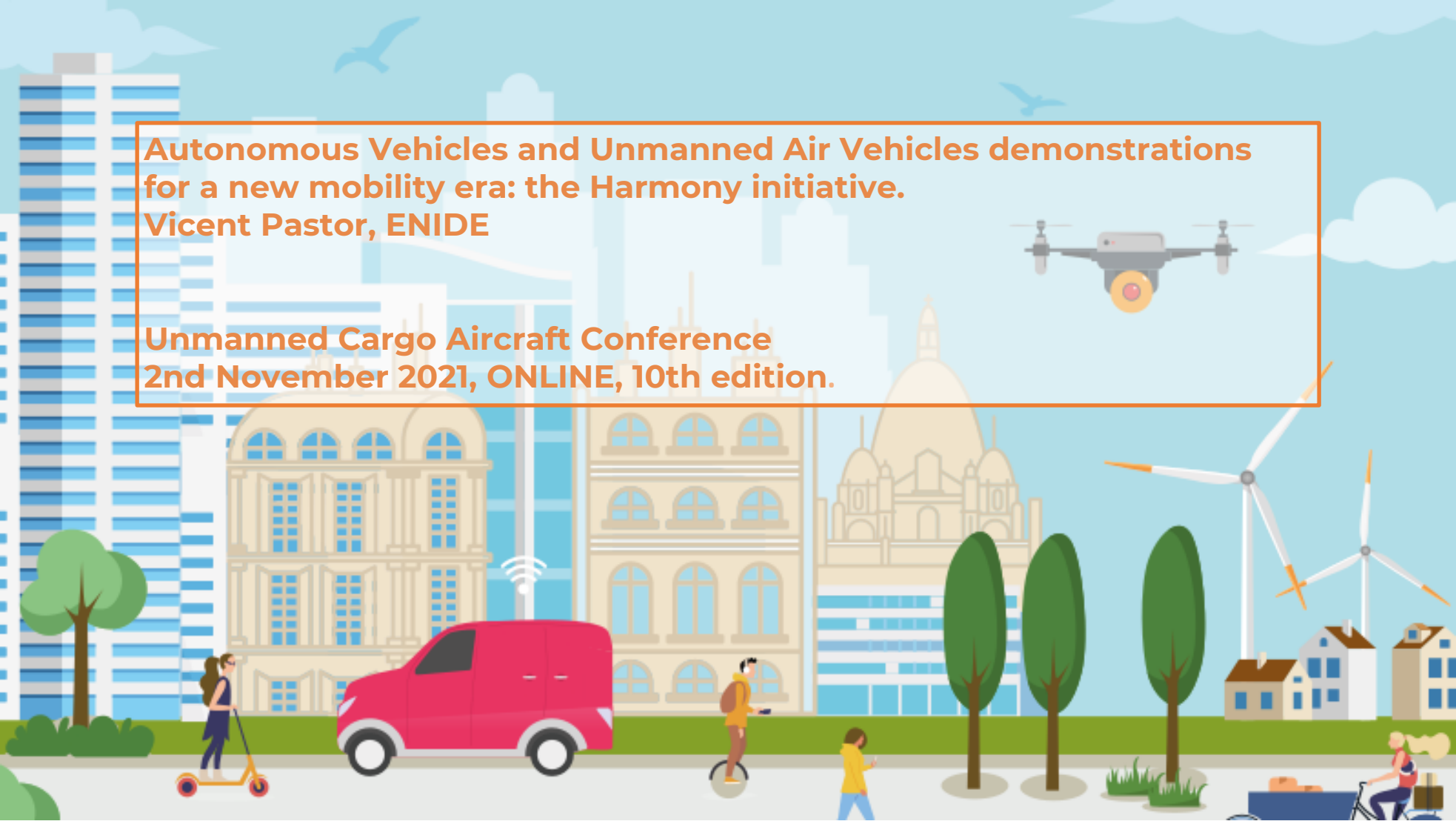


Autonomous Vehicles and Unmanned Air Vehicles demonstrations for a new mobility era: the Harmony initiative.

Vicent Pastor, ENIDE

Unmanned Cargo Aircraft Conference
2nd November 2021, ONLINE, 10th edition.

