

PASSPORT



PASSport project. A case study about
aerial surveillance of maritime areas and infrastructures

HPA Homeport homecoming, June 22nd 2023

Agenda

- The need for PASSport initiative
- The consortium
- The architecture
- AI, EGNSS, EO and MR as enabling technologies
 - => OSNMA service usage
- DEMO

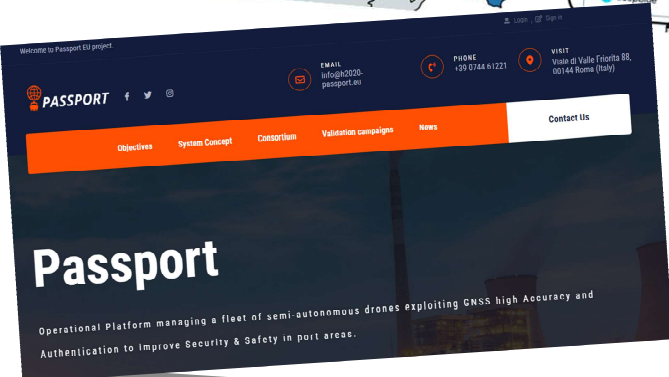
PASSport

Operational Platform managing a fleet of semi-autonomous drones exploiting GNSS high Accuracy and Authentication to improve Security & Safety in port areas

- The need stems from the directive 2005/65/CE asking to complement surveillance systems for the whole port area, in order to significantly improve security and safety for daily operations implanted in port area. Around one thousand European ports fall within the scope of the directive.
- The proposed solution is intended to **complement already operational platforms** by extending the surveillance perimeter using a fleet of drones to provide innovation and operational support to the recognition, management and analysis of safety and security aspects of daily operations
 - ✓ Pollution monitoring (safety)
 - ✓ Support to e-navigation (safety)
 - ✓ Critical buildings/ Infrastructures protection (security)
 - ✓ Protection against non-cooperative small craft approaching the port areas (security)
 - ✓ Underwater threats monitoring (security)
- The project novelty is represented by **the usage of a fleet of semi-automated drones integrating Galileo services** (and other sensors) for a safe and efficient guidance, navigation and control (GNC) even in a challenging environment in presence of obstacles - including buildings and other ground assets - and potentially unfavorable weather conditions.



Team and identity



- www.h2020-passport.eu
- <https://www.linkedin.com/company/h2020-passport>
- <https://twitter.com/PassportH2020>
- <https://www.facebook.com/H2020-PASSport-100313468652600>
- https://www.instagram.com/h2020_passport/

The concept

Copernicus



EGNOS



EGNSS (Galileo/EGNOS)



Passport Aerial Segment (PAS)

External Operational interfaces

- Dintel
- Operator EMP
- Operator shiplocus

Passport Ground Segment (PGS)

- Passport Mission Element (PME)
- Passport Control Element (PCE)

Passport Underwater Segment (PUS)

