



Intelligent Road Asset Management Platform

# UAV road survey: Multi-UAV inspections

ANIBAL OLLERO. UNIVERSITY OF SEVILLE | 19.11.2024 | 6<sup>th</sup> EAB Workshop



*International leaders: 3 Papers between the 15 most cited ones (Scopus)*

## Technologies developed in some European Framework projects

**FP5 COMETS.** Real-time coordination and control of multiple heterogeneous unmanned aerial vehicles



**FP6 AWARE.** Platform for Autonomous Self-Deploying and operation of Wireless sensor-actuator networks cooperating Aerial Objects.



**FP7 ARCAS:** Aerial Robotics Cooperative Assembly System



**FP7 EC-SAFEMOBILE** Estimation and Control for Safe Wireless High Mobility Cooperative Industrial Systems



**H2020 AEROARMS:** Aerial Robotic system integrating multiple ARMS and advanced manipulation capabilities for inspection and maintenance



**H2020 AERIAL-CORE: AERIAL** COgnitive integrated multi-task Robotic system with Extended operation range and safety



COMETS (2002-2005) ; AWARE (2006-2009) ; EC SAFEMOBILE and ARCAS (2008-2012) AEROARMS (2016-2019); AERIAL-CORE (2019-2003)

## *Other projects*

- **TEMA** (Trusted Extremely Precise Mapping and Prediction for **Emergency Management**). Horizon Europe. Enero 2023-Diciembre 2026. Subvención GRVC: 905.500€
- **SIMAR** (**Safe Inspection and Maintenance** supporting workers with modular robots. Artificial intelligence, and augmented Reality). Horizon Europe. Septiembre 2022-Agosto 2025. Subvención GRVC: 628.600 €
- **PILOTING**. (Pilots for **robotic inspection and maintenance** grounded on advanced intelligent platforms and prototype applications). 1 de enero de 2020 hasta 31 de diciembre de 2023. Subvención GRVC: 1.130.835
- **RESIST** (**RESilient transport InfraStructure** to extreme events). Desde 1 de septiembre de 2018 hasta 31 de agosto de 2021. 352.000,00 €.
- **MULTIDRONE**: MULTIPLE DRONE platform for **media production**. H2020-ICT-2016-1. 1 de enero de 2017 hasta 31 de diciembre de 2019. Subvención GRVC: 751.278.53 €
- **COURAGEOUS**. Building a common understanding of the effectiveness of **counter-UAS solutions** Horizonte 2020. Desde 1 de abril de 2021 hasta 31 de marzo de 2024. Subvención GRVC: 369.025 €
- **U-ELCOME**. **U-space** European COMMon dEpLoyment - Octubre 2022-Septiembre 2025. Subvención GRVC: 64.020€
- **SAFEDRONE**. SESAR-IA – Innovation action. Desde junio de 2018 hasta 31 de mayo de 2020. 174.500 €
- **GAUSS: Galileo-Egnos** as an Asset for UTM Safety and Security. 1 marzo de 2018 hasta 28 de febrero de 2021 359.312 €

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# OMICRON solution: Multi-UAV Inspections

**Autonomous fleet of drones enables multi-view inspections**

**Inspected risky and difficult-to-access zones, with shorter service interruptions**  
*releases workers from accessing stringent areas*

**A Visual Software Tool to control the missions supports the drone flights**

*Multi-view asset monitoring, easy-to-use interface for charging missions & visual feedback from flying drones*

