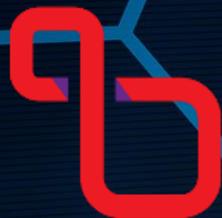




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Ministry of Science  
and Higher Education

**RESEARCH UNIVERSITY EXCELLENCE INITIATIVE  
PRIORITY RESEARCH AREA  
SMART CITIES AND FUTURE MOBILITY**





On 30 October 2019  
the Silesian University of Technology became  
one of 10 Research Universities in Poland



### Priority Research Areas:

POB1 – Computational Oncology and Personalized Medicine

POB2 – Artificial Intelligence and Data Processing

POB3 – Materials of the Future

**POB4 – Smart cities and future Mobility**

POB5 – Process Automation and Industry 4.0

POB6 – Climate and Environment Protection, Modern Energy



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Department of Transport Systems,  
Traffic Engineering and Logistics

The activities undertaken by the Silesian University of Technology under Priority Research Area 4: Smart Cities and Future Mobility are inextricably linked with the notion of **sustainable development**. What provides its foundation is managing development in such a way as to satisfy both current and future needs, without compromising the capabilities of future generations. According to these assumptions, the research and implementation activities currently underway fall under two major sub-areas:

- **identification of the needs** connected with the existing infrastructure as well as those of the society
- **technological and spatial development** making it possible to satisfy the needs previously identified, to overcome contemporary limitations, to improve the efficiency of solutions, and to reduce the negative impact of human activity on natural environment and quality of life.



## POB4 – Smart cities and future Mobility



Spatial information systems in the cities of the future

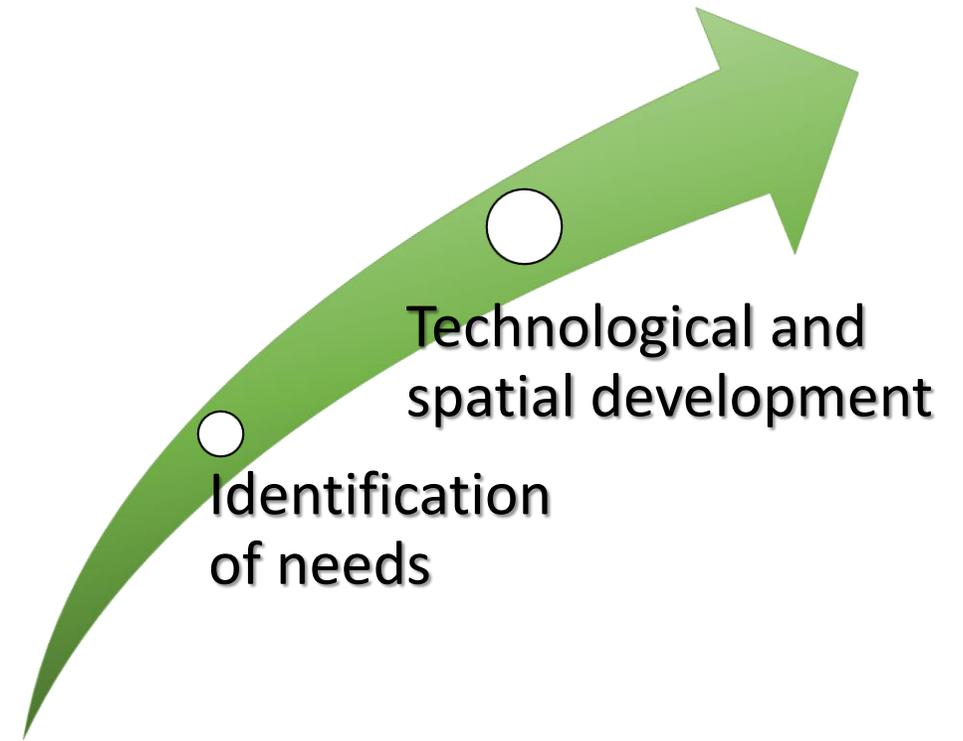
Architecture and environmental engineering

Materials, structures and calculation methods

Social dimension of a smart city

Modern means and transport systems

Modeling, control and automation of future mobility processes and systems



**POB4 – Smart cities and future Mobility**



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Department  
of Transport Systems,  
Traffic Engineering  
and Logistics

# MULTIMODAL TRAVEL PLANNER AS SUPPORT IN THE PROCESS OF LEARNING PRO-ECOLOGICAL BEHAVIOUR OF TRAVELERS – REMARKS BASED ON INTERNATIONAL PROJECTS

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# Agenda

The present research has been financed from the means of the National Centre for Research and Development as a part of the international project within the scope of ERA-NET Programmes.



