CITY MICROCLIMATE AND TRAFFIC ANALYSIS

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MICROCLIMATE

Climatic conditions measured in localized areas, restricted within 1km in the horizontal dimension and 120m in the vertical dimension, especially when these differ from the climate of the surrounding regions. The above is often caused by specific geographic, structural, or natural factors.

For example, the climate may differ between:

- concrete areas (Patras centre)
- coastal suburbs (Marina of Patras)
- forested areas and green spaces (Dasyllio)
- areas with high altitude (Aroi, Patras)

Environmental Variables

- temperature
- light
- wind
- humidity
- frost
- rain
- air quality

A Review of Urban Microclimate Research Based on CiteSpace and VOSviewer Analysis
Jiajing Li, Yang Mao, Jingyi Ouyang and Shuanning Zheng - International Journal of Environmental Research and Public Health

CIRCULATION PROBLEMS

Urban Heat Island (UHI) Effect is a climatic phenomenon in which an urban area is significantly warmer than the surrounding suburban areas due to vehicular traffic and exhaust emissions, dark road surfaces that absorb more solar radiation, limited vegetation and geometric effects of high-rise buildings.

Microclimate investigation of vehicular traffic on the urban heat island through IoT-Based device
Emir Husni, Galang Adira Prayoga, Josua Dion Tamba, Yulia Retnowati, Fachri Imam Fauzandi, Rahadian Yusuf, Bernardo Nugroho Yahya
journal homepage: www.cell.com/heliyon

During extreme cases of heavy rainfall, some roads located near the sea or rivers is possible to flood, resulting in traffic disruption of one or more lanes. Drivers must bypass the obstruction, causing circulation delays in junctions and traffic lights.

Analyzing the Effects of Rainfall on Urban Traffic-Congestion Bottlenecks
Yao Yao , Daiqiang Wu, Ye Hong , Dongsheng Chen, Zhaotang Liang, Qingfeng Guan, Xun Liang, and Liangyang Dai

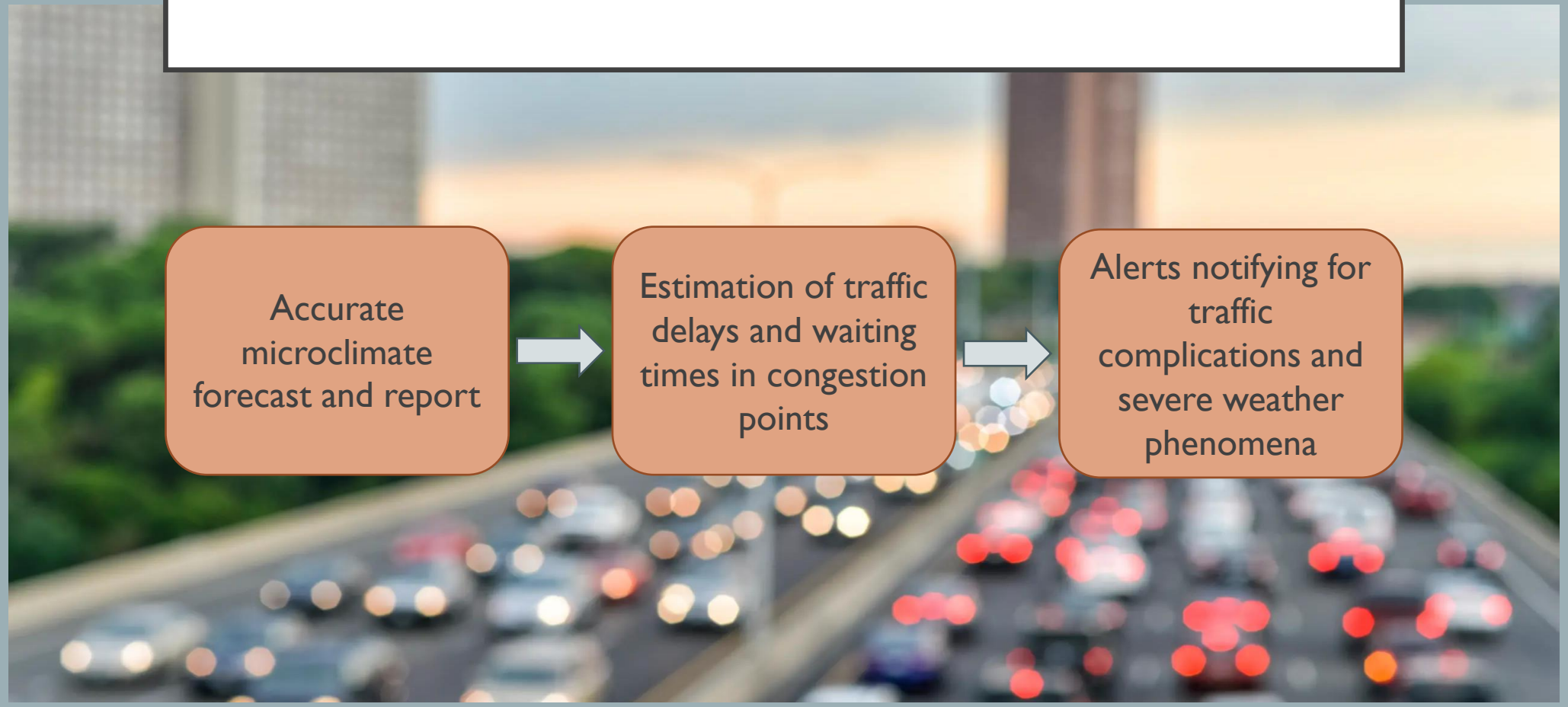
Vehicles especially those with a higher center of gravity (such as trucks), micromobility vehicles and pedestrians are more likely to be carried off, when there are strong crosswinds over a bridge or open coastal areas.