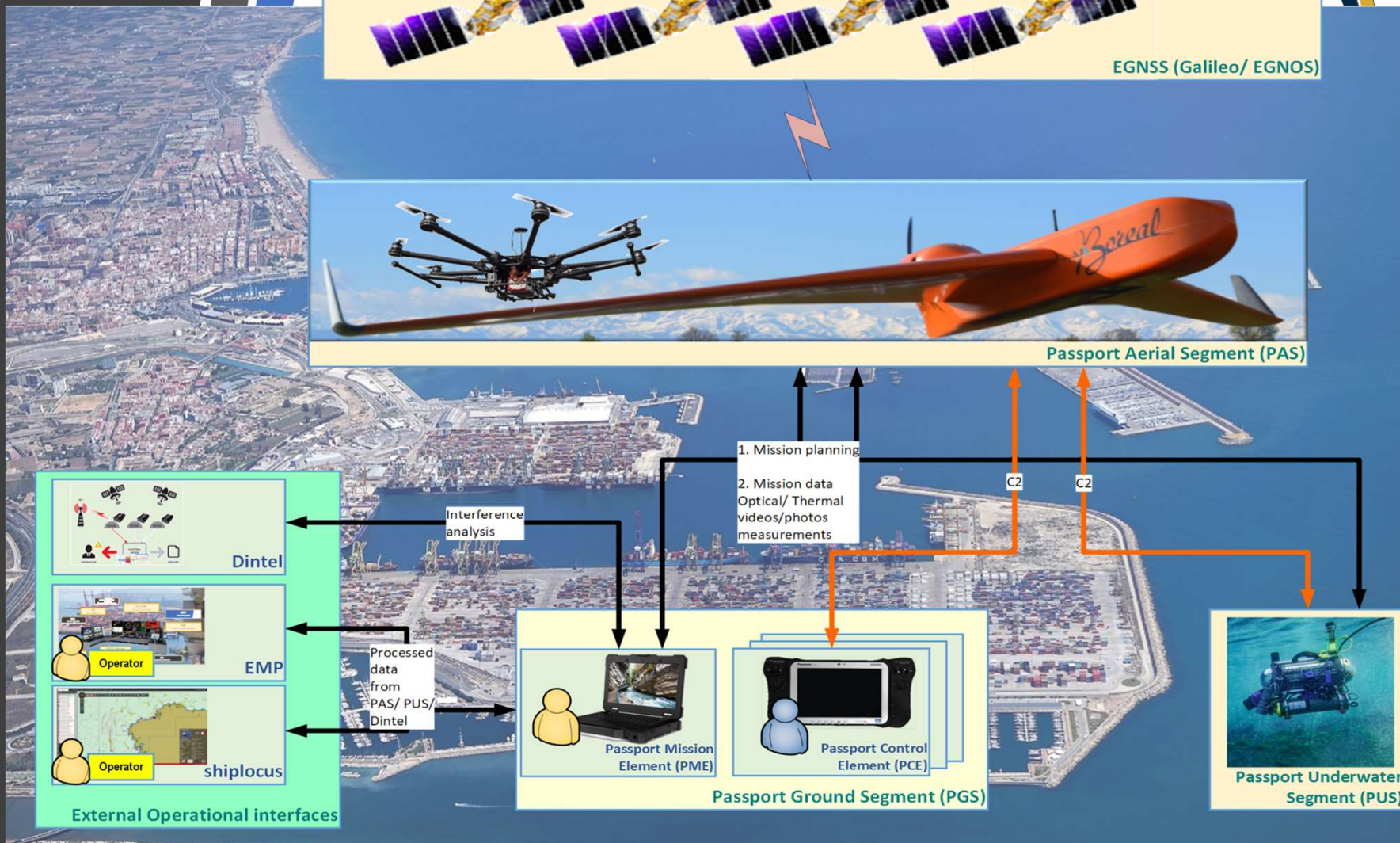
- 1. Mission planning
- 2. Mission data
Optical/ Thermal
videos/photos
measurements

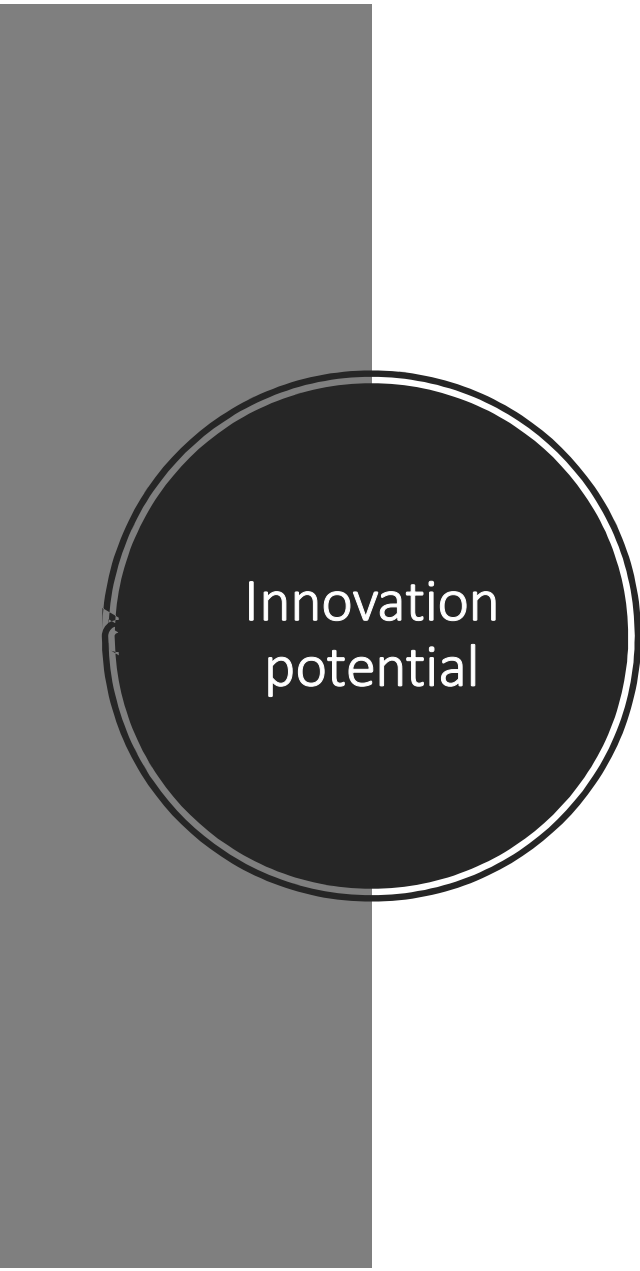
Interference analysis

Processed data from PAS/ PUS/ Dintel

C2

C2





Innovation
potential

Innovation brought by PASSport providing Extended surveillance service with a semi-automated drones

