

Agenda

- 14h: Présentation du projet PASSport (Anglais)
 - Welcome (M. Nisi, S. Rumin)
 - HAROPA port (M. Lorient)
 - The OSNMA service (P. Haro)
 - Copernicus service (F. Raspini)
 - PASSport solution (M. Nisi)
 - DEMO presentation
- 14h45: Démonstration Live
- 15h45: Questions
- 16h: Clôture

PASSPORT





PASSPORT



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

HAROPA, Sept 14th 2023

Agenda

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

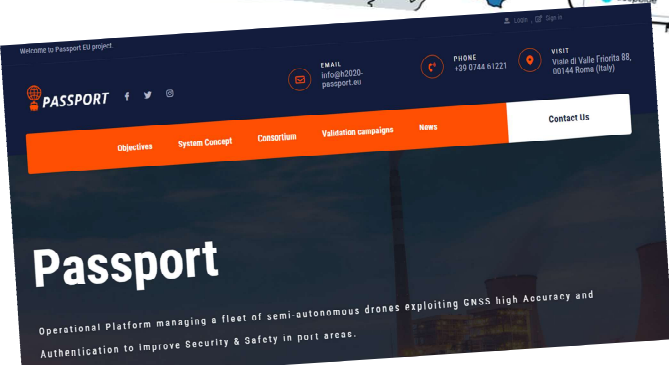
PASSport

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

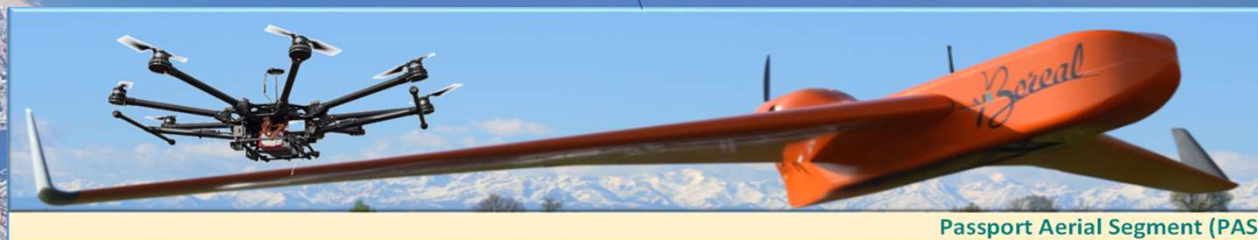
Copernicus



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)

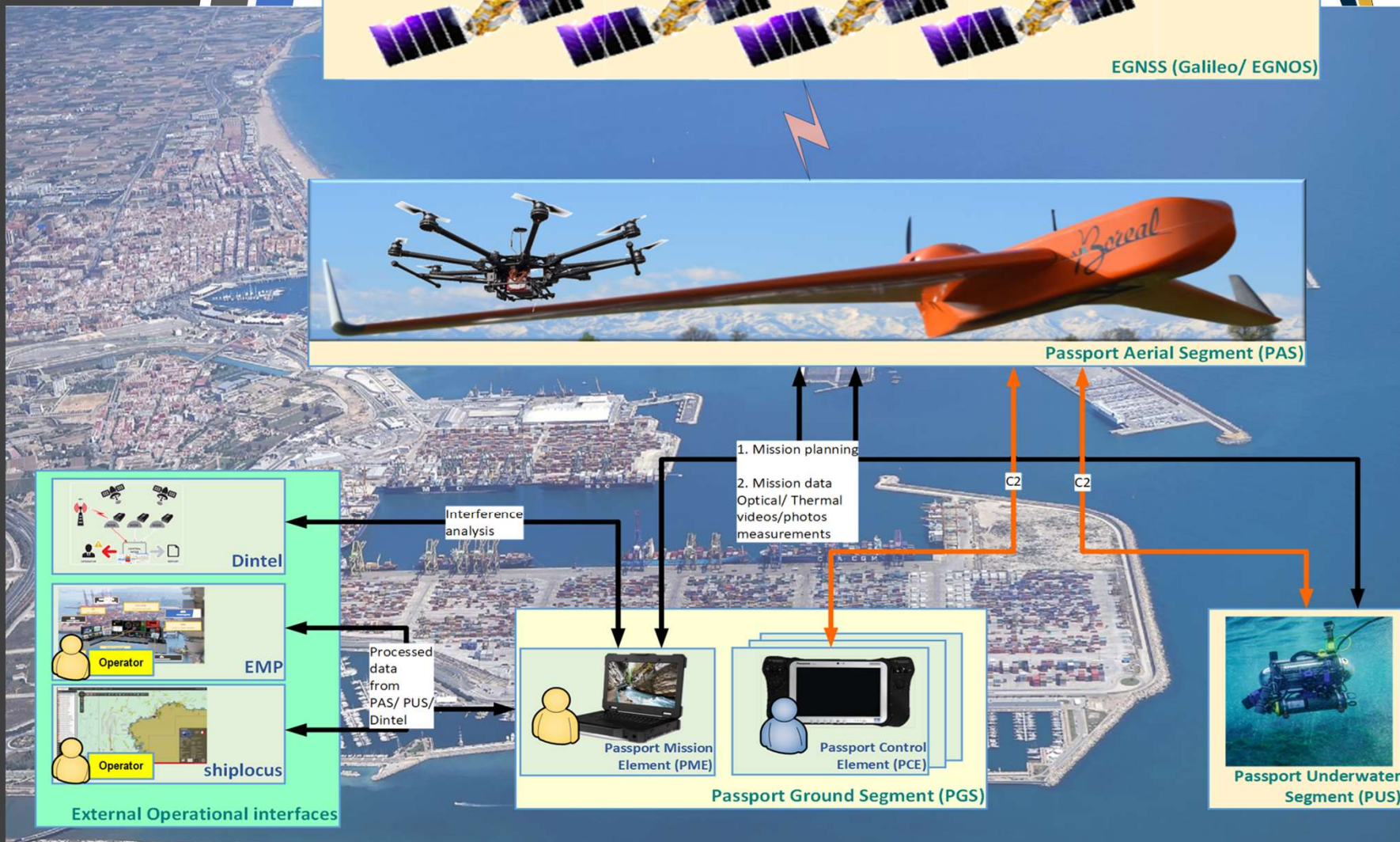
- 1. Mission planning
- 2. Mission data
Optical/ Thermal
videos/photos
measurements