Effects of Wind Barriers on Wind Fields and Vehicle Stability on Bridges
Xiaobo Lin, Bin Lin, Dandan Xia, Li Lin and Zhiqun Yuan

The circulation of numerous cars and motorbikes in urban areas leads to vehicle emissions, a fact that results in poor air quality and low visibility.

Congestion of visitors in places of interest like parks or beaches during sunny days, leading to traffic congestion in the surrounding areas.

SOLUTION

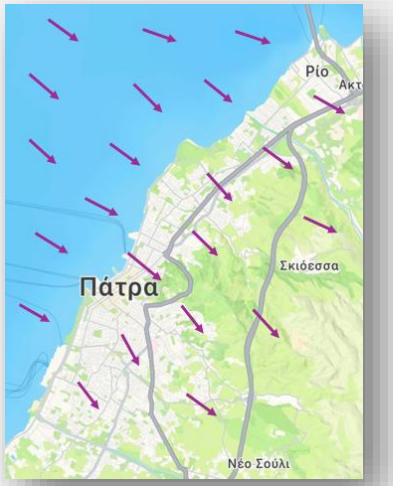

Accurate microclimate forecast and report
Estimation of traffic delays and waiting times in congestion points
Alerts notifying for traffic complications and severe weather phenomena

OUR IDEA

STUDY OF THE CORRELATION BETWEEN WEATHER CONDITIONS AND TRAFFIC SITUATION IN SPECIFIC AREAS.