01

Introduction

02

Eco-friendly travels planning  
Green Travelling and Electric Travelling

03

Conclusion



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Sustainable development is the corresponding to the needs of today's generation and not jeopardizing the capabilities of future generations, fulfilling the current and future needs. It is based on two fundamental assumptions:

- 1) firstly, one has to focus on the **concept of needs**,
- 2) second one needs to take into account also the **limited capability** and must not ignore the limits set by the **natural environment** to the technological progress and to the social order.

Source: Our Common Future. Report of the World Commission on Environment and Development (1987)

Negative impact of transport is particularly visible in emissions of harmful substances, noise and arising traffic obstructions caused by congestion. In recent years, there has been a growing interest in the development of alternative energy sources.

The decarbonisation of the transport sector is one of the basic challenges facing the world. It can be noticed that electricity has become an alternative to traditional fuel.



### Problem identification

- Europe is **heavily dependent** on oil (for its mobility and transport).
- **Mobility limitation is not an option**, but transport has to use less and cleaner energy, better exploit a modern infrastructure and reduce its negative impact on the environment and key natural sources.

### Corrective action

- Alternative energy: LPG, LNG, CNG, **electric energy**, biofuels and hydrogen.
- The acceleration of change in the share of alternative fuels in transport through the development of infrastructure, the development of common (European) **technical specifications and change the image of these technologies** (consumer acceptance).
- The main objective: **reduce** by half the number of conventionally-fueled cars in urban transport by 2030, and then eliminate them from the cities by 2050.

Source: based on Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions: Clean Power for Transport: A European alternative fuels strategy, COM(2013), 17, Brussels 24.01.2013 and White Paper: Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system. COM(2011) 144.



Intensification of work towards the development of electromobility in Poland:

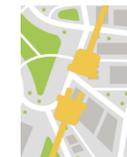
- ✓ Electromobility and Alternative Fuels Act of 11th January 2018 (JoL of 2018 item 317)
- ✓ Electromobility Development Plan in Poland
- ✓ National Policy Framework for Alternative Fuel Infrastructure
  
- ✓ The **minimum number of charging points** until 31.12.2020 in public access charging stations
- ✓ The **minimum share of electric vehicles** in the fleet of vehicles used by local governments
- ✓ The **minimum share of zero emission vehicles** in the fleet of buses urban public transport
- ✓ The possibility of establishing a **clean transport zone**. Access only for electric vehicles or powered by hydrogen or natural gas
- ✓ The possibility of **using a separate bus lanes** by electric vehicles until January 1, 2026





The topic will present the results of international research projects carried out at the Department of Transport Systems, Traffic Engineering and Logistics under the ERANET programme related to electromobility.