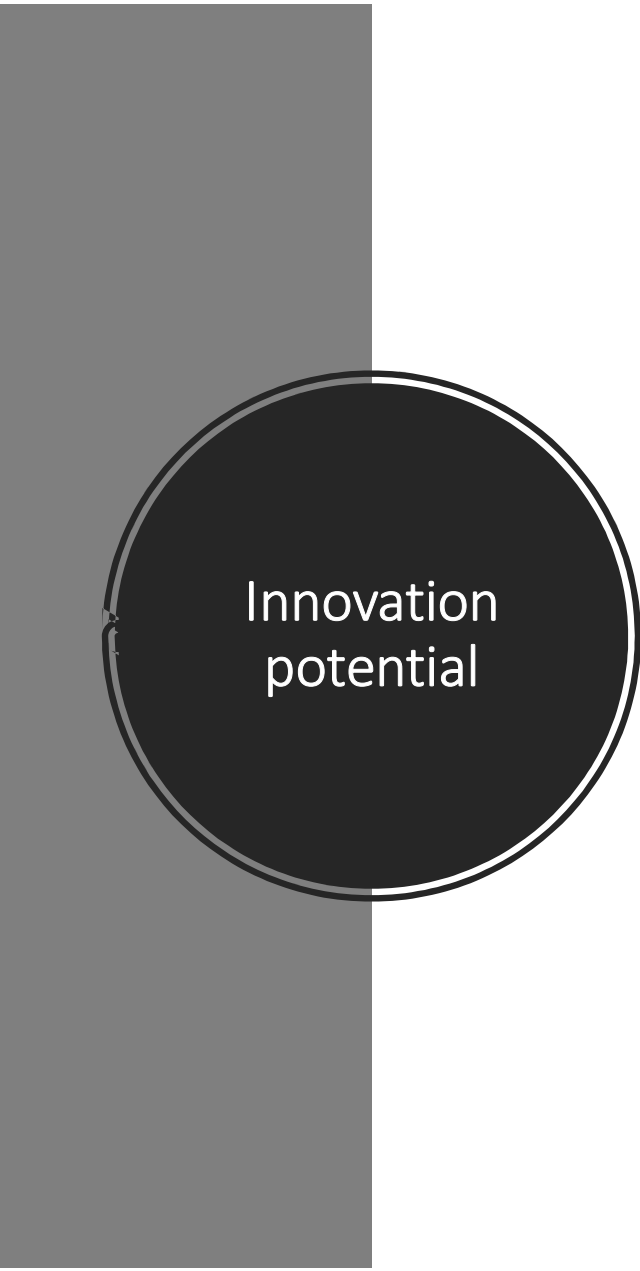
Interference analysis

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:**

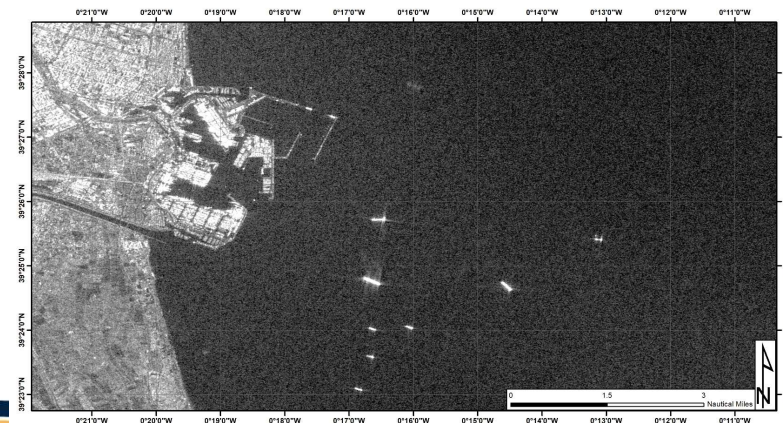
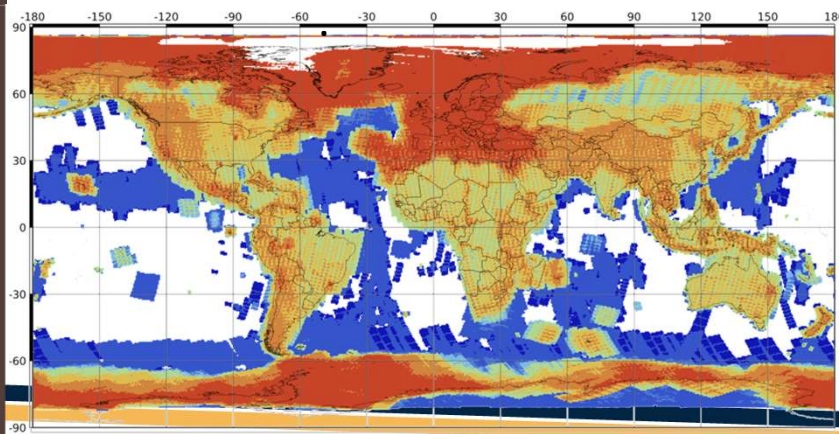
Sentinel-1 data for the assessment of the major winds within Ravenna and Le Havre port areas.

- **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)



- **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.


Mixed Reality
device for
drones
performed
mission

