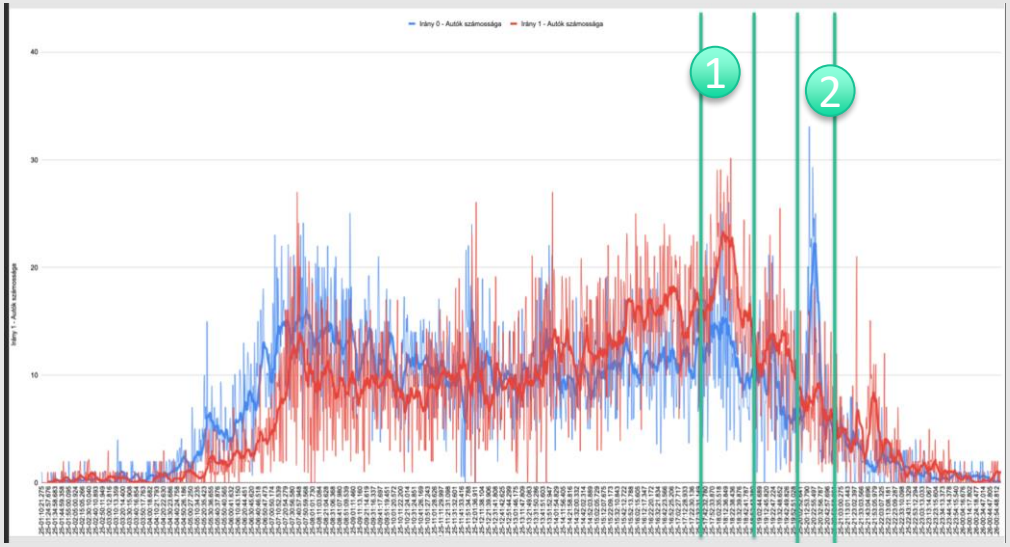
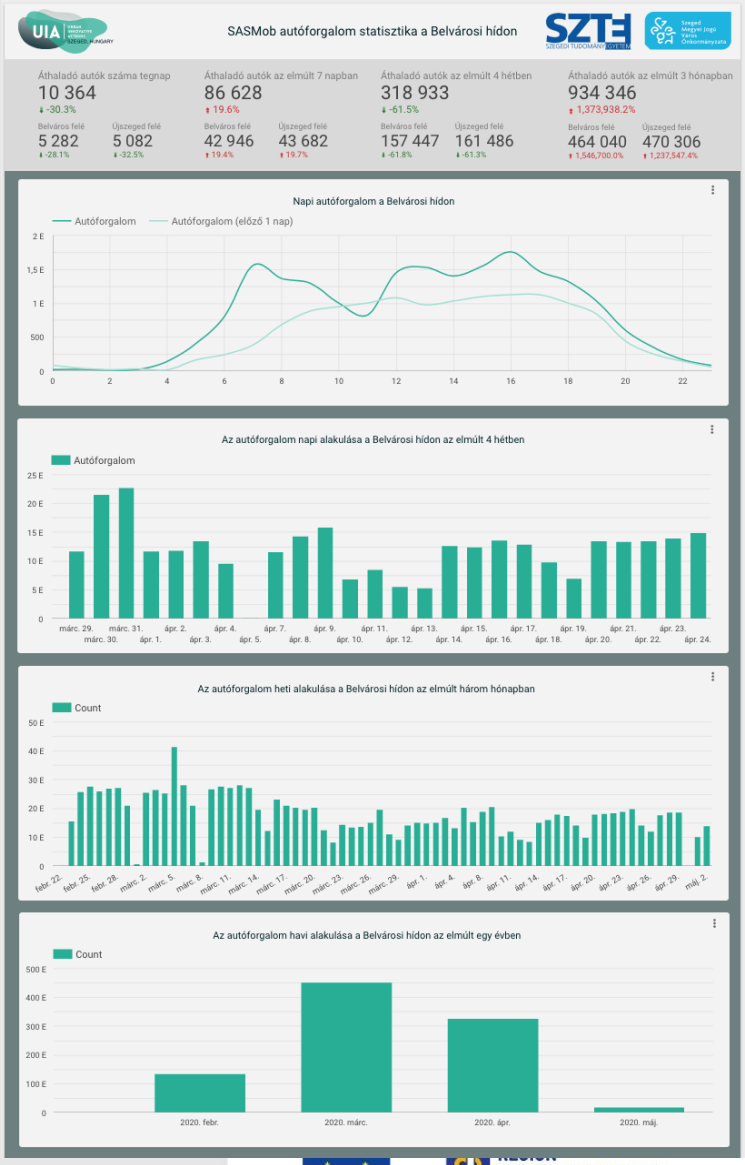
# The gate