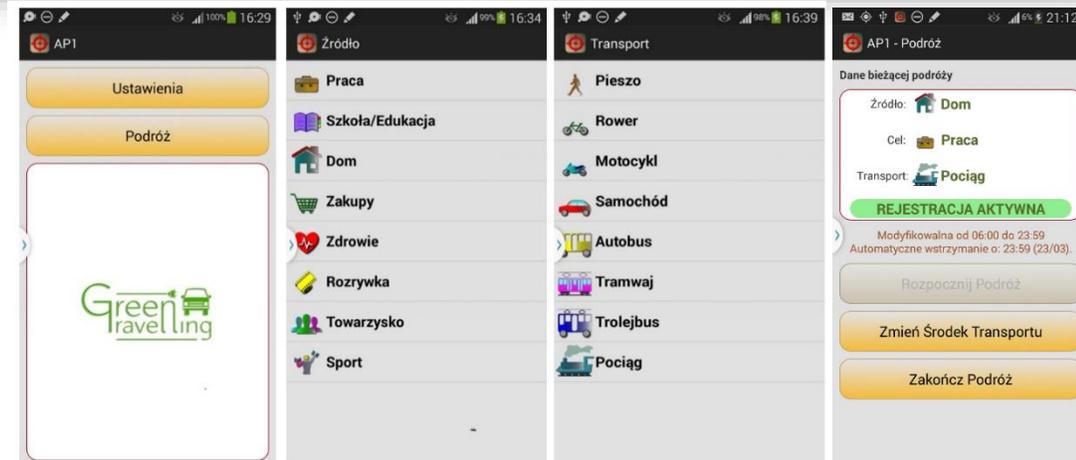
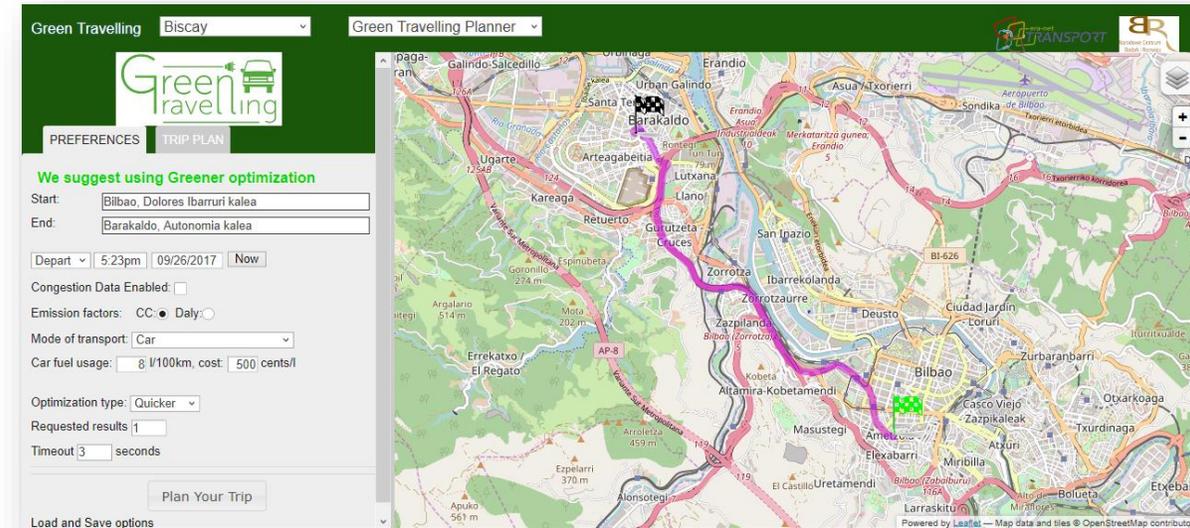
The development of electromobility requires undertaking of numerous activities and constitutes a challenge for contemporary cities. As part of the discussed projects, it needs to be mentioned that new IT products significantly support the decision-making process related to electromobility in cities.



- **2014-2017 - realization of the project Green Travelling.**
  - Full title: A Platform to Analyse and Foster the Use of Green Travelling Options
- **The project is carried out under the EU Programme ERA-Net Transport III**
  - in Polish side financed from the means of the National Centre for Research and Development
- **Project manager from Polish side:**
  - Dr hab. inż. Grzegorz Sierpiński, prof. PŚ
- **Partners in the Green Travelling project:**
  - Saitec (Spain) - leader
  - Factor CO2 (Spain)
  - DeustoTech (Spain)
  - Mantis (Turkey)
  - Silesian University of Technology, Faculty of Transport and Aviation Engineering (Poland)

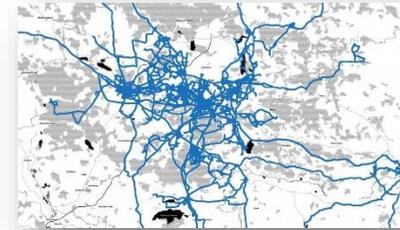


- The main goal of the project was to support „green travelling”. The project is directed towards ecological ways of traveling.
- The beneficiaries of the project are both travelers (the prepared tool provides them with information on the optimal route) and local government authorities (the platform can be a significant support in making decisions regarding the selection of action scenarios - incentives and restrictions - in cities).
- General products of the project:
  - GTalg - algorithm representing a key element of the project related with travel planning
  - GTplat - platform for decision support addressed to local authorities