Coverage	RPAS allows to cover large area in reduced time
Cost saving	No need for static infrastructure to be deployed
Operational Time efficiency	The implementation of AI & DL algorithm allows to have additional information (image and video metadata) for an improved situational awareness in real time
Service reliability	GNSS (high accuracy, integrity, authentication) and other sensors allow the solution to be more reliable and resilient
Usability	Operator does not require specific expertise as operations (take off, mission management, area scanning and landing) are driven by an automated process once waypoints are configured (although a qualified remote pilot will still be present when required by the regulation)
Interoperability	interface with some already deployed and daily used operational platforms (developed by partners of the consortium)

Earth
Observation
(EO) usage to
support port
operation
monitoring

- **GOAL:**

To use dedicated algorithm based on Copernicus data: wind detection and measurement, ship detection, air pollution estimation, port facility stability assessment

- **Maritime applications**

Sentinel-1 data for the detection of ships within Le Havre and Valencia port areas.

- **Maritime applications:**

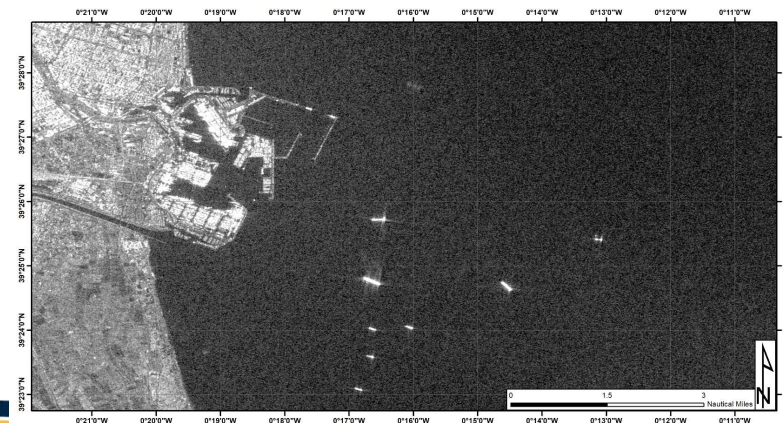
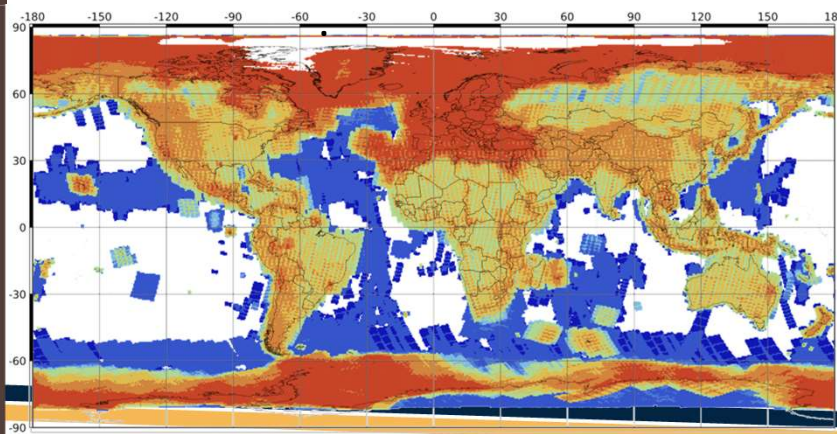
Sentinel-1 data for the assessment of the major winds within Ravenna and Le Havre port areas.

- **Terrestrial applications**

analysis of EGMS interferometric data for the assessment of the stability of Hamburg port facilities and infrastructures.

- **Atmosphere applications**

Sentinel-5p data for the Kołobrzeg air quality assessment



GNSS usage as enabling technology

- **GOAL:**

To use E-GNSS capabilities to contribute to **safety** (automated drones flying in a challenging environment) and **security** (image geo-referencing for surveillance analysis or the need of a robust and protected GNSS signal as input for GNC of the drones) for operations in ports.