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
228 followers
7h · 🌐

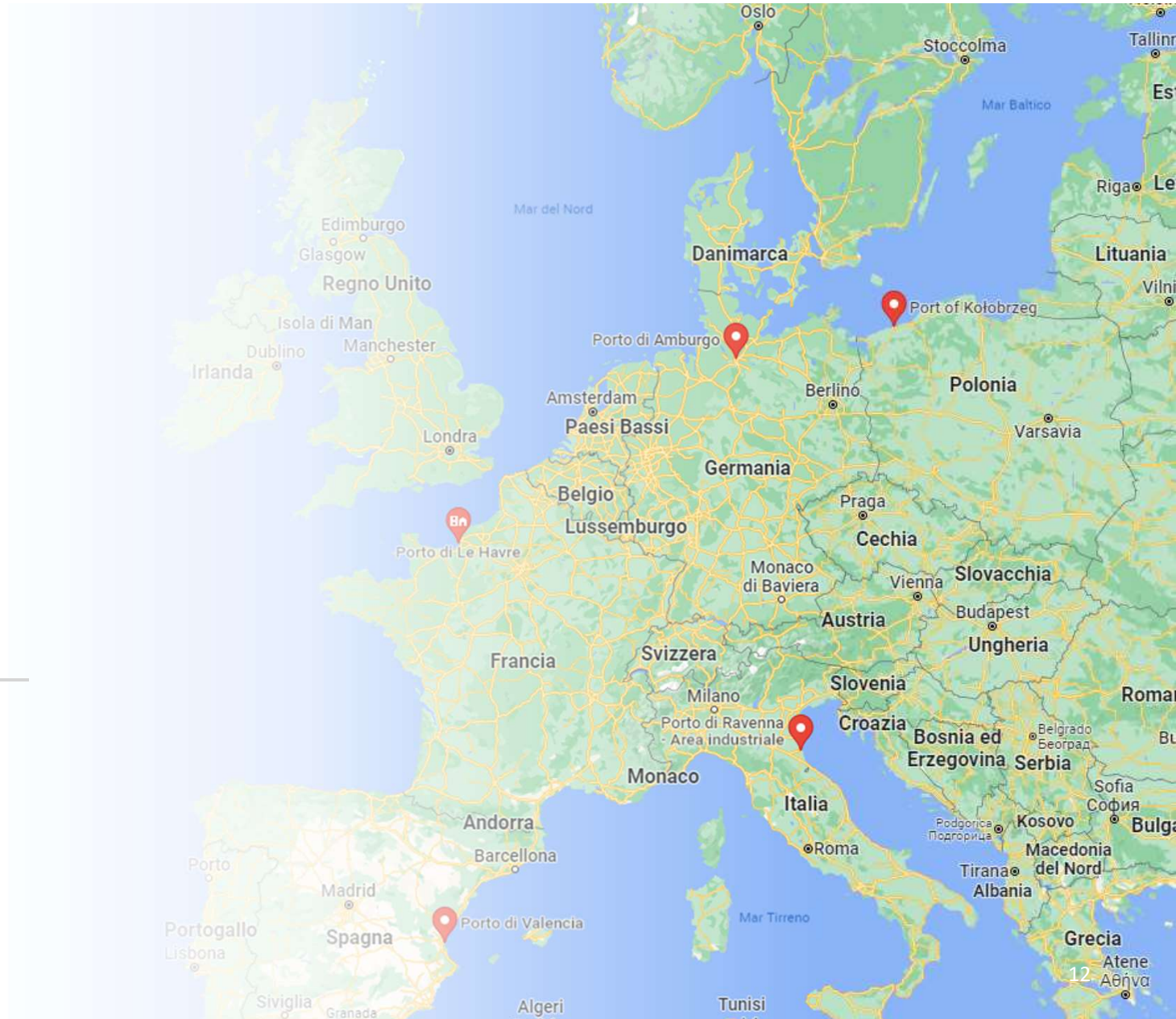
The H2020-PASSport Project has been presented the International Association of Ports and Harbours (IAPH) Sustainability Award in the category Digitalization. BM Bergmann-Marine is one of the partner in the project and as associated member of IAPH we could convince our partners for BM to submit it to 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