Platform Unmanned Cargo Aircraft

Unmanned Cargo Aircraft Conference

HARMONY

2020 CiViTAS

2021-11-02

Autonomous Vehicles and Unmanned Air Vehicles demonstrations for a new mobility era: the Harmony initiative

Vicent Pastor

enide

Vision

Develop a new generation of harmonised spatial and multimodal transport planning tools which comprehensively model the dynamics of the changing transport sector and spatial organisation, enabling metropolitan area authorities to lead the transition to a low carbon new mobility era in a sustainable manner

Main outcomes

Harmony Model Suite

A platform bringing together transport and spatial planning tools, people and freight activity-based models, network models and land-use models.

Training material and activities

Authorities and transport professionals will develop skills and knowledge to use the model suite tools.

Best practices for SUMPs

The best practices for SUMPs will provide authorities with evidence-based recommendations to update their Sustainable Urban Mobility Plans, including autonomous vehicles and drones.

Factsheet

21 partners from 9 European countries

UCL
TRT
aimsun.
City of Rotterdam
TU Delft
enide
significance quantitative research
OXFORDSHIRE COUNTY COUNCIL
AIRBUS
*
ARRIVAL
CITTÀ DI TORINO
WOLVERHAMPTON
TNO
moby
transport for athens
Torino Urban Lab
GRIFF AVIATION
e-trikala
Metropolis GZM

Budget: 7,649,645.25 Euro - Duration: 06/2019 – 11/2022*

www.harmony-h2020.eu
Harmony-H2020
Harmony_H2020

HARMONY

HARMONY's AV and Drones demonstrations

- **Oxfordshire County (UK)**:
  - AV + drones for freight
  - AV bus for passengers
- **Rotterdam (NL)**:
  - AV van for freight
- **Trikala (GR)**:
  - Drone for pharmaceutical purposes

Fleet used for the demonstrations

www.harmony-h2020.eu

Harmony-H2020

Harmony_H2020

ARRIVAL

GRIFF AVIATION

HARMONY

The Trikala demonstration

Freight: drones

Need:

- Pharmacies in villages receive medicines occasionally.
- When they run out of stock, someone has to drive to Trikala to pick up the medicines.
- But usually, elderly people that live in the villages, either call their relatives to deliver the medicines or they have to go/drive to Trikala to purchase them by themselves.

- **Challenges**:
- Medicines must be delivered to the person who has subscription
- Flying over citizens heads
- Ensure the box conditions (temperature and moisture sensor that could be monitored by the pharmacist)

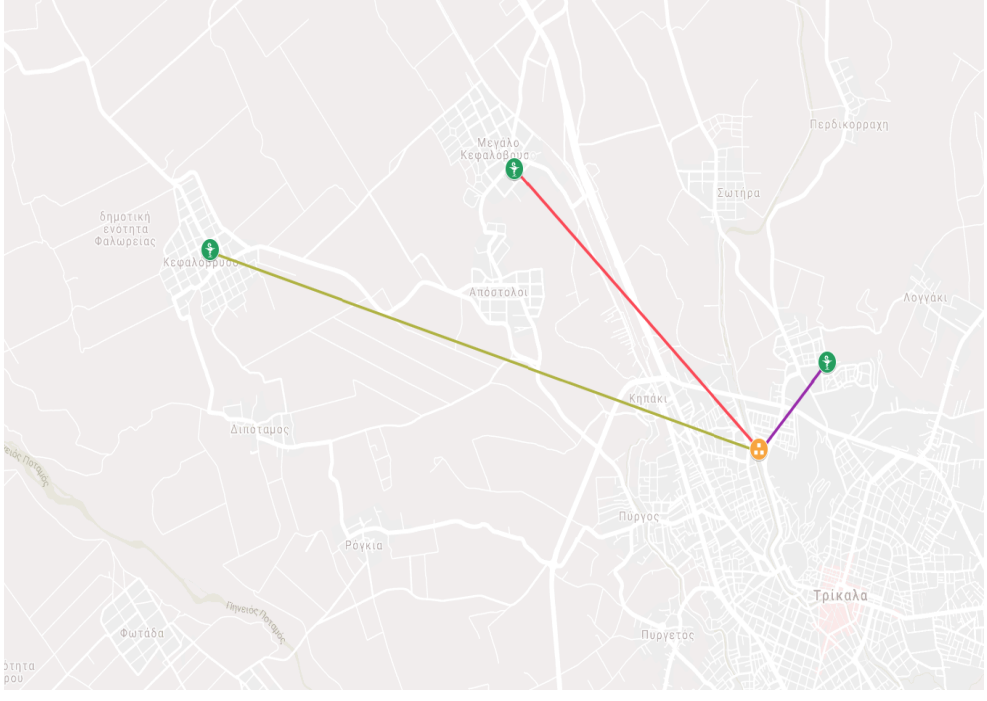
Use case (final scenario tested):