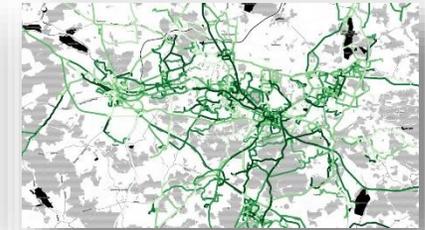




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➤ All recorded travels



➤ Travels in time



➤ Velocity profile



➤ Multimodal travels



➤ Transfer points



➤ Motivations

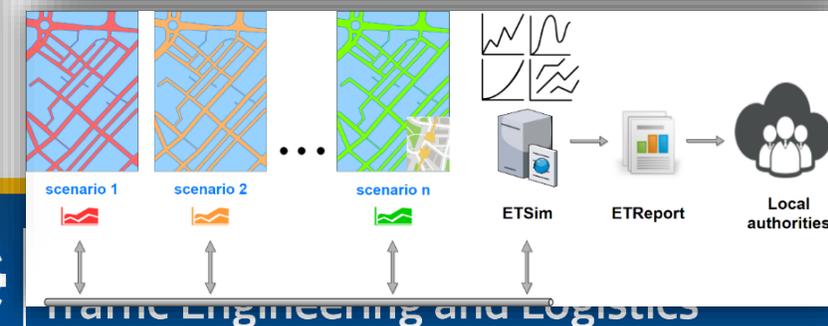
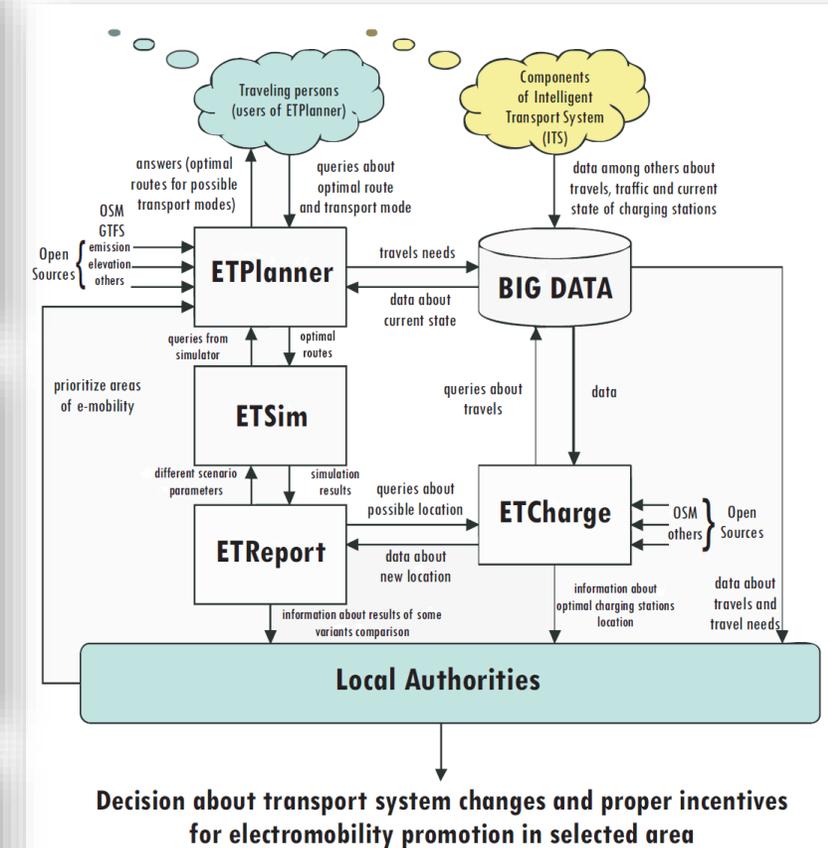
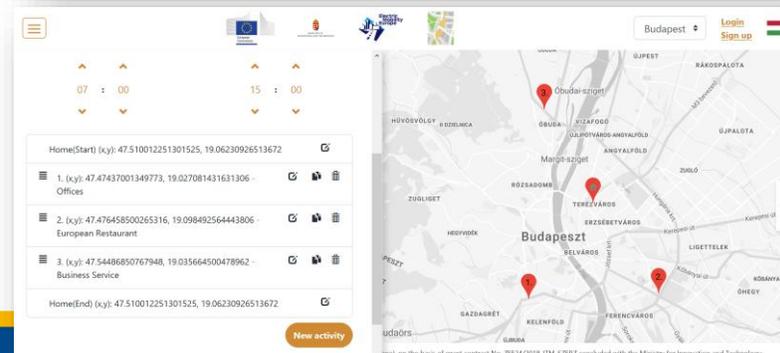
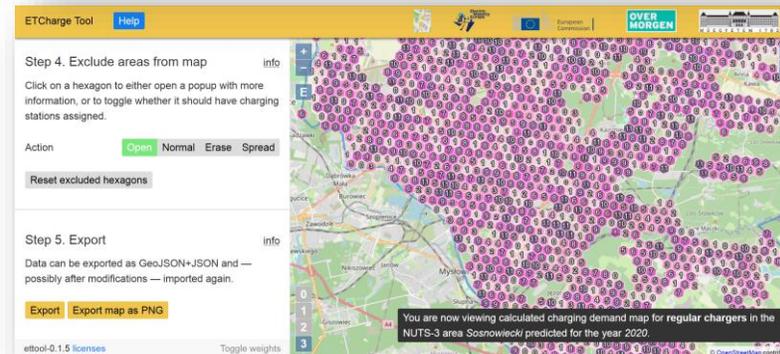
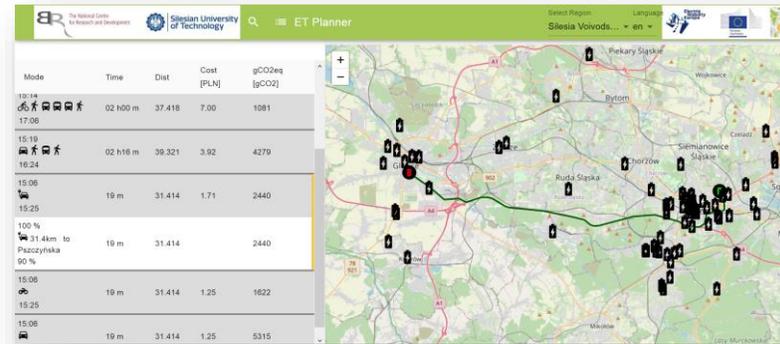
- **2018-2020 – realization of the project Electric Travelling.**
  - Full title: Electric travelling - platform to support the implementation of electromobility in Smart Cities based on ICT applications
- **The project is carried out under the ERA-NET CoFund Electric Mobility Europe Programme**
  - in Polish side financed from the means of the National Centre for Research and Development
- **Project manager from Polish side:**
  - Dr hab. inż. Grzegorz Sierpiński, prof. PŚ
- **Partners in the Electric Travelling project:**
  - Saitec (Spain) – leader
  - Silesian University of Technology, Faculty of Transport and Aviation Engineering (Poland)
  - Factor CO2 (Spain)
  - DeustoTech (Spain)
  - Budapest University of Technology and Economics (Hungary)
  - Delft University of Technology (The Netherlands)
  - Over Morgen (The Netherlands)