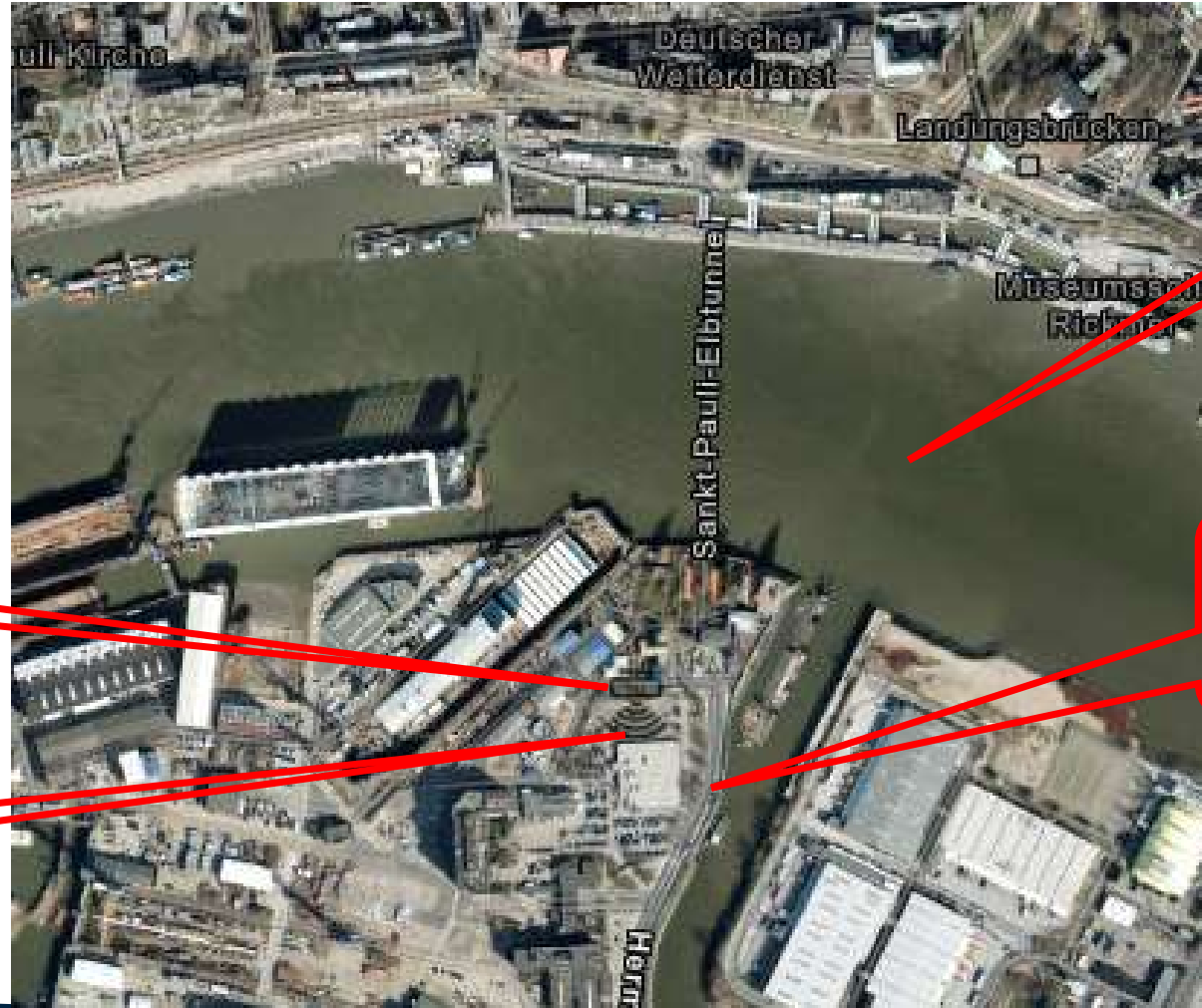


PASSport use cases and validation campaigns



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)

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)