Aspects of traffic circulation			
			
cars	bicycles	electric scooters	pedestrians

LOCALIZATION OF WEATHER CONDITIONS

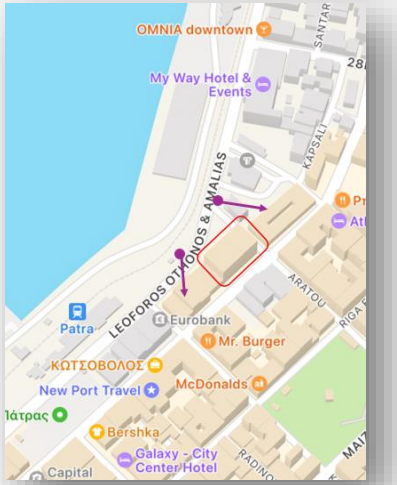


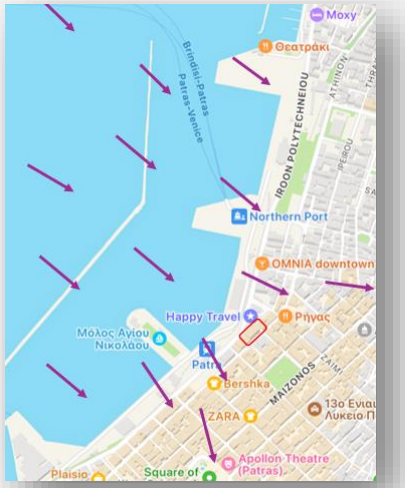
3rd party APIs
Regional weather data

CORRECTION
Systematic differences are stored and modify local data

Regional weather with microclimate accurate corrections

Local weather stations and sensors
Microclimate data





DATA SOURCES

Google maps / Tom Tom

Google places

Weather APIs (OpenWeather, Copernicus)