# Object detection

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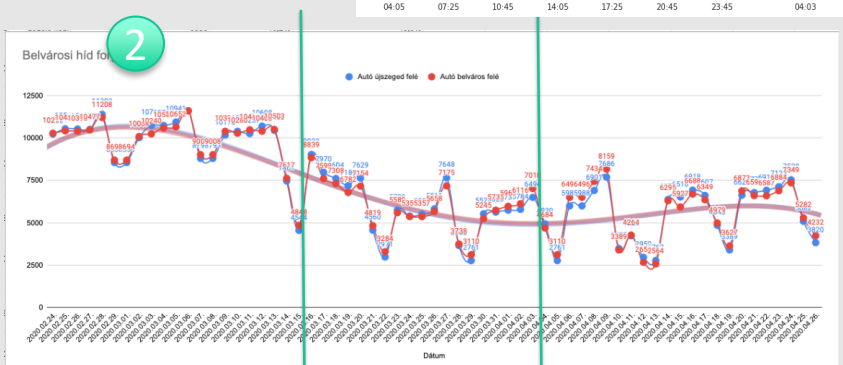
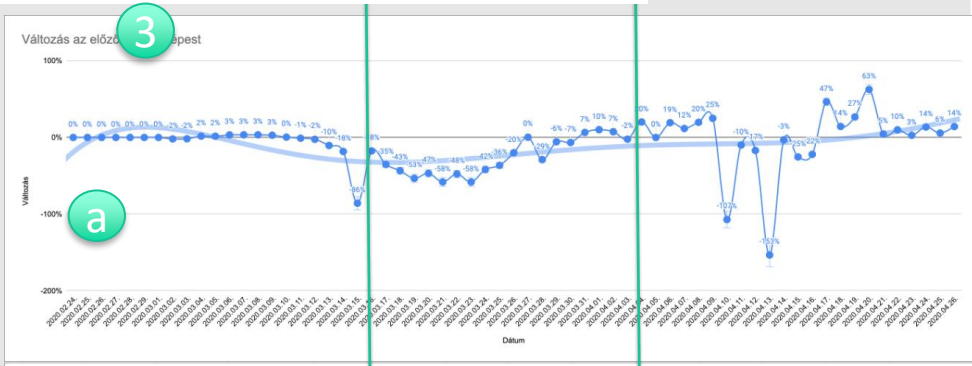
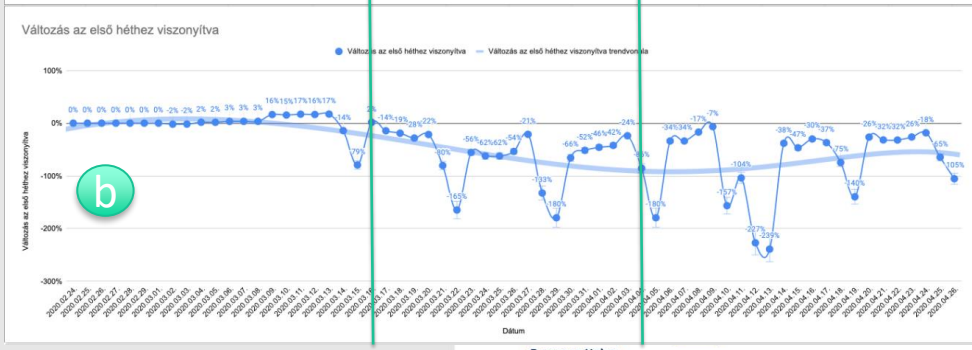
# Effect of the COVID-19 on the traffic