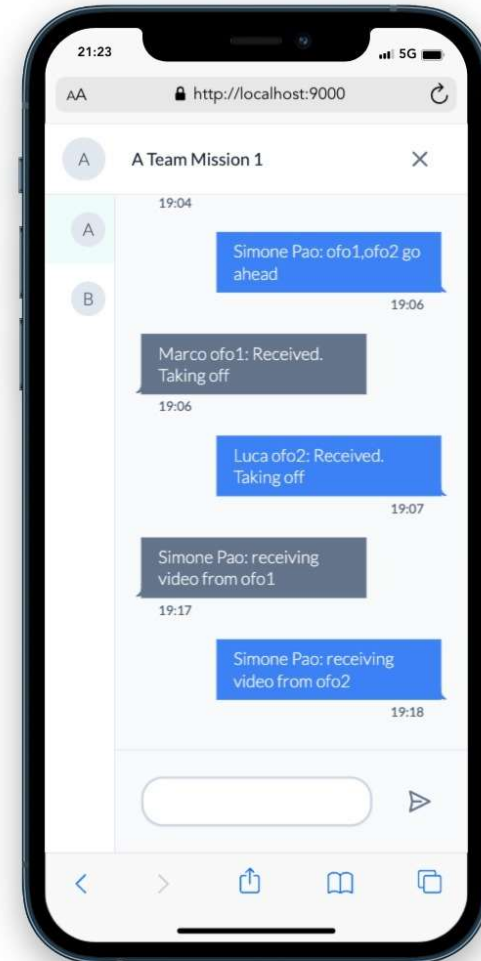
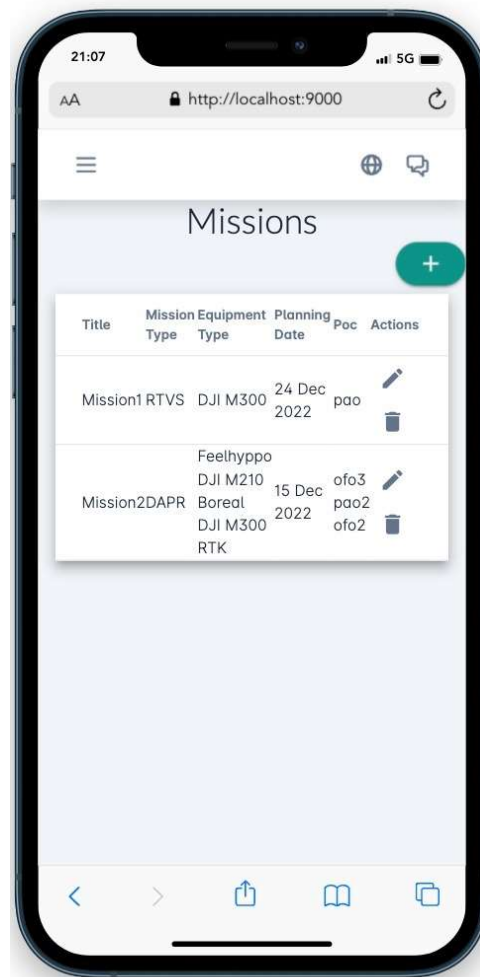
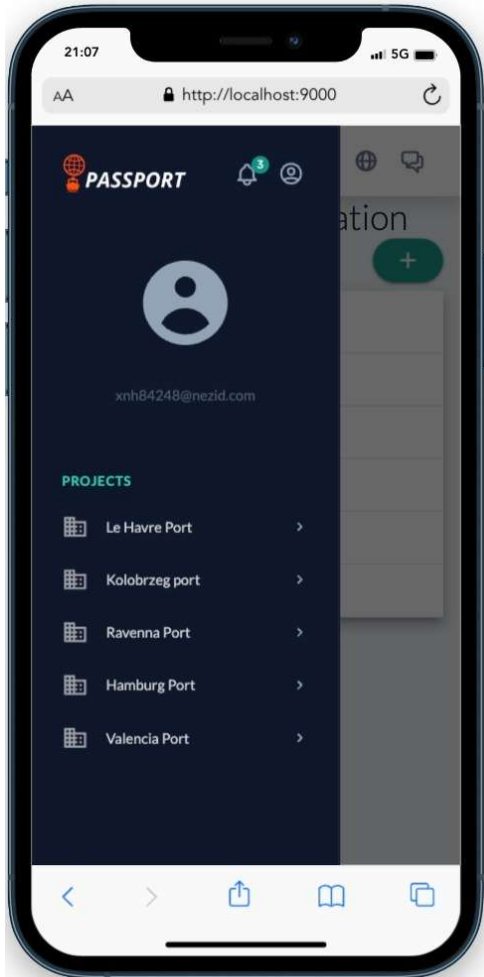
- Nodes Configuration
- Video Streaming and Processing
- Home
- Archive
- View