E-GNSS can provide:

- **High accuracy:** E-GNSS can provide drones position very accurately, even in the level of centimeter depending on the technology used.
- **Integrity and reliability** of the solution is required not only for the safety of the operations but also as means of measuring the confidence in the correctness of the positioning information provided by the navigation system. The reliability on the RPAS position provided by the GNSS user terminal will be also very useful to increase the reliability of the images taken from the RPA.
- **Robustness against interferences or spoofing attacks.** The concern on GNSS interferences, mainly the intentional ones, recommends the use of GNSS solutions that are robust against interferences.

Galileo OSNMA Receiver Guidelines for Test Phase (v1.1)

Annex 2 - OSNMA Test Vectors

<https://www.gsc-europa.eu/electronic-library/programme-reference-documents>

User requirement	GNSS contribution
Safe trajectory for automated RPAS	High accuracy (e.g. Galileo HAS, PPP)
Geo-localisation of detected target	Integrity (e.g. SBAS, HA with integrity)
System resilience	Signal authentication (e.g. Galileo OS-NMA) Interference detection (e.g. DINTEL)

HOW? →

GNSS user terminal
(e.g. magicUT)

Interference monitoring system
(DINTEL)



Mixed Reality
device for
drones
performed
mission

- **GOAL:**


to increase **situational awareness and improve decision making** time by providing the user with real-time data from drones that are part of the system.

Use-cases:

- Pollution detection where drone monitors discharged ballast waters or ships' emissions and measures level of SO₂. An immediate alert will be visible through the glasses with the identification of a polluter if a pollution is detected.
- Safety and security monitoring where immediate alert and video feed will be shown to the operator when a predefined criterium is met, e. g. movement detection (unauthorized entry to port facilities) or elevated building temperature (fire indication).



Promotion and Stakeholders perspectives gathering

 H2020-PASSport
158 followers
5mo · 🌐


<https://lnkd.in/enKZr5pr>

Présentation du projet PASSport à la 11e édition des assises port du futur 2021. Notamment, en présence des principaux ports français et du Ministre de la Mer, a été présentée la campagne C4 qui se déroulera au port du Havre en mai 2023.

Presentation of the PASSport project at the 11th edition of the assise du port du futur 2021. In particular, in the presence of the main French ports and the Minister of the Sea, the C4 campaign was introduced which will be carried out at the port of Le Havre in May 2023.

EUSPA - EU Agency for the Space Programme
#Galileo #Copernicus #drones #EGNSS

See translation




PASSPORT. 11me Assises port du futur. Novembre 2021
youtube.com


<https://lnkd.in/eAtqKh-E>

#technology #marine #sustainability #iaph



 H2020-PASSport
158 followers
6h · 🌐

Vancouver, May 17th 2022
International Association of Ports and Harbours (IAPH) conference for sustainability awards. ...see more

 BM Bergmann-Marine
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The H2020-PASSport Project has been presented the International Association of Ports and Harbours (IAPH) Sustainability Award in the category Digitalization. BM Bergmann-Marine is one of the partner in the project and as associated member of IAPH we could convince our partners for BM to submit it to the award. Now, as we are successful, we congratulate our partners ALCINA, GMV, Sistemica S.p.A., G7 International Srl, DiGi ONE Srl, TopView srl, DEEP BLUE SRL, German Aerospace Center (DLR), Eurecat - Technology Centre of Catalonia, M3 Systems, Università degli Studi di Firenze, Akademia Morska w Szczecinie, Fundación Valenciaport, Cerema, AUTORITA ... PORTO DI RAVENNA, as well as our associated partners, especially the ports supporting our validation campaigns Hamburg, Ravenna, Kolobrzeg, Valencia and Le Havre. As our owner Michael Bergmann MBA FRIN AFNI wasn't able to join, we are very thankful to Dr. Phanthian Zuesongdham from Hamburg Port Authority (HPA) Anstalt öffentlichen Rechts to speak on behalf of the project consortium and together with the partners at the event to accept the award.

