

# Trikala, Greece

On demand Automated Mobility as a  
complement of Public Transport in suburban areas and  
Delivery services in pedestrian areas

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# Vision

## Overall vision

- On demand automated Mobility as a complement of Public Transport of underserved suburban areas and delivery services within pedestrian areas in Trikala city
- CCAM contributing minimisation of ICE vehicles use in the city and the development of multimodal mobility that will lead to healthier, safer, more affordable, more sustainable, more cost-effective and responsive transport (City's vision)

## In the project

- On demand CCAM to increase access to the city centre and eliminate ICE vehicles, including:
  - Demonstration of the integration of AVs in public transportation including their interconnection with other modes of transport and major POIs such as, the railway station and the University, and their integration into the transport system
  - Demonstration of the integration of delivery robots fleet to the delivery services of the city inside the pedestrian area to serve local stakeholders' needs

# Local Ecosystem



**ICCS:** Satellite site leader - coordinator of common aspects of Trikala pilot use cases and responsible for the legal aspects

**eTrikala:** Local site leader responsible for setting up the digital and physical infra for all the use cases and performing passenger rides and deliveries

**UNIGENOVA:** Planning and operation of the logistics services with regards to all operational and technical tasks. Provision of continuous supervision during the course of logistics services and vehicles' maintenance

**CERTH:** Responsible for setting up the last-mile small passenger vehicle use case demonstrator, deployment of TMC services, VRU dedicated solutions

**SUBURVAN** (external): Responsible for providing and operating the automated mini vans fleet

**YAPE** (external): Responsible for providing part of the autonomous delivery robots fleet

**Trikala Municipality** (external): Continuous support and responsible for providing all required permissions for the operation of the fleet on the public roads

**VODAFONE** (external): Telecom operator providing improvement of the network

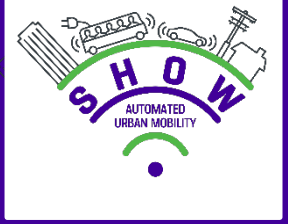
# Use Cases

## The Passenger Service (2 mini vans):

- On demand passenger transportation in mixed traffic without dedicated lanes in 9.6km route. Demand from different groups, needs and hours of operation to be served from the different fleet complementing each other
- Remote supervision, monitoring and immobilization via remote control center
- Safety driver on board for the initial stages mandatory
- Request for a ride and passengers notification via booking application.
- Free of charge service
- Smart traffic lights integration for green wave implementation
- Major POIs defined as bus stops (train station, thematic park, University)
- Secure depot and terminal with charging facilities

## The Logistics Service:

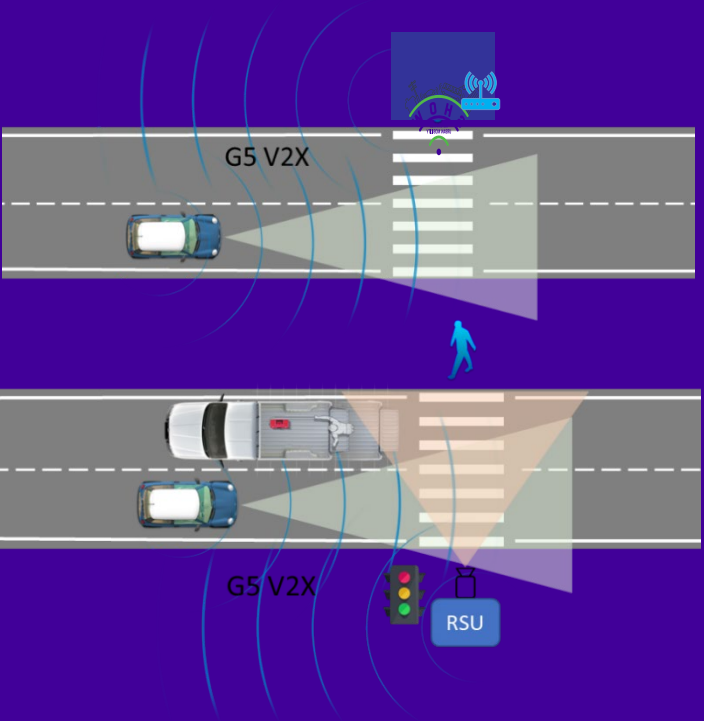
- Operation in the pedestrian area of the city center, free of charge
- Remote supervision, monitoring and immobilization via remote control center and fleet/deliveries management
- Delivery of small parcels and goods to local stakeholders via customer application