Navigation Pane:

- System Configuration
- User management
- 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)



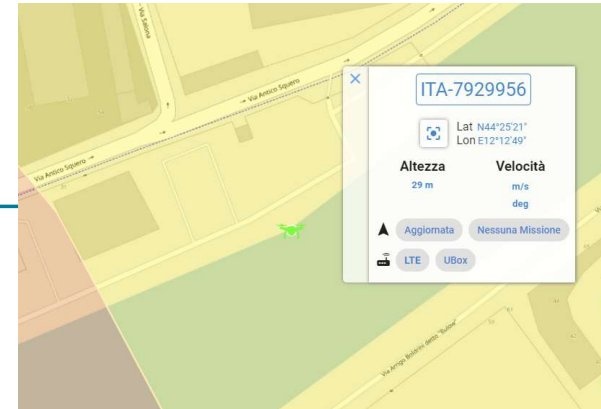
The PASSport platform: On field operator (OFO)



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.

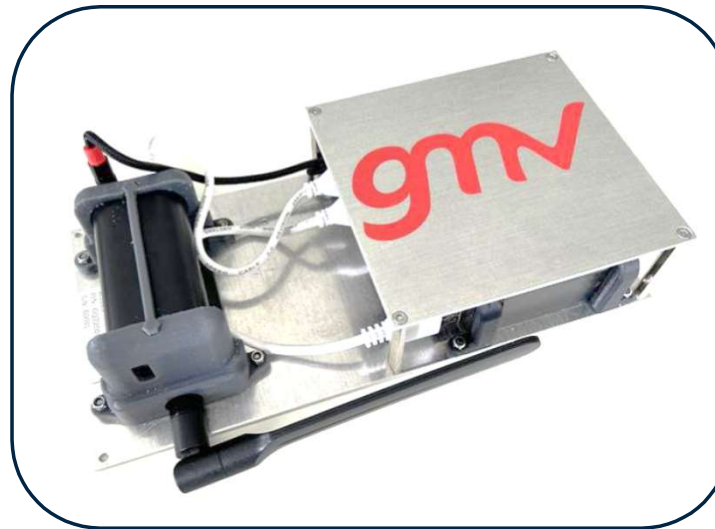


magicUT OSNMA GNSS receiver



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



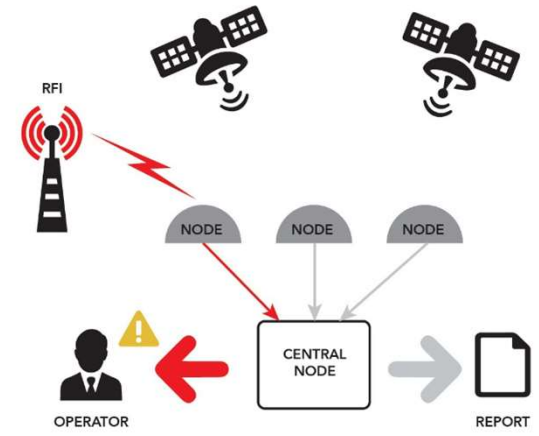
Dynamic tests:
On-board UAS

Valencia - 10/2023



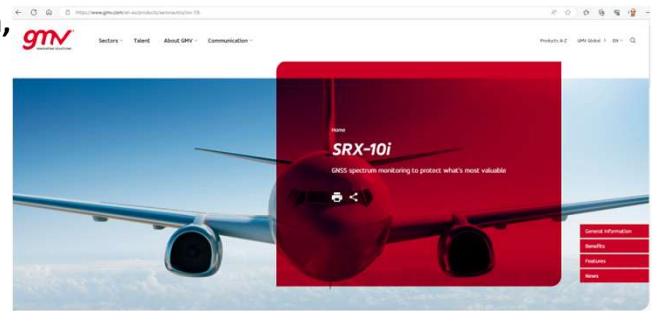
DINTEL/srx-10i: real-time dual-band GNSS interference detection system