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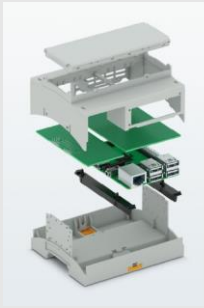
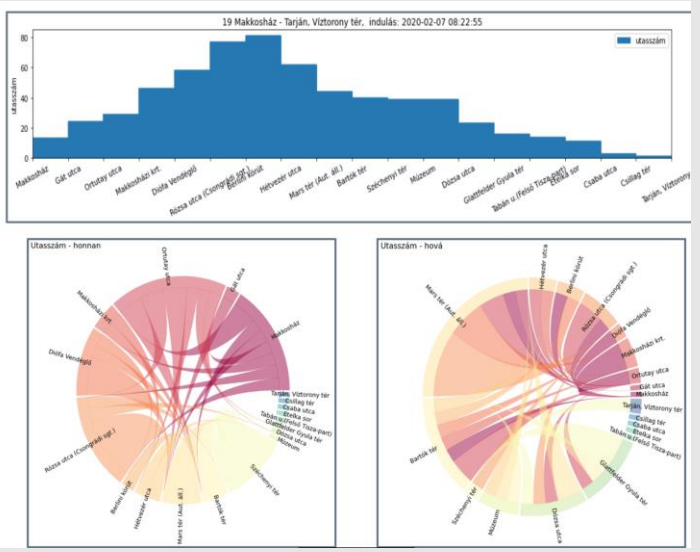
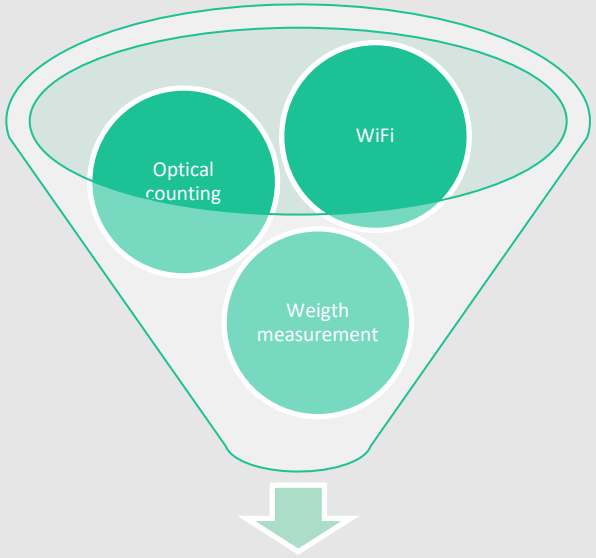
# Public transportation

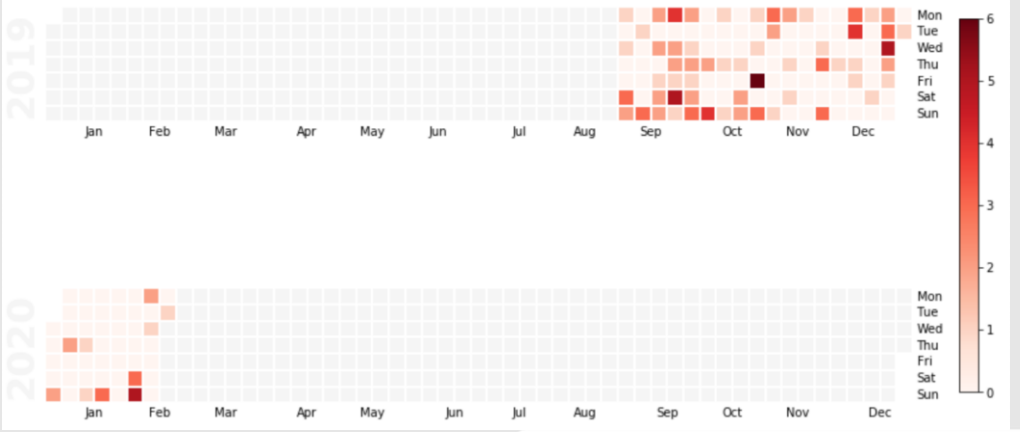
## Number passengers on a given trolley line