**Team drones up for more reliable and shorter inspections!**

## KPIs:

- 65% fewer people in danger zones
- 50% lower idle times





# OMICRON Solution: Multi-UAV System

*There is a bridge to inspect*



# OMICRON solution: Multi-UAV Inspections

*There is a bridge to inspect*



*Equipped drones*





# OMICRON solution: Multi-UAV Inspections

*There is a bridge to inspect*



*Equipped drones*



*UAV management tool  
(visual software)*



# OMICRON solution: Multi-UAV Inspections

*There is a bridge to inspect*

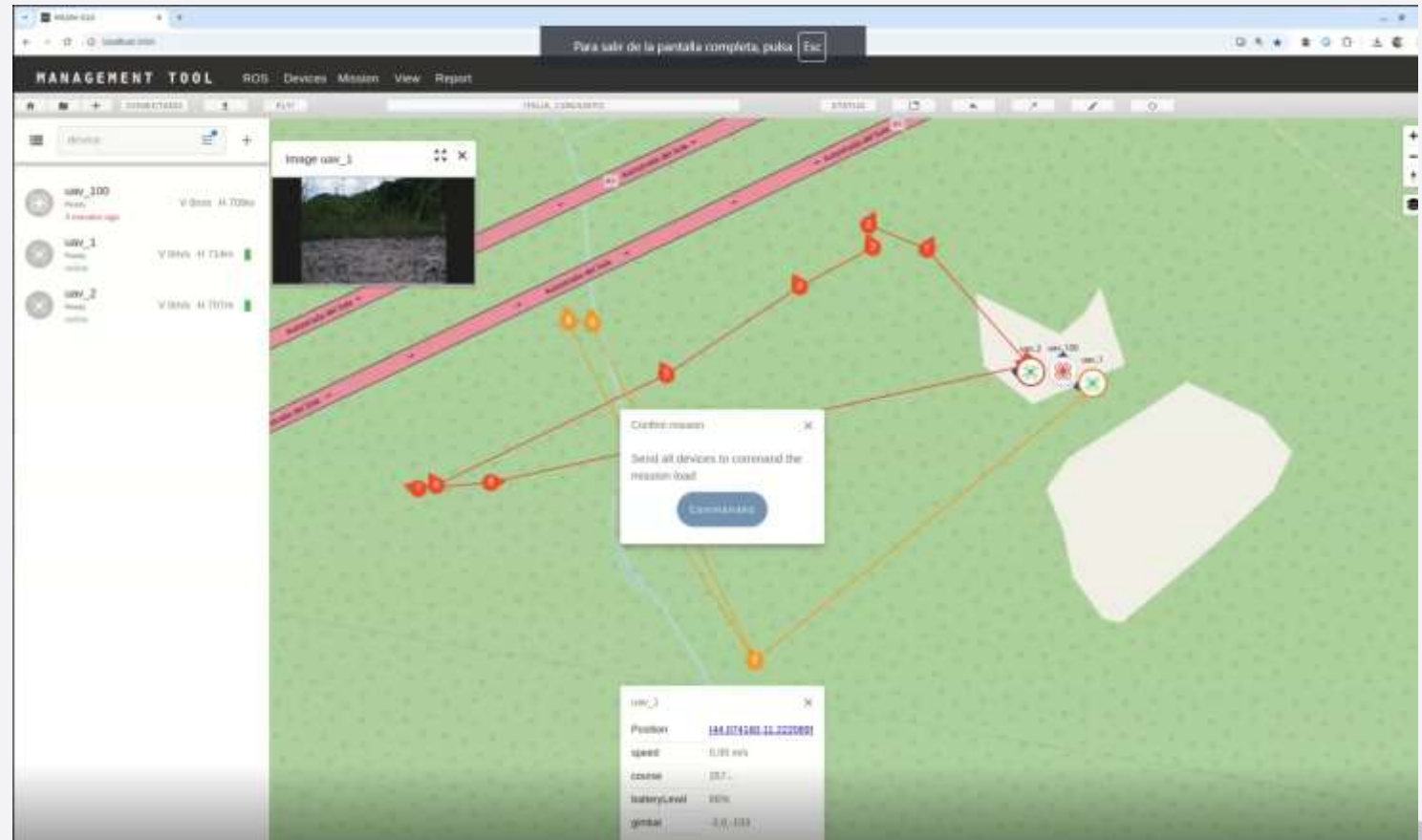


*Equipped drones*



*UAV management tool*

*i) Plan & launch missions*





*There is a bridge to inspect...*



*Equipped drones*

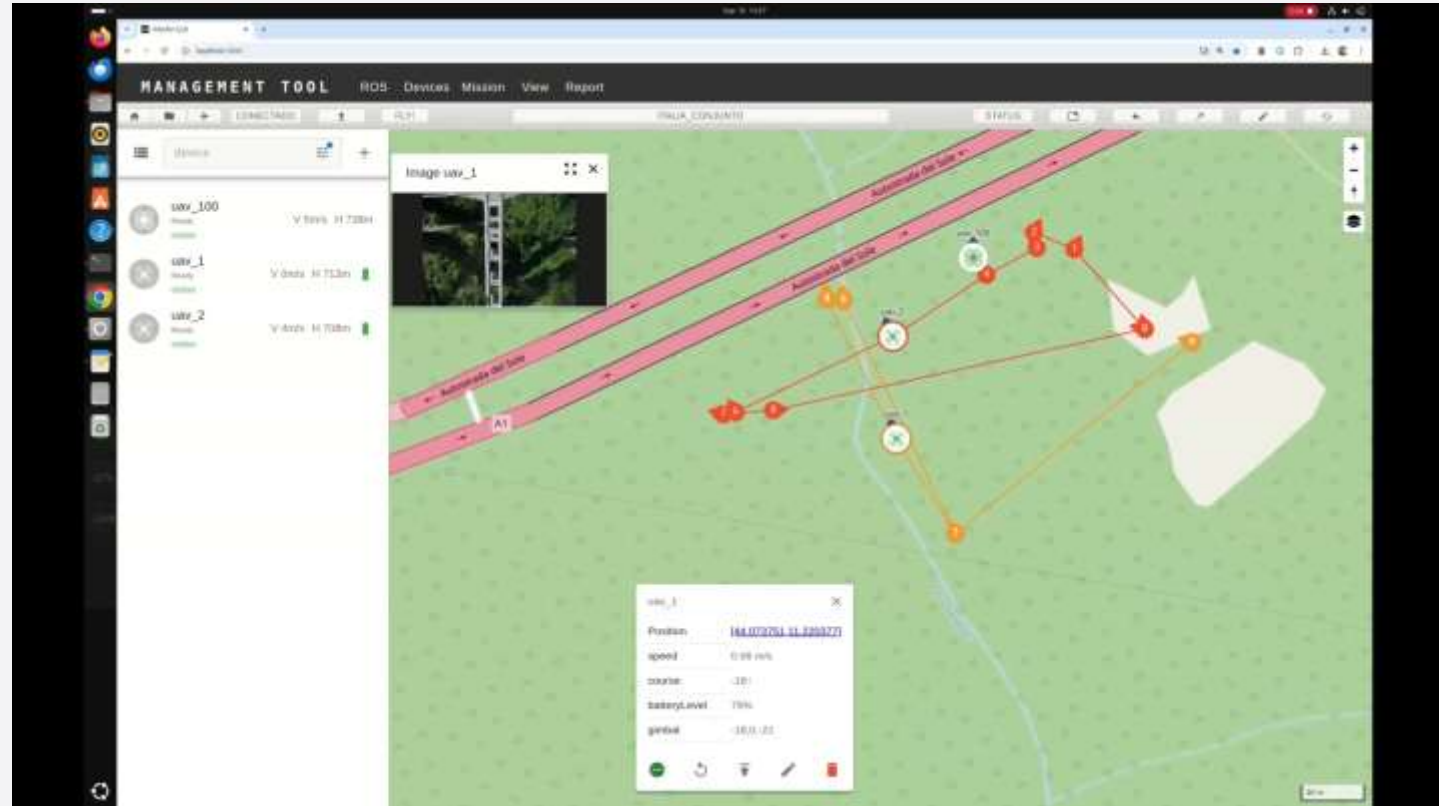


*UAV management tool*

*i) Plan & launch missions*

*ii) Monitor concurrent flights*

*iii) Receive visual feedback*



# OMICRON solution: Multi-UAV Inspections

*There is a bridge to inspect...*



*Equipped drones*

*i) Imagery records*



*UAV management tool*

*i) Plan & launch missions*

*ii) Monitor concurrent flights*

*iii) Receive visual feedback*



# OMICRON solution: Multi-UAV Inspections

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# OMICRON solution: Multi-UAV Inspections

## CONCLUSIONS:

- On-site testing demonstrates **the technology and the procedure are viable**
  - Fleet of drones **collaborating for gathering imagery and digital record to be subsequently checked**
- Not only bridges but also long-corridors can be inspected with multi-view capabilities, with **collaborating UAVs, each autonomously performing its part of the task.**
  - Monitor flight missions from Ground Control Point: **asset owner involved** in how operations occur!
- Our solution does not replace traditional in-place workers; it supports more recurrent tracking of how minor or major damages evolve (performing pre-testing task **quicker and safer!**)
  - **50% less time needed to develop inspections.**



# OMICRON solution: Multi-UAV Inspections

*Teaming up drones speeds up inspection & is in your hands!*

**Adapting the Multi-UAV solution to the bridge inspection use case:**

- *The objectives for and constraints on inspecting the target asset are the main point.*
- *Having the road stakeholder on board is essential for UAVs' effective integration!*

**Improves execution time**

**Get involved! We can adapt the system to your problem!**

OMI  RON

Intelligent Road Asset Management Platform

# Thank you