- 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!

marco.nisi@grupposistemica.it



HAROPA PORT

Le Havre
Rouen
Paris

Connection makers

 [in](#)    #HAROPA PORT

HAROPA PORT

France's leading port

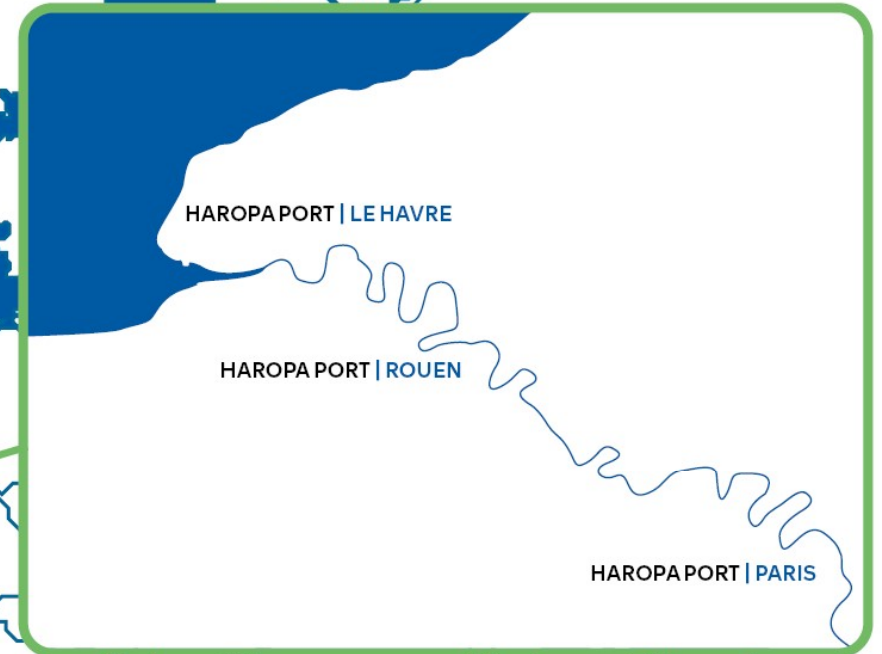


A CONNECTED market offering

#Maritime

#Fluviale – River

#Foncière – Real Estate





Le Havre