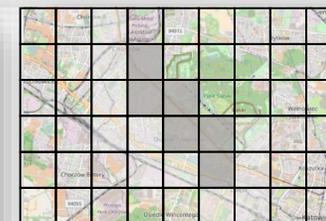
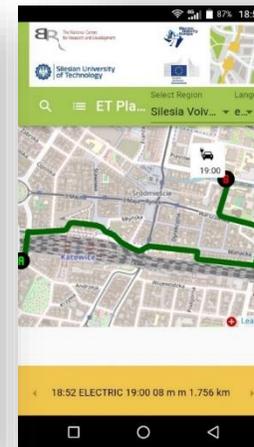
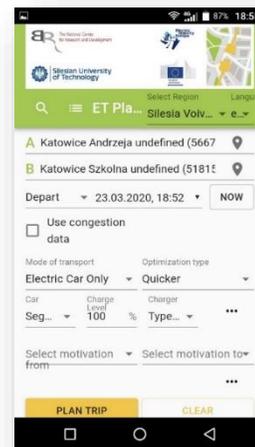
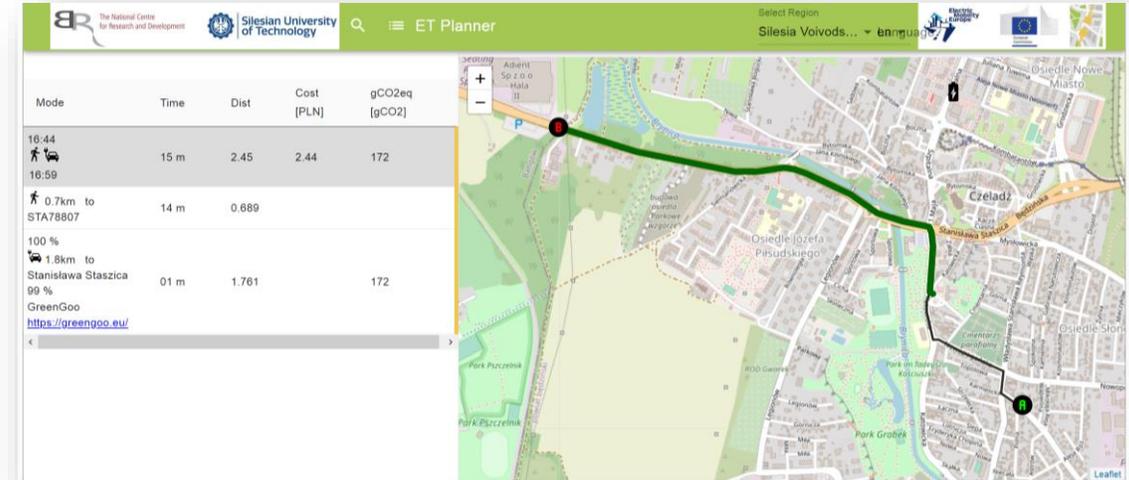
➤ The Electric Traveling project is to facilitate the implementation and further development of electromobility in urban and suburban areas.