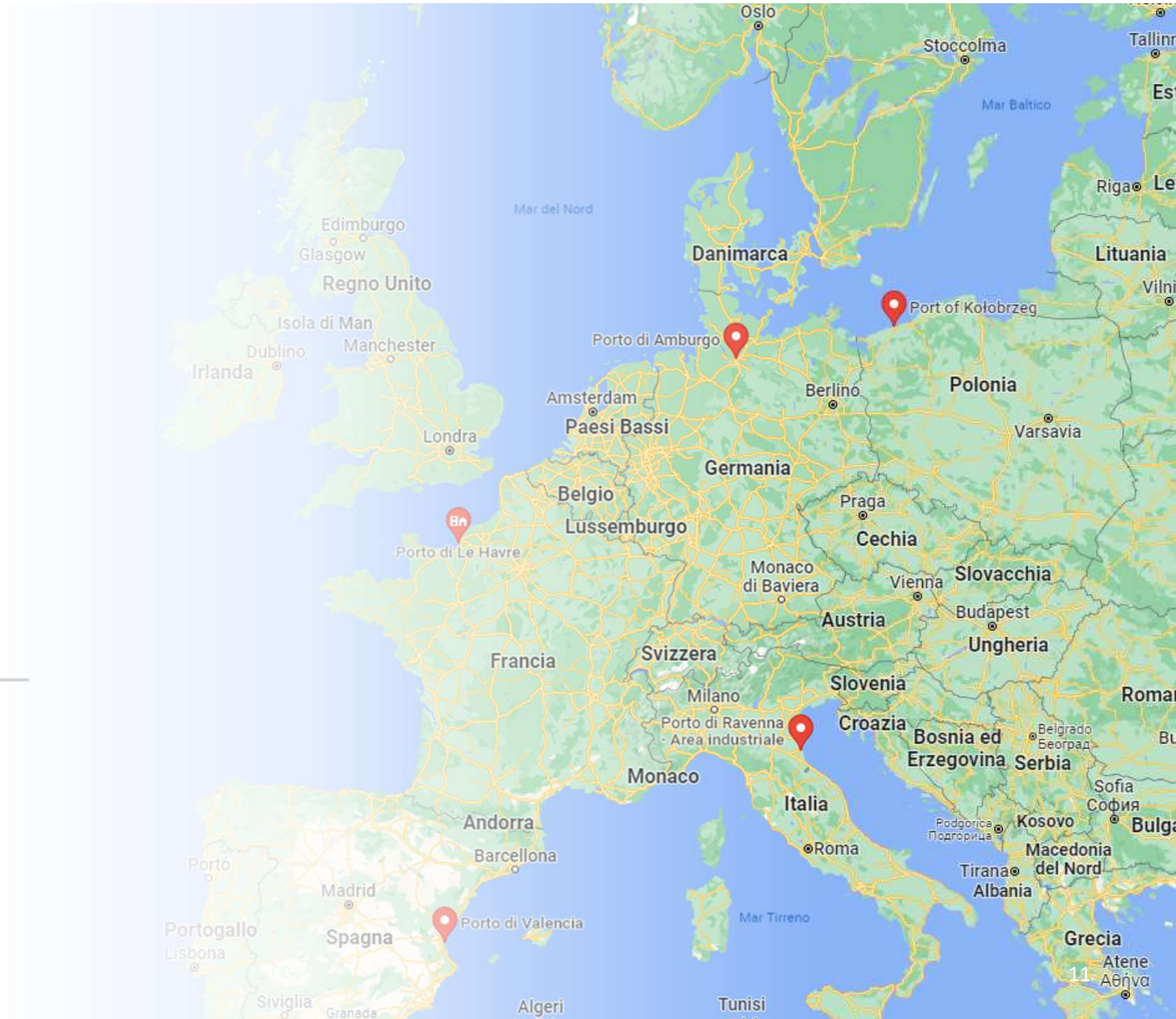
Thank you International Association of Ports and Harbours (IAPH), thank you expert jury and thank you public voters selecting our project. It is a great honor!