# Smart traffic lights, Remote control center, Real time alerting, Fleet management, Surveillance, Customer application



## Target passengers

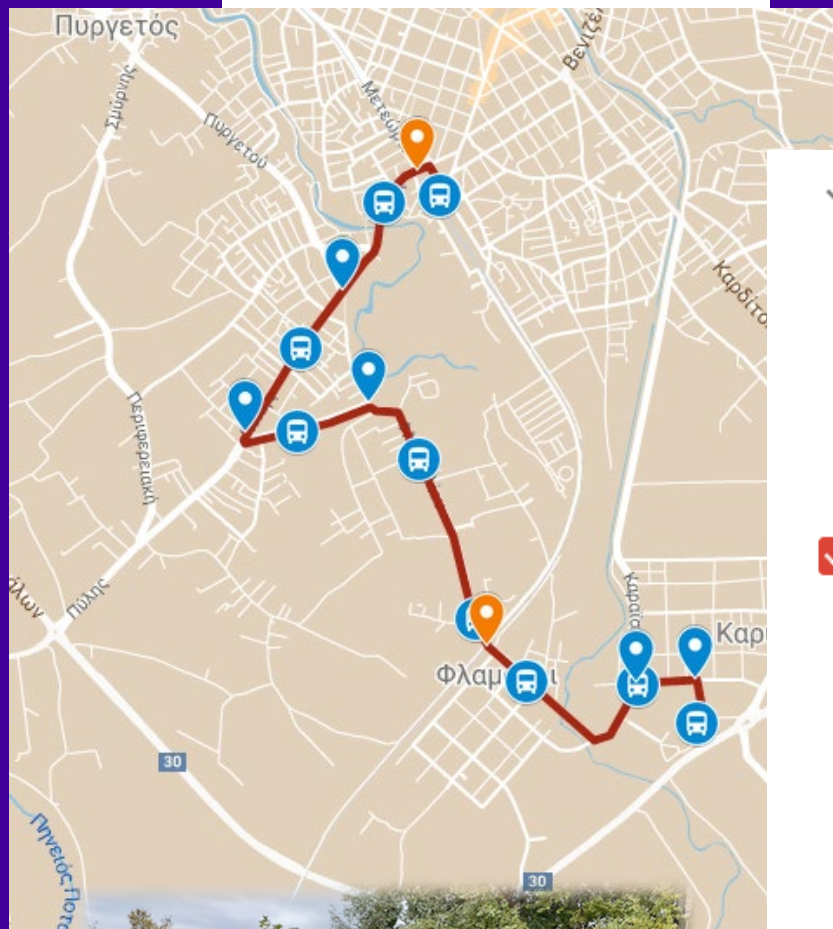
### Mini Vans:

- Employees of the Municipality and e-Trikala,
- Students of the University and Military school,

## Fleet

- 5 delivery robots (droids) for small freight distribution, L4, electric
- 2 automated 6-7 seats mini vans for passenger transportation (under tendering process), L4, electric





