GZM Co-creation lab
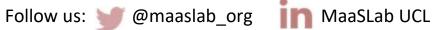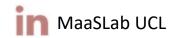
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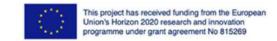
The HARMONY project

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.

Demonstrate in real life conditions:

- AVs for passenger and freight
- Drones for freight

More information: https://harmony-h2020.eu

Part of:
2020 CIVITAS

MaaS Lab

HARMONY drone demonstrations and activities

Oxfordshire

- Drones demonstration - Freight: carrying parcels within Milton Park
- Integration and demonstration of UTM (Unmanned Traffic Management) & UTMC (Urban Traffic Management Control)
- Drones collaborating with AVs - Freight (microdepots)
- Acceptance surveys to stakeholders (before & after the demo)

Trikala

- Drones demonstration - Freight: carrying medicines from the city to surrounding villages
- Acceptance surveys to stakeholders (before & after the demo)
- Acceptance survey to citizens

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- Working with stakeholders to specify various UAM use cases
- Acceptance surveys to stakeholders for the identified use cases
- Acceptance survey to citizens for the identified use cases

Examples of drones to be demonstrated

Heavy and light-lifting drones (5kg to 100kg) provided by Griff Aviation

U Space services

U1 Foundation	U2 Initial services	U3 Advanced services
• E-registration • **E-identification** • **Pre-tactical Geo-fencing**	• **Tactical Geo fencing** • Tracking • Flight planning management • Weather information • **Drone aeronautical information management** • **Procedural interface with ATC** • Monitoring • **Emergency management** • **Strategic De-confliction**	• **Dynamic geo-fencing** • **Collaborative interface with ATC** • Tactical de-confliction • Dynamic capacity management

U Space use example

1. Preparation of the drone mission: a drone operator plans to fly a drone to carry a small package from a village to the city centre 30 kilometres away. She selects a suitable drone from her fleet and selects a drone supervisor who will not actually be piloting the drone, but will be supported by automated functions and tools allowing her to monitor several drones flying at the same time. To prepare the flight, the drone operator uses information-sharing services connected to ATM via SWIM [13] (e.g. NOTAMs [14], meteorological conditions and forecasts at the nearest aerodrome), combined with other U-space services, such as navigation and communication coverage services, flight planning assistance services and services providing the expected density of traffic in the mission area. Since the drone is registered, the system automatically links the elements described in the registry with elements of the flight request, in which full details of the airworthiness of the drone and its behaviour in emergency situations are described. For example, this information could include designated safe landing areas, or details of the equipage and capabilities of the drone. That way, if the drone fails at any point in its flight, it will behave in a predictable manner, minimising risk to people and property on the ground.

2. Submission of a flight request and receipt of an acknowledgement: the planned route adheres to applicable regulation, airspace requirements (including airspace availability, temporary and permanent restricted areas) and requirements on specific drone equipment. If the flight requires an additional approval, then the request is submitted to the relevant entity and an answer is sent to the drone operator. The planned flight does in fact conflict with several other planned drone operations, so the operator is offered the possibility of a longer route or a delay to the drone's arrival by 5 minutes. She chooses the latter option and receives an acknowledgement, which includes th drone's 4D trajectory describing the entire flight. When the drone is airborne, it receives informatic and alerts and might alter its original route to avoid traffic, meteorological conditions or any changes to airspace accessibility. Throughout the flight, the drone broadcasts its unique identifier. The tracking service allows the drone flight path to be followed and supports other services like situational awareness, which provided, with some limitations, to a wide range customers (e.g. drone operators, ATC, police).

Benefits to European society and economy

Drone users/operators:
- Offer fair, flexible & open access to the airspace
- Open up drone services market

Citizens:
- Offer new & innovative drone services
- Ensure safe & secure drone operations
- Safeguard privacy & ensure environmental protection (noise & visual pollution)

Regulatory authorities:
- Maintain control over airspace
- Ensure privacy, safety, security & environmental protection
- Enforce registration & identification of drones
- Protect safety & security critical areas

Businesses:
- Enabling the development of new business models
- Spurring jobs & market growth
- Support move towards automation & digitalisation

3. Execution of the flight: the drone is equipped with a DAA system which allows it to avoid hazards. The DAA system navigates it around a flock of birds and an unreported obstacle (e.g. a crane). As it arrives in the city, it receives an alert on a modification of airspace availability on its route: a car accident has just taken place and the local police have set up a temporary highly restricted zone to automatically geofence the site. The geofenced zone is not actually empty as the police are using a drone to give them an aerial view of the accident, and this mission is approved. The incoming helicopter ambulance is a priority flight, and this information is shared to ensure drones crossing its path will route round it.

4. Mission completed: the drone arrives safely at its destination and delivers the parcel. It is now ready to be prepared for its next mission: a roof survey of a building 500 metres away.

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COMMISSION IMPLEMENTING REGULATION (EU) 2019/947

- Categories of operations: open, specific and certified

- Legal age +16 to operate drones

- Risk assessment procedures

- Cross border operations and special UAS zones

Workshop activity: UAM Use cases

- Description of the use case: take x from a to b

- Expected outcome: for the operator and for society

- Actors: who will be involved?

- Preconditions: conditions that must be met or activities that must be completed prior to executing the use case.

- Postconditions: end state of the use case

- Flow: The description should be sequential and provide adequate detail to understand all user actions and system responses.

- Requirements: any non-functional or special requirements for the system as the use case is executed. (legal or regulatory requirements, quality standards, or organizational requirements outside of the functional requirements the system is expected to perform)

PTL1   Slide not to be included in my presentation but will be translated for group moderators

Pana Tronca, Luciano; 02.12.2020

Working to provide recommendations for Sustainable Urban Mobility Plan

- Clear recommendations regarding SUMPs but missing air component

- Importance of integration with logistics (SULPs) when discussing UAM

- Where does UAM interact with the ground?

Building on policies in place, technical opinions, UAM blueprints, project experience and workshop outputs

- Flights in urban areas at low altitudes are currently heavily restricted

- Disjointed regulatory frameworks across topics and countries

- U-SPACE (air traffic management, vehicle specifications, future market), IT (data, privacy, cybersecurity), Urban Planning, Public Acceptance

- Bringing together a range of stakeholders for a coherent collaborative solution to enable progress

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HARMONY consortium

21 partners from 9 European countries

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Thank You!
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