- Drone to deliver medicines to pharmacies located in villages upon urgent requests
- increase efficiency and quality of social care

Business opportunities:

- Develop systems that can recognise the recipient and deliver directly to him/her

Demonstration area



3 routes:

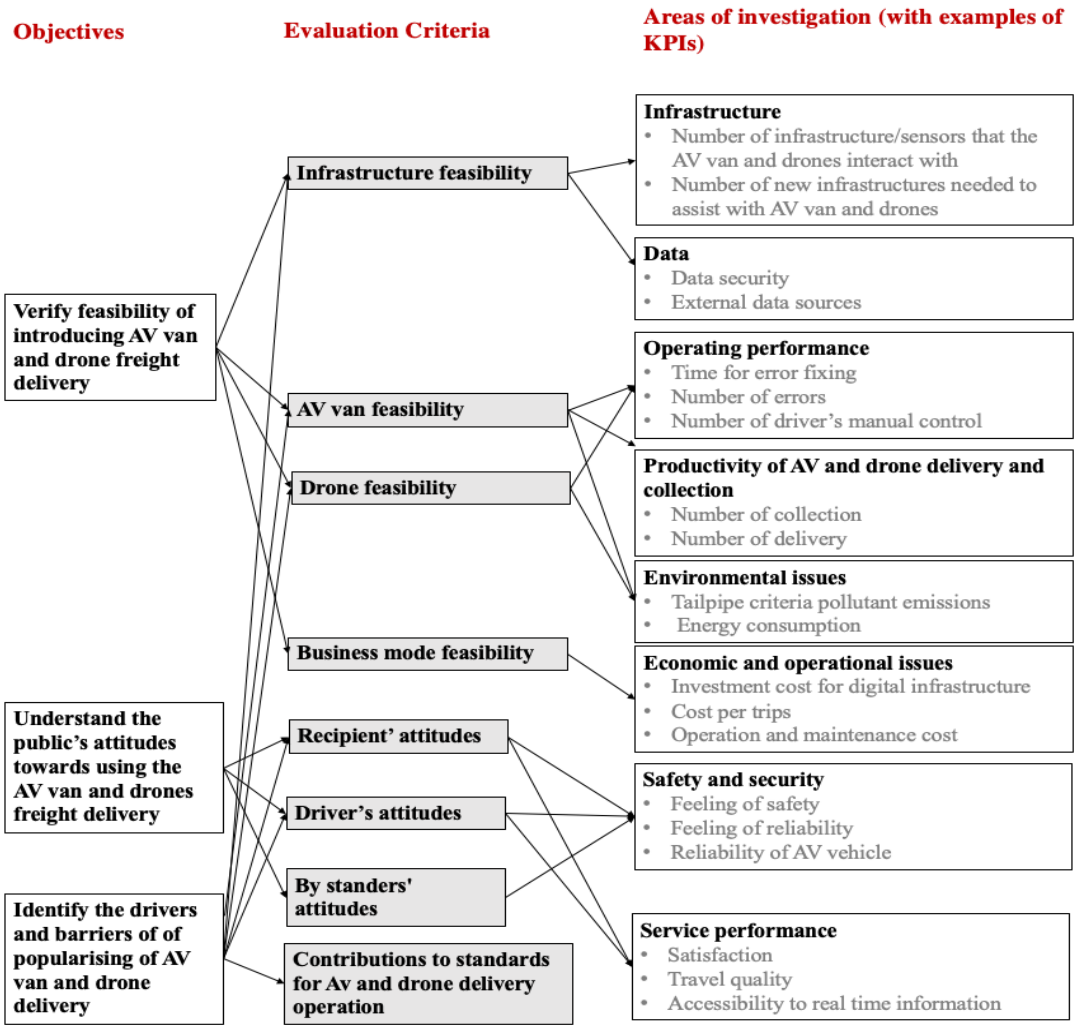
- Trikala to Leptokaria - 1km
- Trikala to Megalo Kefalovriso - 3.4km
- Trikala to Mikro Kefalovriso - 5.74km