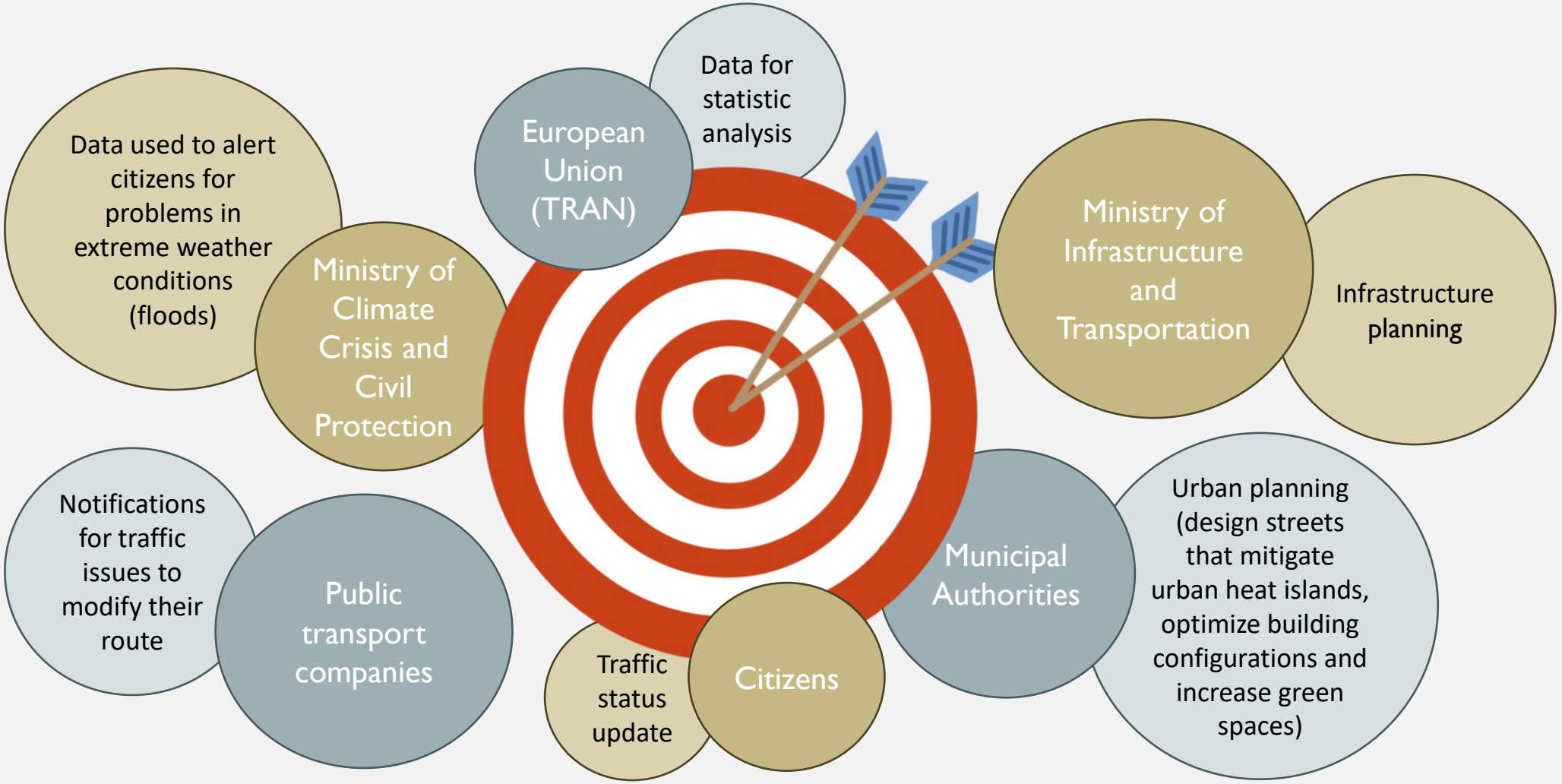
Lab provided sensors

Microclimate – Traffic Correlation

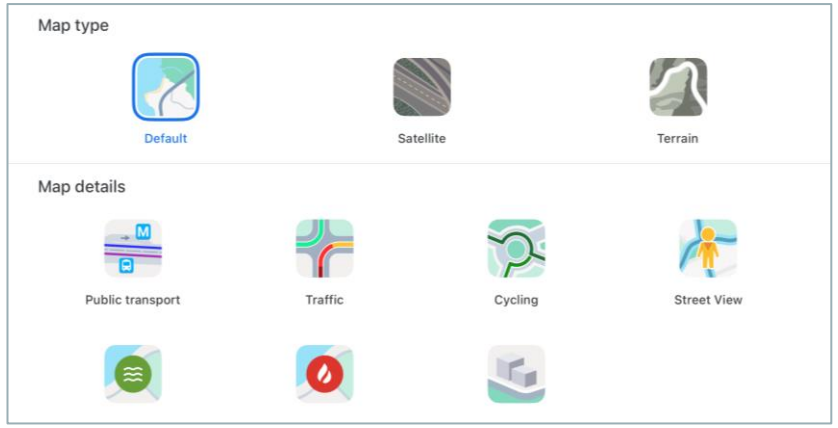
SENSORS

- **Air temperature** (BARANI, MeteoHelix IoT Pro)
- **Humidity** (BARANI, MeteoHelix IoT Pro)
- **Sun intensity** (BARANI, MeteoHelix IoT Pro)
- **Rain amount – flood** (BARANI, MeteoRain 200 Compact - MClimate, Flood sensor)
- **Wind speed and direction** (BARANI, MeteoWind IoT Pro)
- **CO_2** (MClimate, CO_2 Sensor & Notifier)
- **Sound level** (Dutch Sensor Systems, Ranos dB 2)