PASSPORT



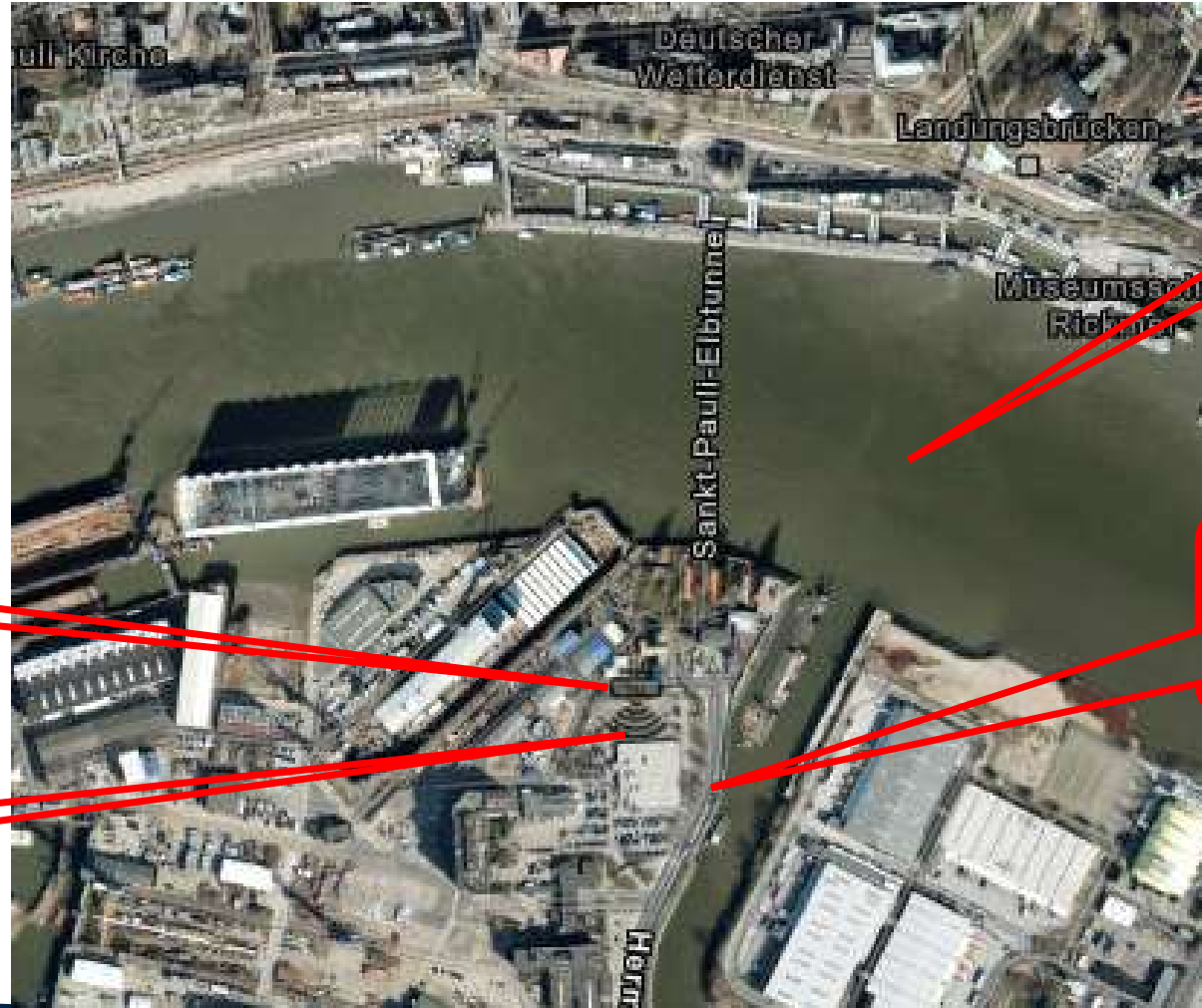
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PASSport use cases and validation campaigns



DEMO

- Introduction to PASSport platform Desk + mobile
- Activity 1 DAPR: Copernicus EGMS
- Activity 2 RTVS: video collection and images analysis



Vessel Hubbe + magic UT

- DJI mavic pro2+
- DJI 210) +
- pollicino tracker

Dintel: interference analysis

CCTV



The PASSport platform: Platform Admin Operator (PAO)

The screenshot displays the PASSport Platform Admin Operator (PAO) interface. On the left, a sidebar menu is organized into three main sections:

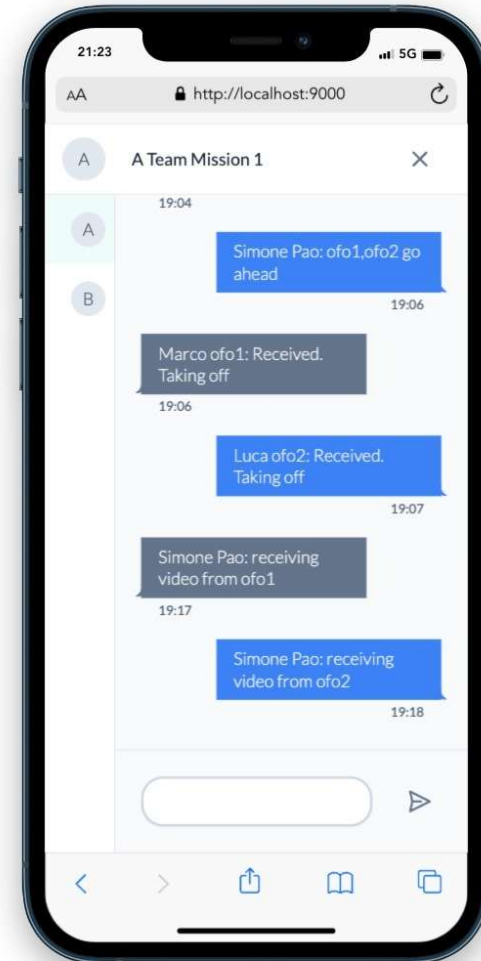
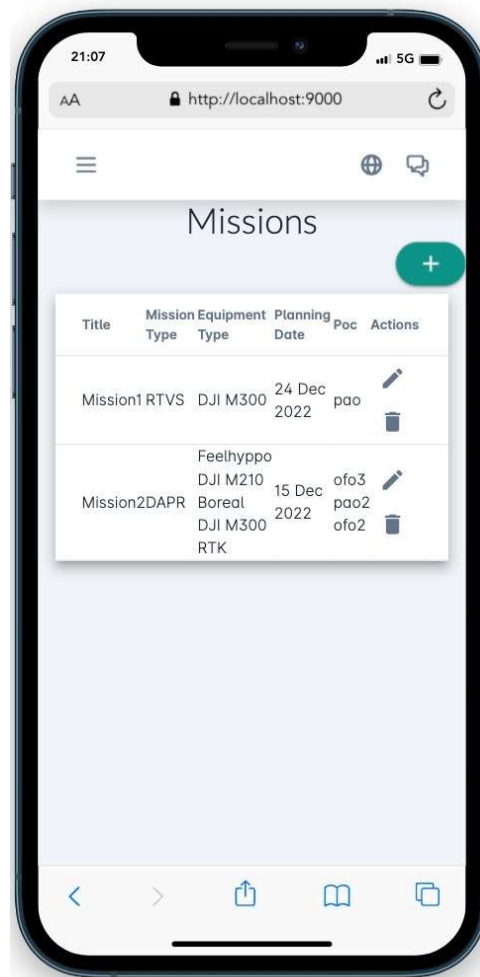
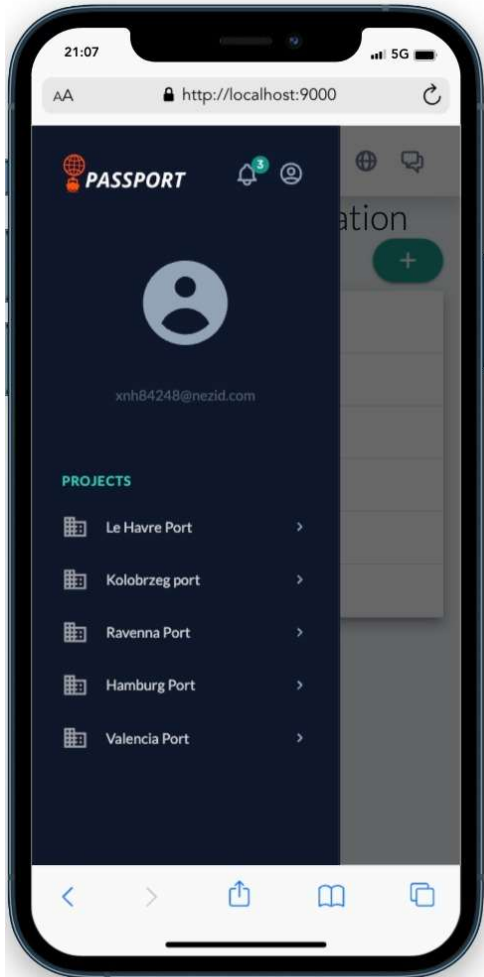
- CoC (Chain of Command):** Mission Planning, SecOps (Security Operations), Config, Threats, Status.
- DAPR (Data acquisition Processing and Reporting):** Data Acquisition, Data Processing.
- RTVS (Real time Video Streaming):** Nodes Configuration, Video Streaming and Processing, Home, Archive, View.

The central navigation pane shows the user 'admin@localhost' and lists system configuration options: System Configuration, User management, and PROJECTS (Le Havre Port, Equipment Configuration, CoC (Chain of Command), DAPR (Data acquisition Processing and Reporting), RTVS (Real time Video Streaming), Dintel, Shiplocus, MRP (Mixed reality platform)).

The main content area features a large video feed of a coastal scene with 'boot 0.70' and 'boot 0.69' labels, a smaller video feed of a group of people, and a gallery of images/videos.

A 'PASSPORT' logo with a globe icon is located in the bottom right corner.

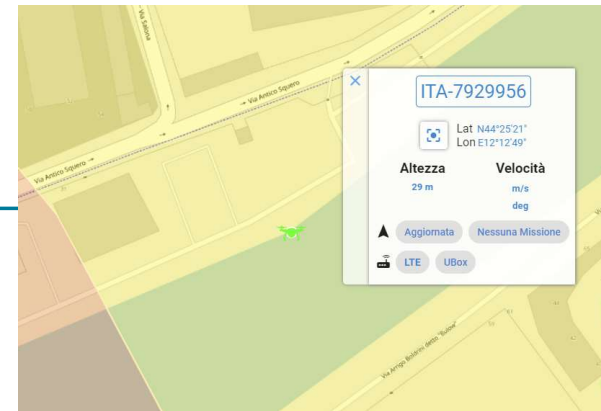
The PASSport platform: On field operator (OFO)



Pollicino Box

Pollicino™ Box allows one to identify and track any drone during the flight, transmitting the GNSS data-position via LPWAN technology.