➤ The project will help travelers in choosing the travel mode (including electric vehicles) and routes (using ICT applications) and will support local authorities in determining the appropriate directions of development of electromobility.



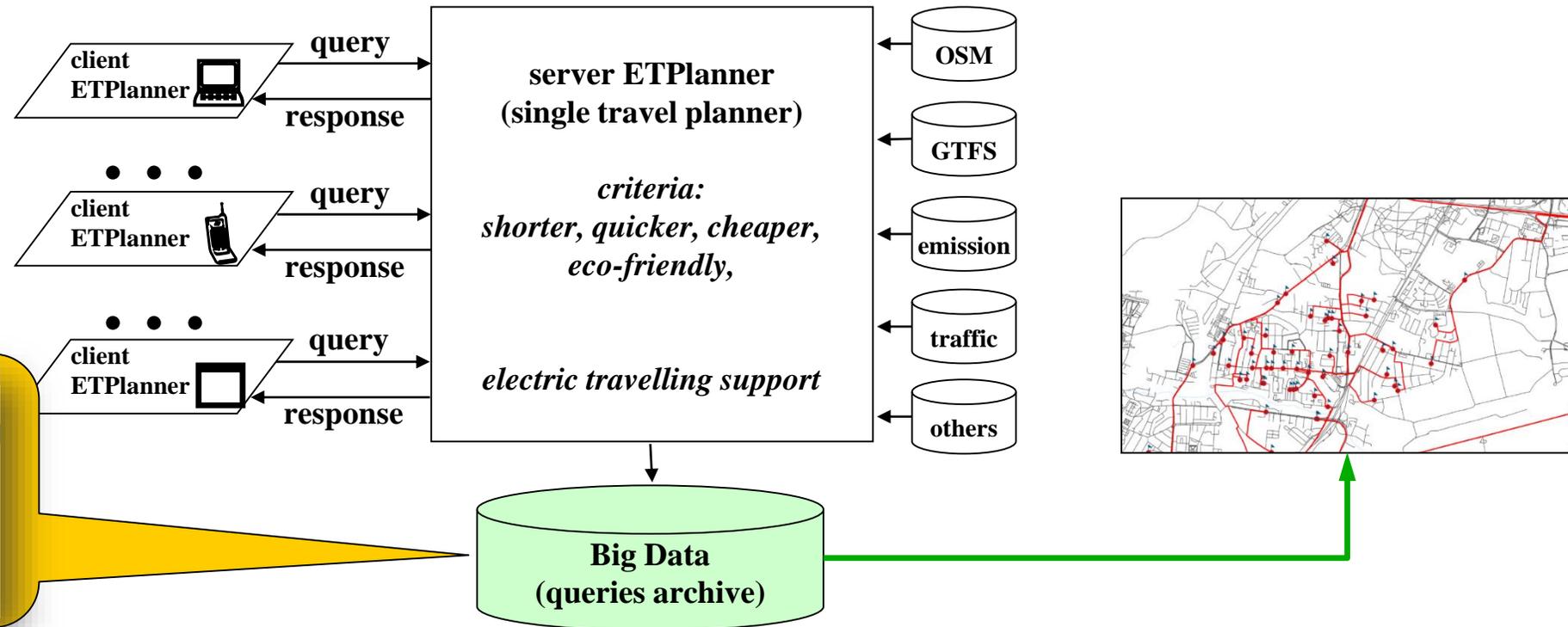


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- Walk Only
- Bike Only
- Electric Car Only
- E-car already rented
- Walk and Urban Bike
- Electric car-sharing**
- Walk and Public Transport
- Walk and Urban Transport
- Walk and Park & Ride
- Walk and Bike & Ride
- Car
- Motorcycle
- All

PLAN TRIP



Choose

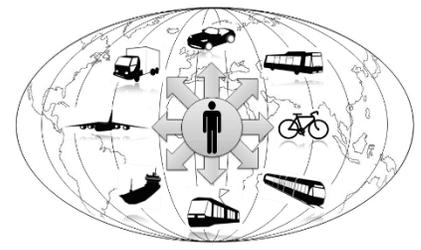
- Choose
- HOME
- WORK**
- EDUCATION
- SHOPPING
- SERVICE
- DUTY TRAVEL
- MEDIC
- AUTHORITY / ADMINISTRATION
- SPORT / RECREATION
- ENTERTAINMENT
- OTHER

- |                         |                    |                       |                         |
|-------------------------|--------------------|-----------------------|-------------------------|
| ✓ date and time         | ✓ electricCarIndex | ✓ maxWalkDistance     | ✓ requestedResults      |
| ✓ fromPlace and toPlace | ✓ chargeLevel      | ✓ energyConsumption   | ✓ responseTimeout       |
| ✓ mode                  | ✓ minChargeLevel   | ✓ energyCost          | ✓ showIntermediateStops |
| ✓ weightOptimization    | ✓ chargerPlugType  | ✓ fuelConsumption     | ✓ arriveBy              |
| ✓ motivationFrom        | ✓ carWeight        | ✓ fuelCost            | ✓ congestionEnabled     |
| ✓ motivationTo          | ✓ driverWeight     | ✓ motorcycleFuelUsage | ✓ carEngineType         |
| ✓ maxBikeDistance       | ✓ luggageWeight    | ✓ motorcycleFuelCost  | ✓ motorcycleEngineType  |



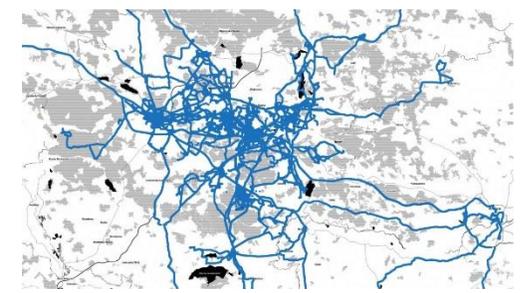
implementing changes in the transport system

changing behavior patterns of the travelling population



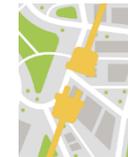
decision making by local authorities

study of current travel needs based on ET Planner queries





- ✓ The projects implemented under the ERANET program open up new opportunities in shaping transport behavior (by extending the functionality of travel planners and decision support in the problems of locating charging stations, implementing electric buses or planning the distribution of goods), and also pay special attention to environmentally friendly travel and multimodality. These two aspects, in accordance with the EU guidelines, should be developed in the near future (according to EU documents, this perspective has now been defined until 2050).
- ✓ Interdisciplinary and international cooperation under the project provides an opportunity for implementing innovative solutions and more importantly universal ones – independent from the area they are applied.



Department of Transport Systems, Traffic Engineering  
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Priority Research Area Smart Cities and Future Mobility  
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# THANK YOU FOR YOUR ATTENTION

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