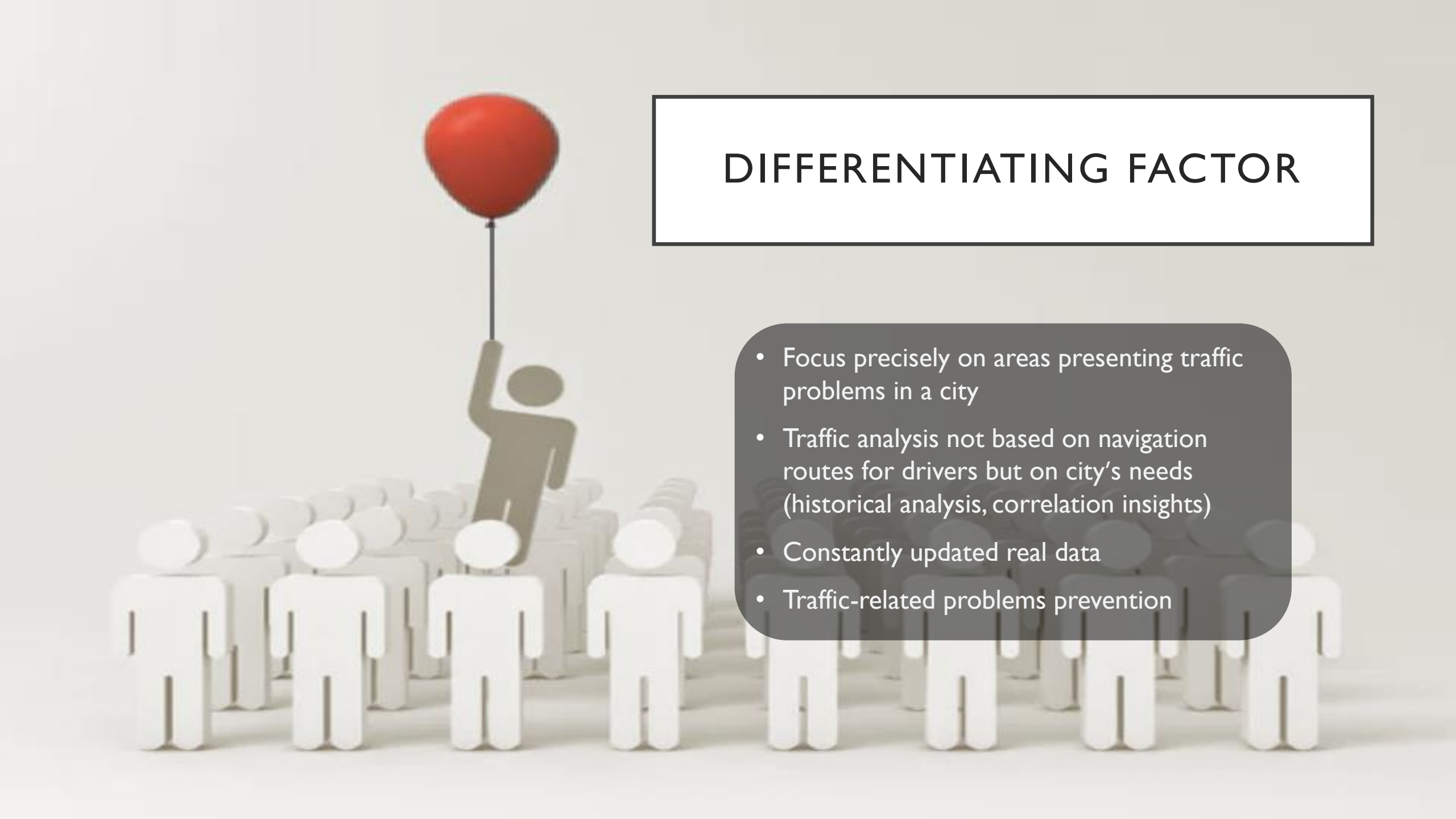
TARGET GROUP



Google Maps is an app that provides real-time traffic conditions, delays and alternative route suggestions. However, route planning and the ability to adjust departure times based on microclimates is unavailable and weather insights are indirect and not detailed. A recent update, also offers safety alerts about weather-related hazards (such as floods).



Drive weather app is designed to show road conditions by analyzing forecasted weather and send users severe weather alerts. It enables you to see how conditions like rain, snow, or storms may impact different parts of your route. This app also includes options for adjusting departure times to avoid weather-related delays.



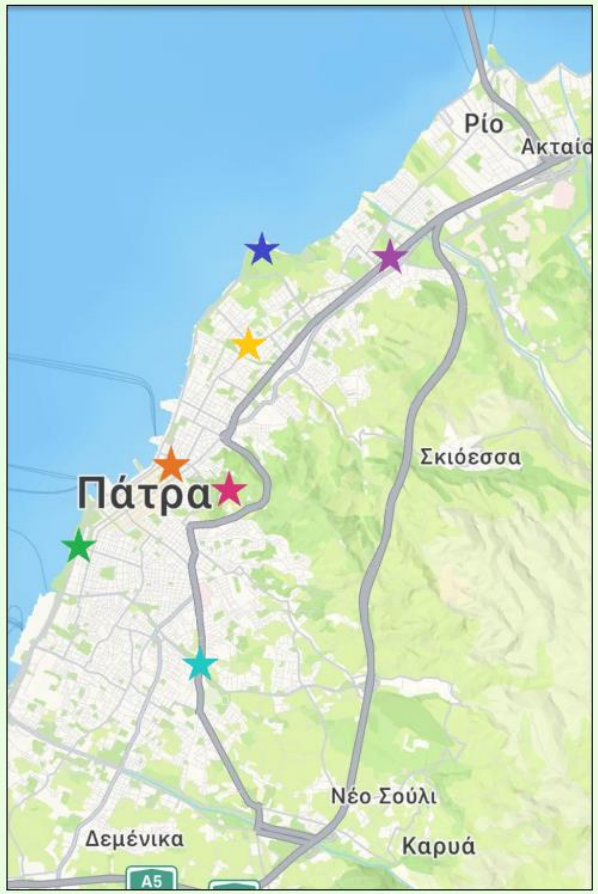
DIFFERENTIATING FACTOR

- Focus precisely on areas presenting traffic problems in a city
- Traffic analysis not based on navigation routes for drivers but on city's needs (historical analysis, correlation insights)
- Constantly updated real data
- Traffic-related problems prevention