- ▼ Πίγανη
- Τοάι
- Μπιτούνι
- Άγριο Τριαντάφυλλο
- ... 6 ακόμα



#### TRAFFIC LIGHTS

- 📍 TLC 1
- 📍 TLC 2
- 📍 TLC 3
- 📍 TLC 4
- 📍 TLC 5



#### RAILWAY INTERSECTIONS

- 📍 RAILWAY INTERSECTION 2
- 📍 RAILWAY INTERSECTION 1

## Passenger Transportation

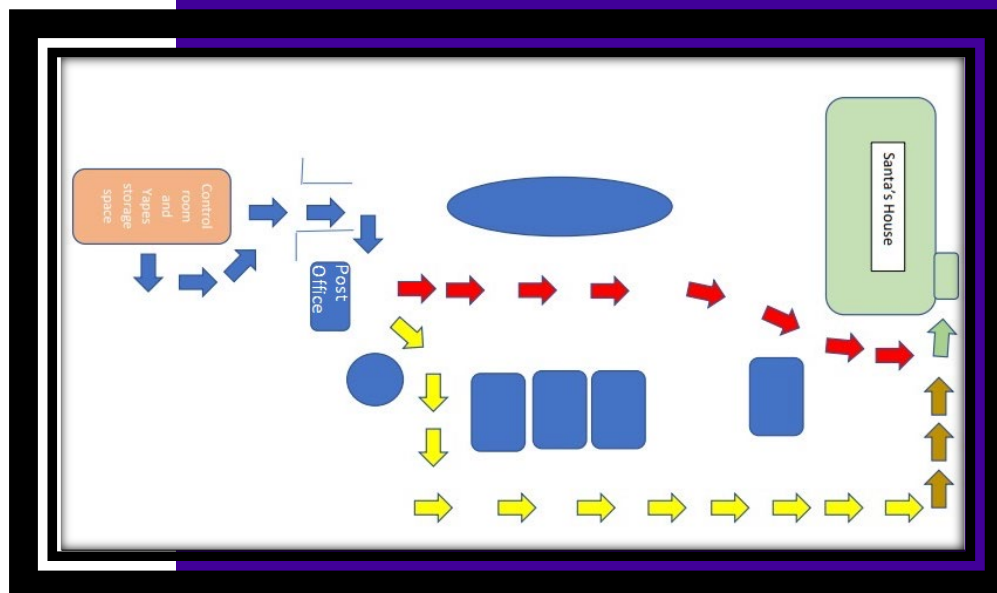
- 9,6 km route length
- 2 L4 Mini vans,
- The service will complement the current one of the underserved area
- Five signalized intersections
- Median Road Inclination < 1%
- Connection with intercity train station, Trikala Thematic park, suburban Flamouli and Karyes village as well as Trikala University.
- Connection with Remote Control Center for continuous monitoring and TMC to optimize operation

