



# Port of Ravenna. Air and Underwater Monitoring using data relay

## SCOPE

Ports and harbours are very responsive in acquiring air and underwater data for monitoring and inspection purposes. This covers both safety and security aspects. Bathymetry and underwater inspections provide valuable data above all when acquired in near real time (without undue delay). Also near real time video for context awareness is an important challenge when performed with automated drones.

## PLANNING

- Campaign execution: 2023 Q2 (May 2023)

## PORT OF RAVENNA

The Port of Ravenna is a canal port with 27 private terminal operators; the overall length of quays is almost 24 km, 14,5 km of which are in operation. Current capacity comprises 603.000 square meters of warehousing, 1.350.000 square meters of yards and 1.256.000 cubic meters of tank storage. The Port manages mainly dry bulk cargo, general cargo, agricultural products, liquid bulk cargo (oil and others) and, to a lesser extent, containers and Ro-Ro traffic. The port of Ravenna is an "A" Category port as indicated in Decision N. 661/2010/EU of the European Parliament and of the Council of 7 July 2010 on "Union guidelines for the development of the trans-European transport network".

## PASSPORT ARCHITECTURE CONFIGURATION





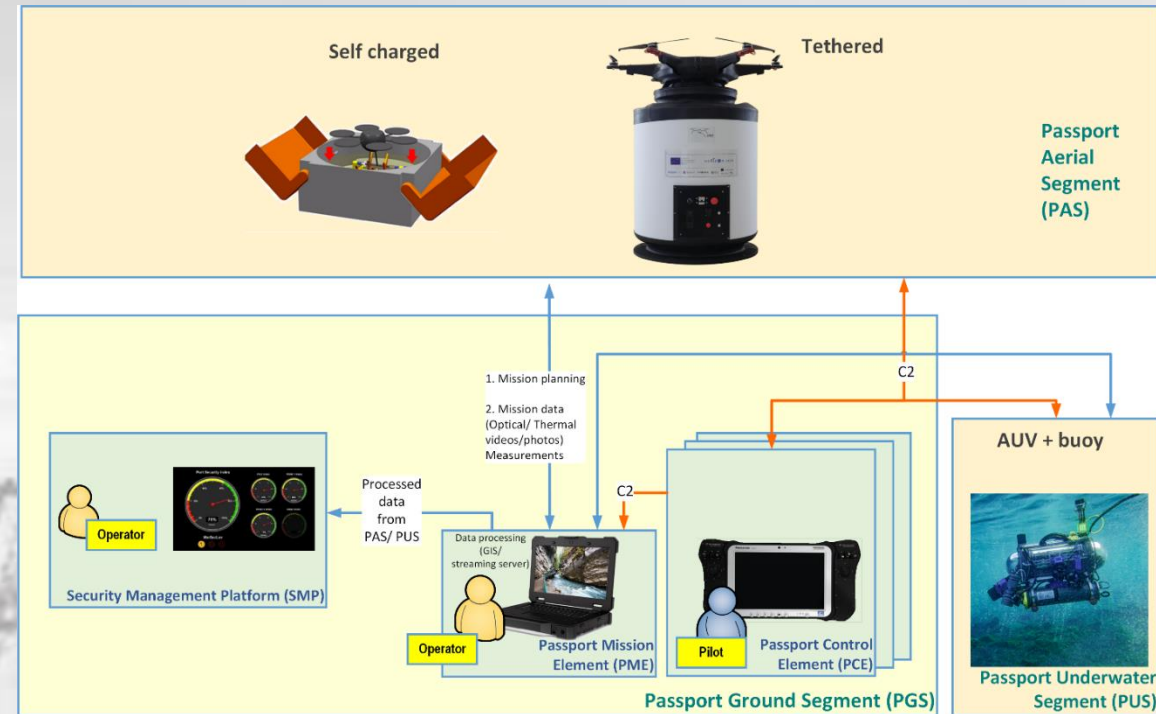
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Air and underwater monitoring is another core use case which requests the usage of both aerial and underwater drones. In particular the identification of underwater threat can be performed by using Autonomous Underwater Vehicles (AUVs) and aerial rotary wings drones acting as bridge for communication relay to the control centre. Moreover, the aerial drones can be used as a support for surveillance inspections. PASSport configuration for this campaign is composed by:

- One (1) self-charged semi-autonomous drone commanded by the PME for missions in dedicated areas in a limited time
- One (1) rotary wing tethered drone equipped by optical camera for distant video monitoring and acting as bridge between the underwater drone and the PME.
- One (1) underwater drone for bathymetry and distant video monitoring also equipped with a buoy (with EGNOS/ Galileo GNSS Rx)
- One (1) control element (PCE) composed managing the fleet of drones
- One (1) mission element (PME) where both real time (video for situational awareness) and data for post-processing are collected, processed together with Copernicus, validated and published. PME also manages all mission phases, i. e. planning, acquisition, processing, validation, reporting.
- One (1) Security Management Platform (SMP) used to trigger threats and activate relevant intervention procedures

## THE PILOT: PIOMBONE QUAY

An area has been preliminary identified: The Piombone quay is a “public quay” (i.e. a quay not in concession to a specific terminal operator) and different vessels can be moored here to carry out port operations or for other reasons like maintenance works or if are under seizure. The quay is about 1 km. long and can host up to 6 vessels. After the end of the concrete quay, are moored some abandoned ships waiting to be dismantled. The quay is on the Piombone canal that is part of a protected wet area and nesting site for different bird species. The potential presence of many ships for different reasons, the absence of a concessioner responsible for the security of the facility, the presence of abandoned ships and the nearness with a protected area make this quay a perfect site for the campaign related with the inspection and security aspects.



The Piombone Canal is the canal that join the Piallassa del Piombone (the southeastern wetland) and the Candiano Canal (the main canal of the port). The canal is 2,5 km. long, 100 metres width, with a draft between 6 and 7 metres and represent good location where carry-out the campaign for bathymetry and underwater inspections because there is no much traffic (so we can plan sufficient time for the measurement without interfere critically with the navigation plans) and for the presence of abandoned ships that are a good target for the inspections.





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