The tracker comes from a specific request of d-flight, the candidate U-space service provider for Italy, and it's ready for EU Regulation 2021/664, which will enter into force on the next 23rd of January.



Compact and easy to install

Can be installed even on small drones and does not require configuration to be used.

Tracking on d-flight

Location, speed, and height in real-time are all available to nearby operators.

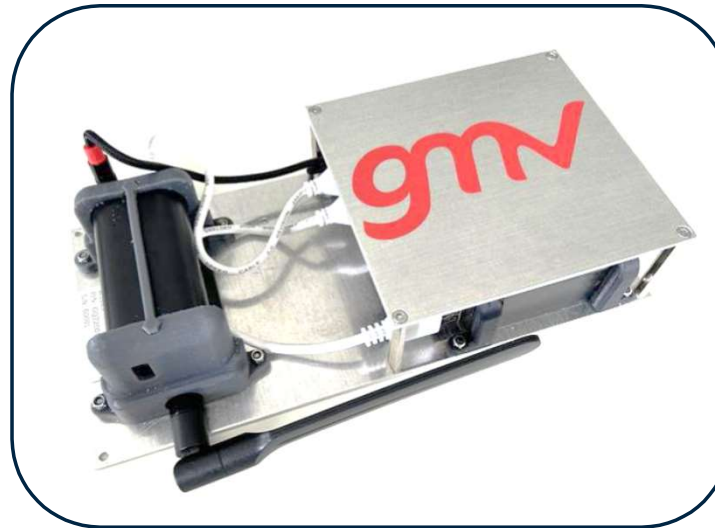


magicUT OSNMA GNSS receiver



Authentication
with OSNMA

Protection Levels
with IBPL



Multifrequency:
L1/E1 + L5/E5a

Multiconstellation:
GPS + GAL

Validation roadmap:

Laboratory &
Static Tests

Until 06/2023



Dynamic tests:
Embarked in vessel

Homecoming Homeport
Hamburg 06/2023



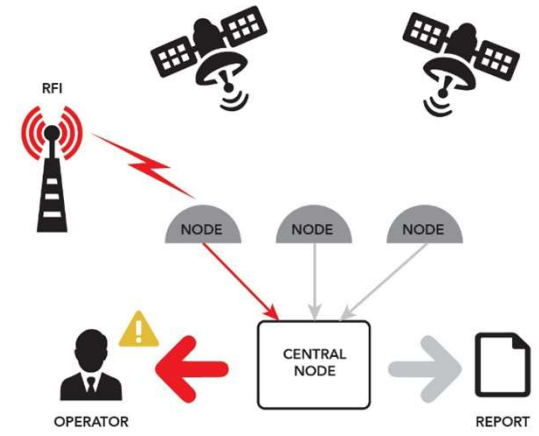
Dynamic tests:
On-board UAS

Valencia - 10/2023



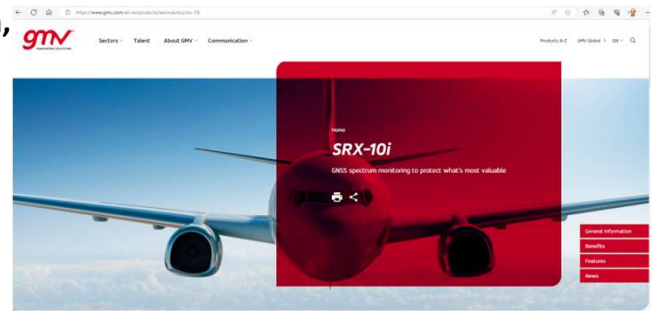
DINTEL/srx-10i: real-time dual-band GNSS interference detection system

- RF front-end with **dual-band** (e.g., GPS L1 + GPS L5) monitoring capabilities
- **Real-time** interference **detection, alert triggering** and **reporting**
- Different deployment **options**:
 - **Standalone** remote node with API for custom client needs
 - Complete **Central Acquisition Facility** (web panel) + **remote node(s)**
 - PASSport visitors' credentials:
 - <https://passport-aes-vm.gmv.com>
 - Username: visitorHPA
 - Password: demoPASSport23



- Proven record of success for **aviation** and **maritime** users
 - Deployed and operating in the **airports** of a **major European ANSP**
 - Tested in **lower Danube** (Romania)

For more information, visit GMV's website





Thank you for
your attention!

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