## Number of trolley lines with less than 5 passengers

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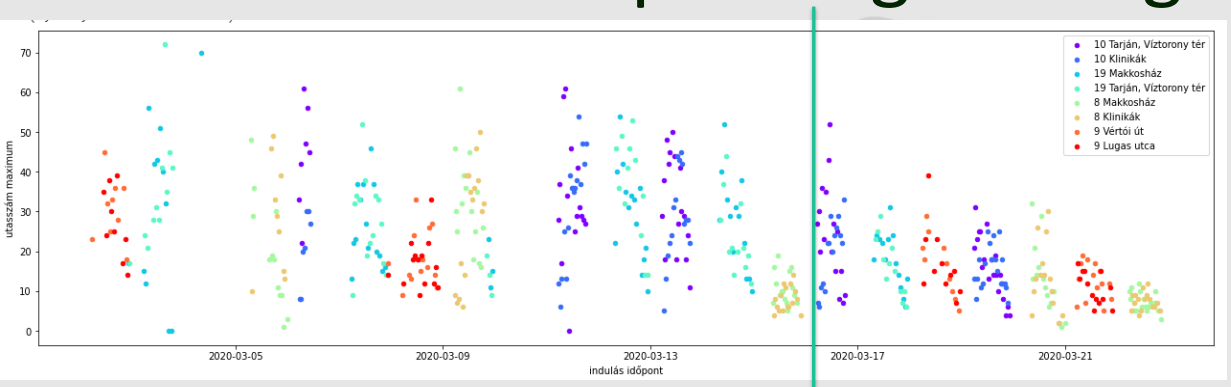
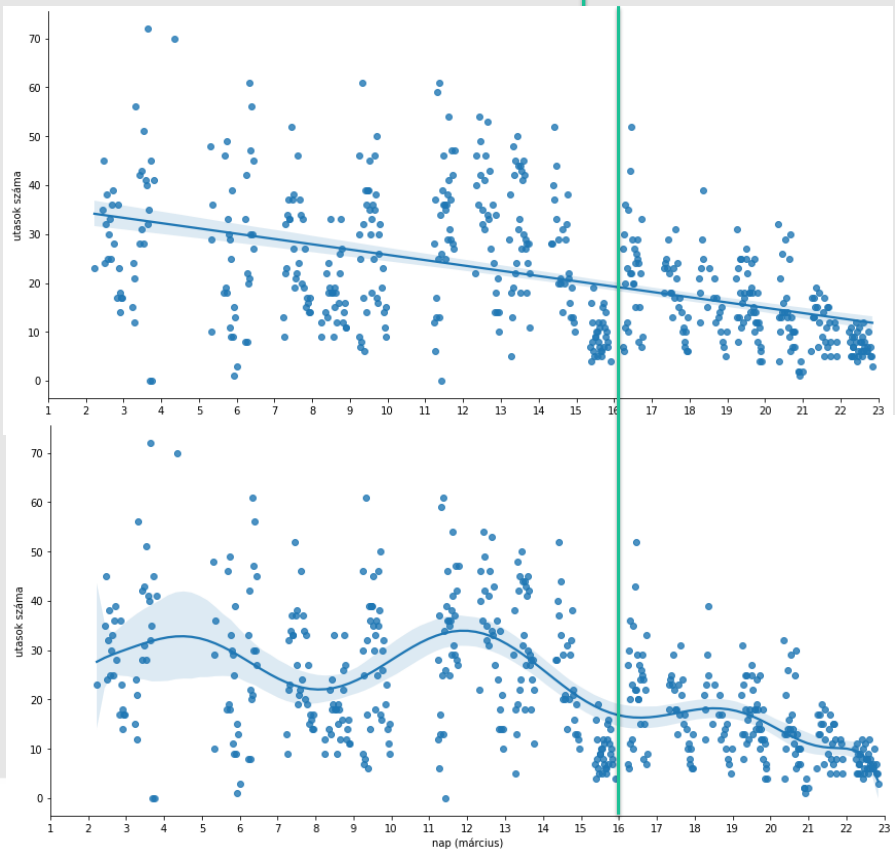
# Effect of the COVID-19 to the maximal number of passengers on given lines