Involved stakeholders

- **Griff:** drone provider
- **E-Trikala:** company owned by the Municipality of Trikala / public authority
- **YPA:** Greek national aviation authority
- **Univ. Aegean & UCL:** scientific guidance and support

Evaluation & KPIs for the demonstration

AVs & Drones demonstrations impact evaluation framework



Source: Kamargianni, M., Y. Zhan, and L. Yfantis, 2021.

Examples of KPIS

KPI	Unit to be counted
KPIs related to Data and Infrastructure	
External data sources used for the AV demo	To measure what and how many external data sources was required for the vehicles to operate in the real-world environment
Number of infrastructure/sensors that the AV van interacted with	Number of infrastructure and which infrastructure
Communication data security	· Communication throughput including data security number of treated messages per time.
	· Number per time unit.
	· Collection method: self- assessment from solution provider.
Privacy protection	Is privacy ensured according to law / GDPR, i.e. no info about localization and real-time speed transmitted to the cloud?
KPIs related to Autonomous Vehicles used for the demos	
Test rides required – AV vans	Number of rides; duration of rides in minutes
Duration/Time in real traffic situations – AV vans	Duration / Time to be measured in minutes
Number of errors of the AV van during the testing phase	Number and type of errors happened during the testing
Time for error fixing	Hours per error
Number of instances where the driver must take manual control	Number of instances / km
Speed variation (st. dev. of speeds) while travelling at constant speed (on link section, single speed limit)	
Number of road traffic accidents	Number and type of road traffic accident
Number of crashes	
Number of traffic violations	
Energy consumption of a vehicle	liters/100km or electric equivalent
Tailpipe criteria pollutant emissions	(NOX, CO, PM10, PM2.5, VOC) in total per year and per vehicle-km or mile

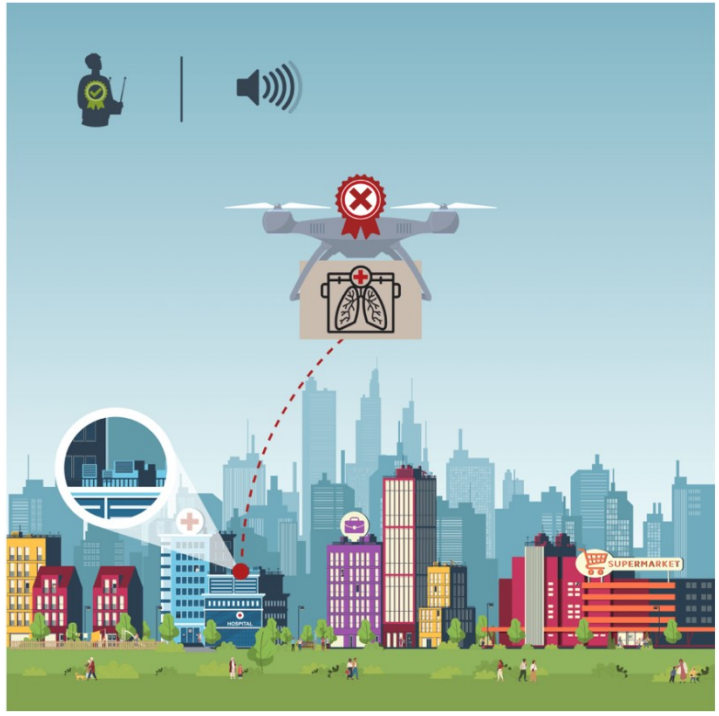
Lessons learned so far

Lessons learned

- Companies are positive towards autonomous vans and willing to test them
- They are also positive towards drones, but they have more questions and takes more time to be convinced about the added value of the use cases
- Authorities -both local/regional and national aviation- are supportive and interested in learning through these demonstrations

HARMONY - drone delivery in Trikala

Drone delivery acceptance survey



http://drones.survey.mobyx.co/

Thank you!

Vicent Pastor
E-mail: jvicent.pastor@enide.com

info@harmony-h2020.eu

https://harmony-h2020.eu/

www.harmony-h2020.eu

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