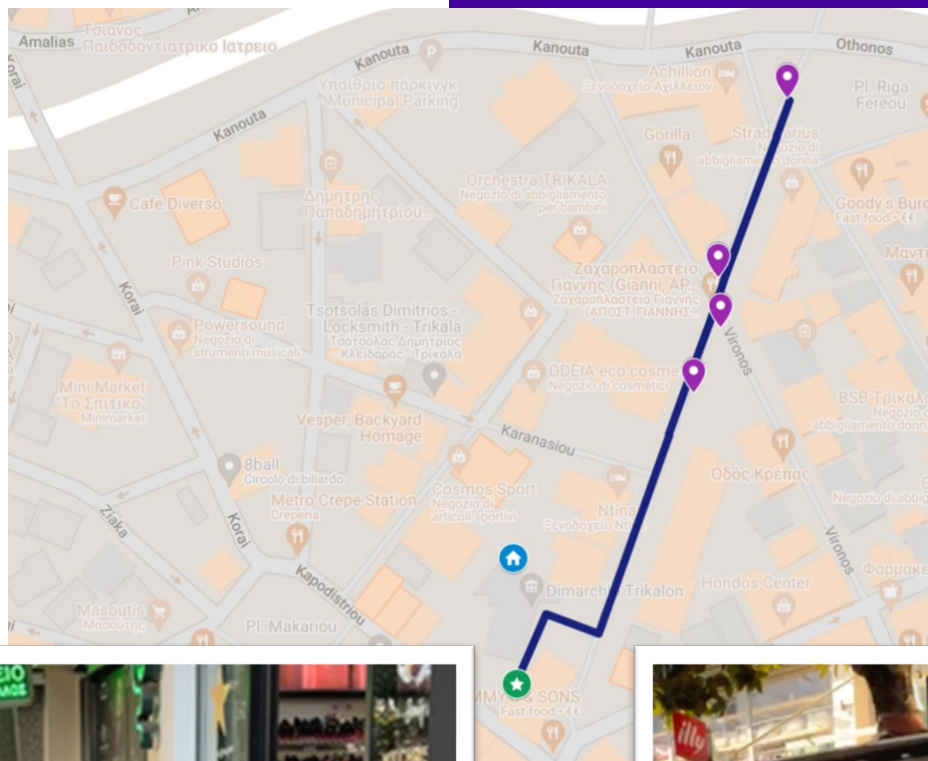




### Delivery of Letters in the Christmas Park,

- Yape collected Christmas letters from the post Office and delivered them to Santa's house. Yape moves in red arrow path when the area is less crowded, Yape moves in yellow arrow path when the area is more crowded.
- The brown arrow indicated the wooden path constructed specially for the Yapes to reach Santa's house.
- Green arrow indicates the Yape entering the house and make the delivery.
- Yape follows the same path back to the control room after the delivery is done.
- The distance between the post office and Santa's house is approximately 500 meters. The Post Office is on a different level than the Santa's house, therefore a ramp has been built for connecting the two zones





## Delivery of items from the Town Hall to the local retailers for daily refilling and vice versa

- Route is completely within the pedestrian area.
- The route is the same for both outward and return journeys.
- There are no road intersections.
- Coffee residual collection. Yapes collected coffee residuals from the coffee shops in the area and delivered them in the deport/control room
- Delivery of Newspapers. Yapes delivered newspapers to the shopkeepers, starting from the deport/control room. 24 stops have been defined along the path.





# Key Feedback



## From stakeholders

- Coffee shop owners liked very much the service and the special reservation system through the Yape booking website



## From passengers

- A priori study performed for passenger use case line dimensioning showed wide willingness to use the automated vans service as well as willingness to pay the same price as the PT.
- *“Trikala citizens are willing to use innovative services that promote safety, multimodality and sustainability via the established technological culture through numerous past innovative projects of intelligent transportation”*



≈ 1359 deliveries so far  
≈ 32 passengers tested the passenger service (pre-demo)



## Key challenges

Legislation adaptation for automation without a driver in mixed traffic without dedicated lane requires a long and difficult process. Public procurement and budgeting as challenging procedures on innovation systems and services.

A lot of safety considerations as well as improvements of the infra (digital and physical) need to be taken into account to ensure safe and smooth operation of the autonomous fleet.

As the responsibility is moved to the remote operator, big amount of data is needed to be transmitted in real time in the form of alerts. Therefore, special software and storage requirements emerged

Significant considerations and reluctance posed from different stakeholders as regards the definition of agreements to integrate the services into the Public Transport system or the supply chain

Curiosity of people led them to press the emergency button on the Yapes. This leads to abort the delivery and the operator should go near the droid to turn it on and take control.

## Resolution/Recommendations



The early communication with the Ministry of Transport, the clear definition of the pilot operation and technical aspects as well as the selection of commercial retrofitted vehicles to avoid delays in homologation and technical verification process

Potential route was identified after several traffic related studies and route risk assessment in order to ensure the safety of operation and define other traffic parameters. Several tests have been carried out as regards connectivity and vehicle's perception

Usage of a special software suite which gives the capability of real time alerts based on specific triggering mechanism to the remote control center for incidents prevention and detection.

Provision of an on-demand service that will complement the PT in terms of serving underserved suburban areas while discussions are held for their future integration to the PT system. Provision of delivery services according to the needs of local stakeholders.



**Showcase of Yape droids**  
Christmas festival 'Mill of Elves' in Trikala

# Expected Impacts



Main focus in Trikala is to make automated vehicles more attractive by associating them to public transport and to the supply chain. The predominant impact is the successful investigation of how AVs can be used via on demand services serving suburban areas and pedestrian areas, thus complementing PT and logistics supply chain to then proceed to actual commercial deployment.



Further impacts for Trikala are expected as such:

- **On mobility**  
Strengthening and complementing the public transport and multimodality with flexible on-demand services
- **On reduction of cars and goods km in cities and emissions**  
Reducing the number of vehicles accessing the city center and the pedestrian areas and therefore fewer emissions and congestion due to fewer overall vehicles in the city
- **On market boost**  
Market boost will be possible with next-generation AVs in combination with V2X connectivity
- **On strategic and fruitful PPPs**  
Follow-up activities together with stakeholder “ELTA COURIER” feasible
- **On deployment of electrified vehicles for shared automated mobility**  
Future automated vehicles will all be electric. Therefore, higher penetration of AVs service in Trikala together with the fleet of e-bikes that Trikala city is planning will automatically lead to higher electrification in the City while boosting multimodality and sharing mobility.



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