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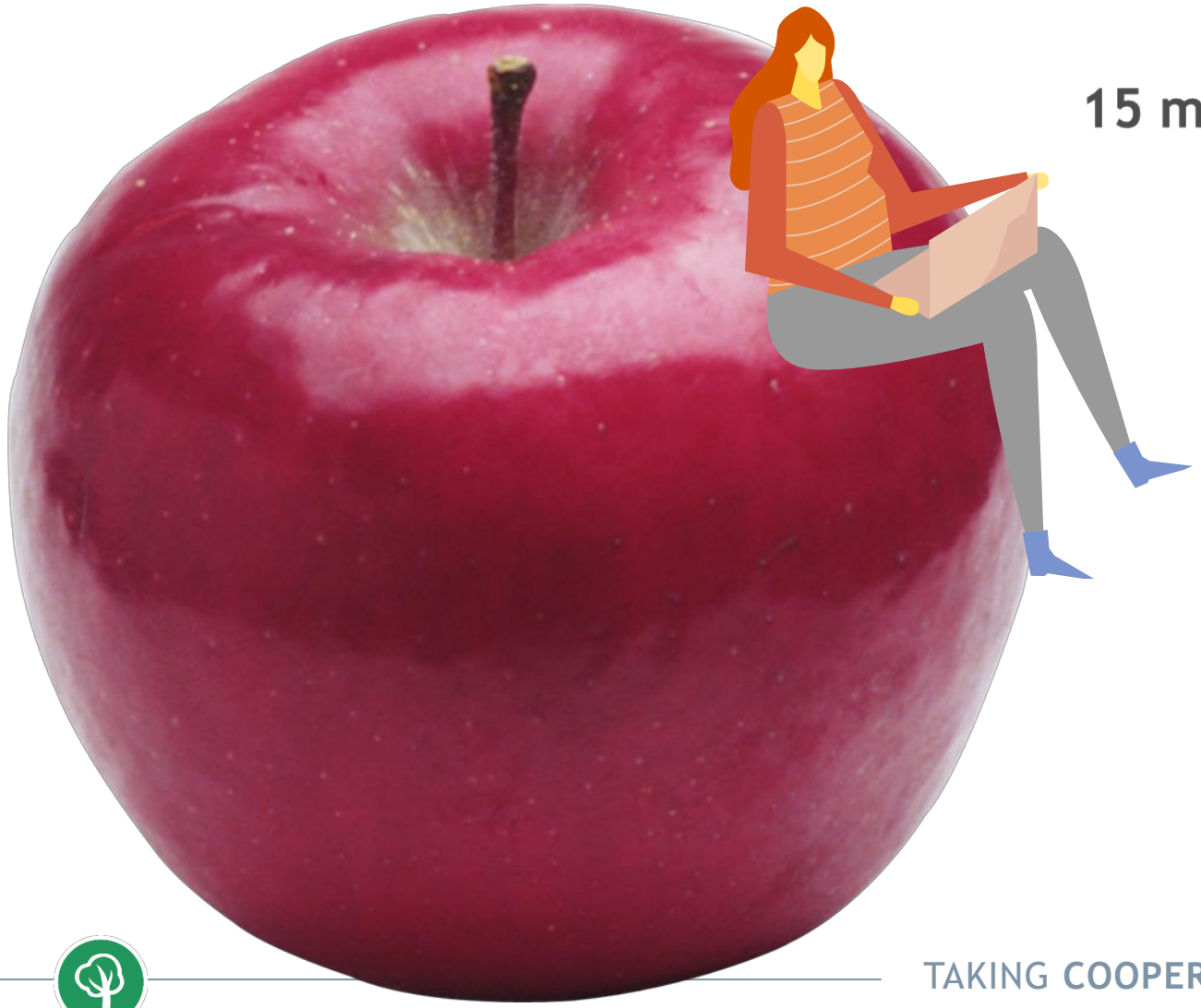
Thank you for your the attention!

***Questions?***

## Topic 1 Discussion, questions and wrap-up

# *DATA-BASED PLANNING OF ENERGY-EFFICIENT PUBLIC TRANSPORT SERVICES AND INFRASTRUCTURE*



15 min break