WEBSITE DRAFT

City Microclimate And Traffic Analysis

Home | City Points Info | Diagrams | Alerts-Problems



- **Agyias Beach**
  38.28215° N, 21.74741° E
- **Tofalos Interchange**
  38.28292° N, 21.77103° E
- **Agyias Crossroad**
  38.27019° N, 21.74572° E
- **Patras Centre**
  38.24775° N, 21.73605° E
- **Dasyllio**
  38.24848° N, 21.74551° E
- **South Park**
  38.23818° N, 21.72512° E
- **Patron-Klaous Intersection**
  38.22523° N, 21.74932° E

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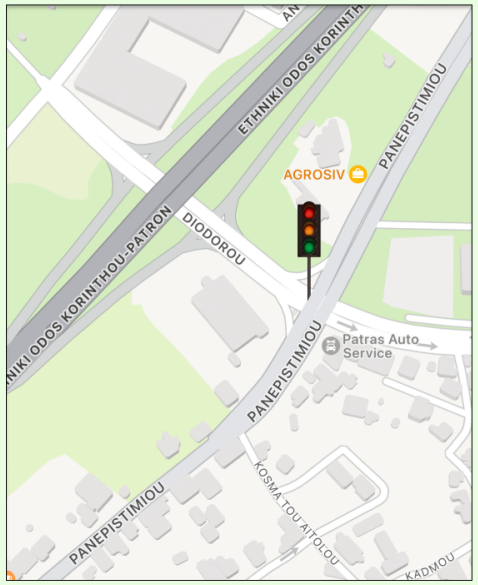

Tofalos Interchange

Coordinates: 38.28292° N, 21.77103° E
Temperature: 20°C
Rain amount: 0mm
Level of CO_2: 420ppm
Wind: 14km/h
Humidity: 68%

Waiting Time: 2min

Friday, 08/11/2024, 12:45:38

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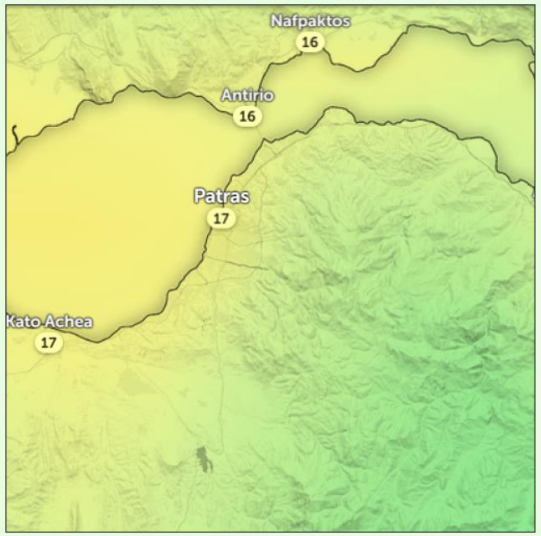
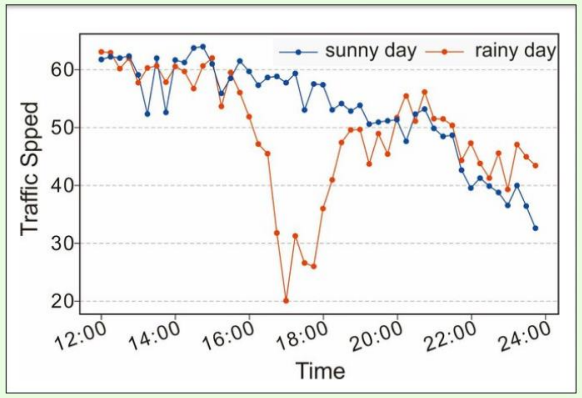


Heat map: Patras, Friday, 08/11/2024, 09:24:45



Traffic speed - Weather conditions diagram

THANK YOU!

Any questions?