A gateway seaport and port of call for the world's biggest container ships

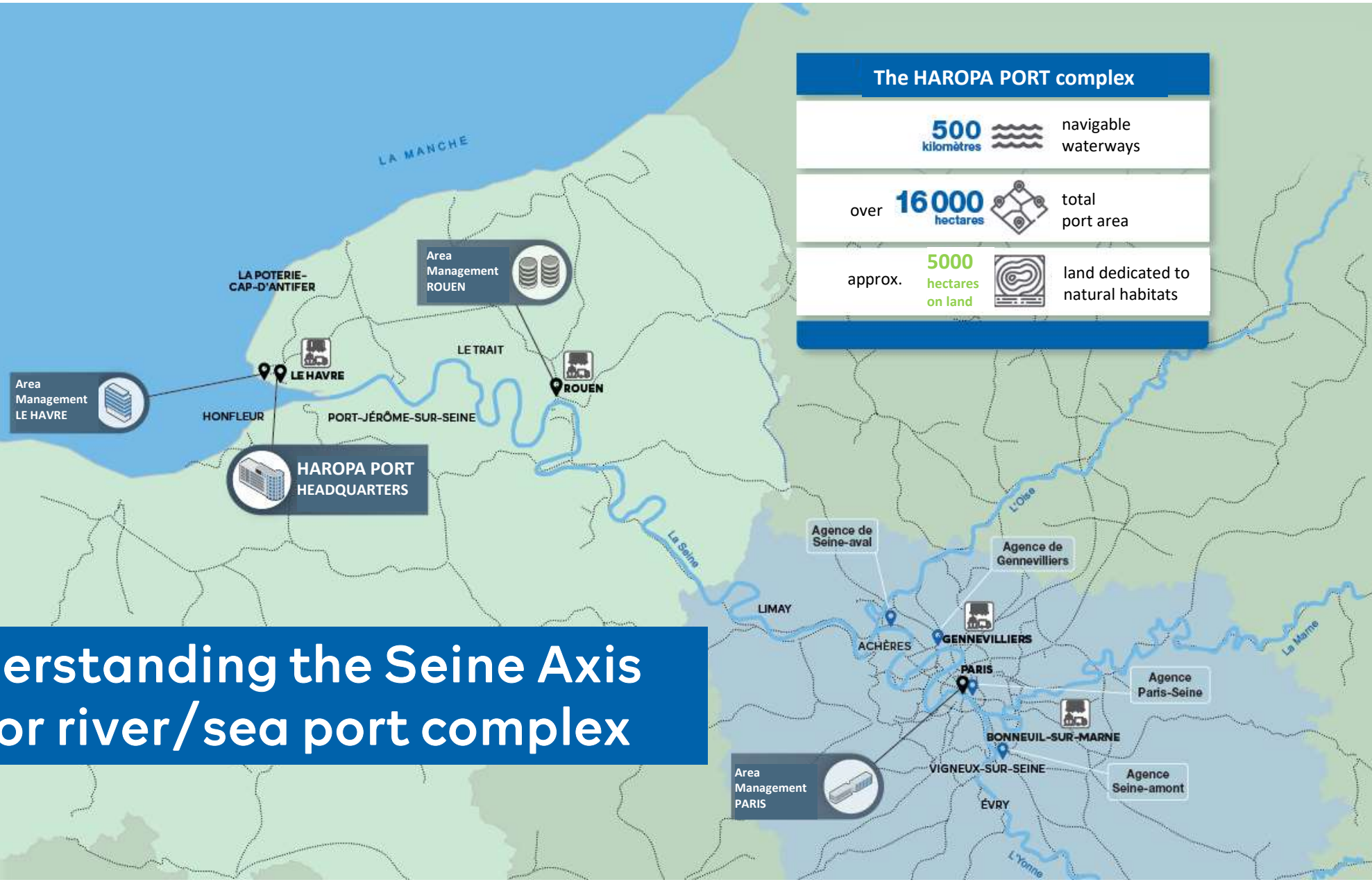
Rouen

The leading West European port for grain and a specialist breakbulk port

Paris

A network of 70 urban ports and the springboard for last kilometer logistics

Understanding the Seine Axis major river/sea port complex

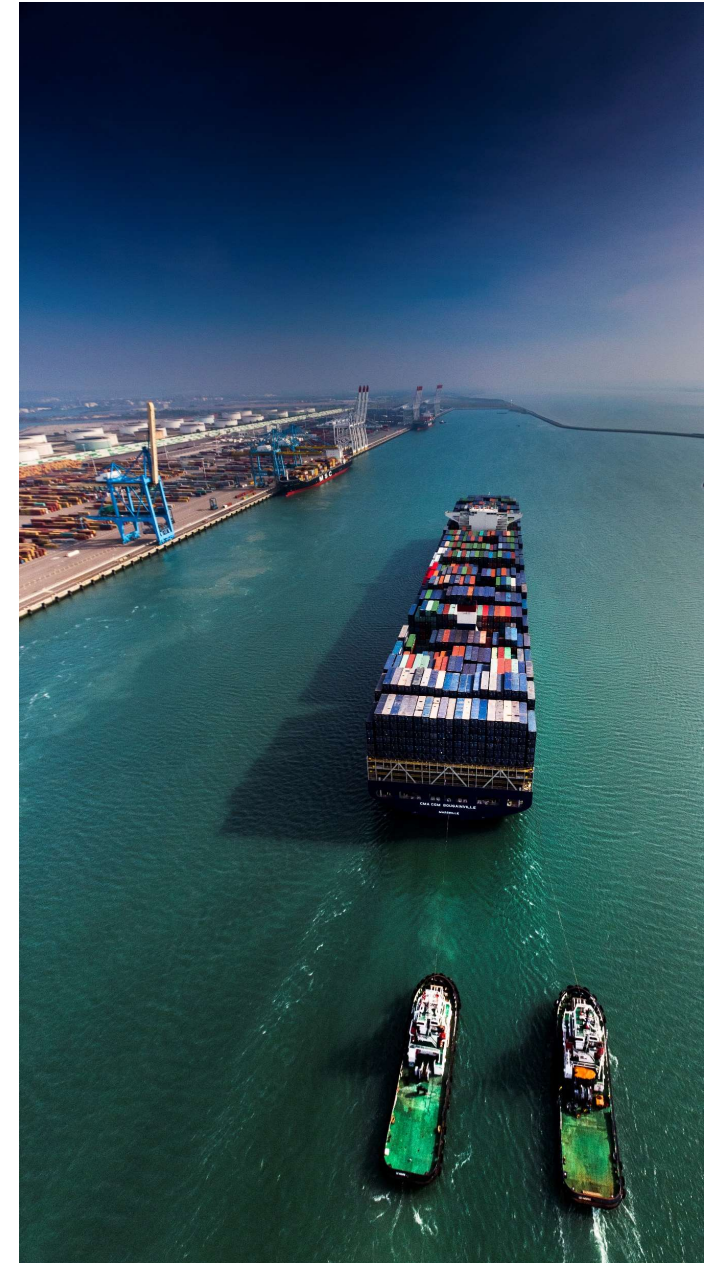
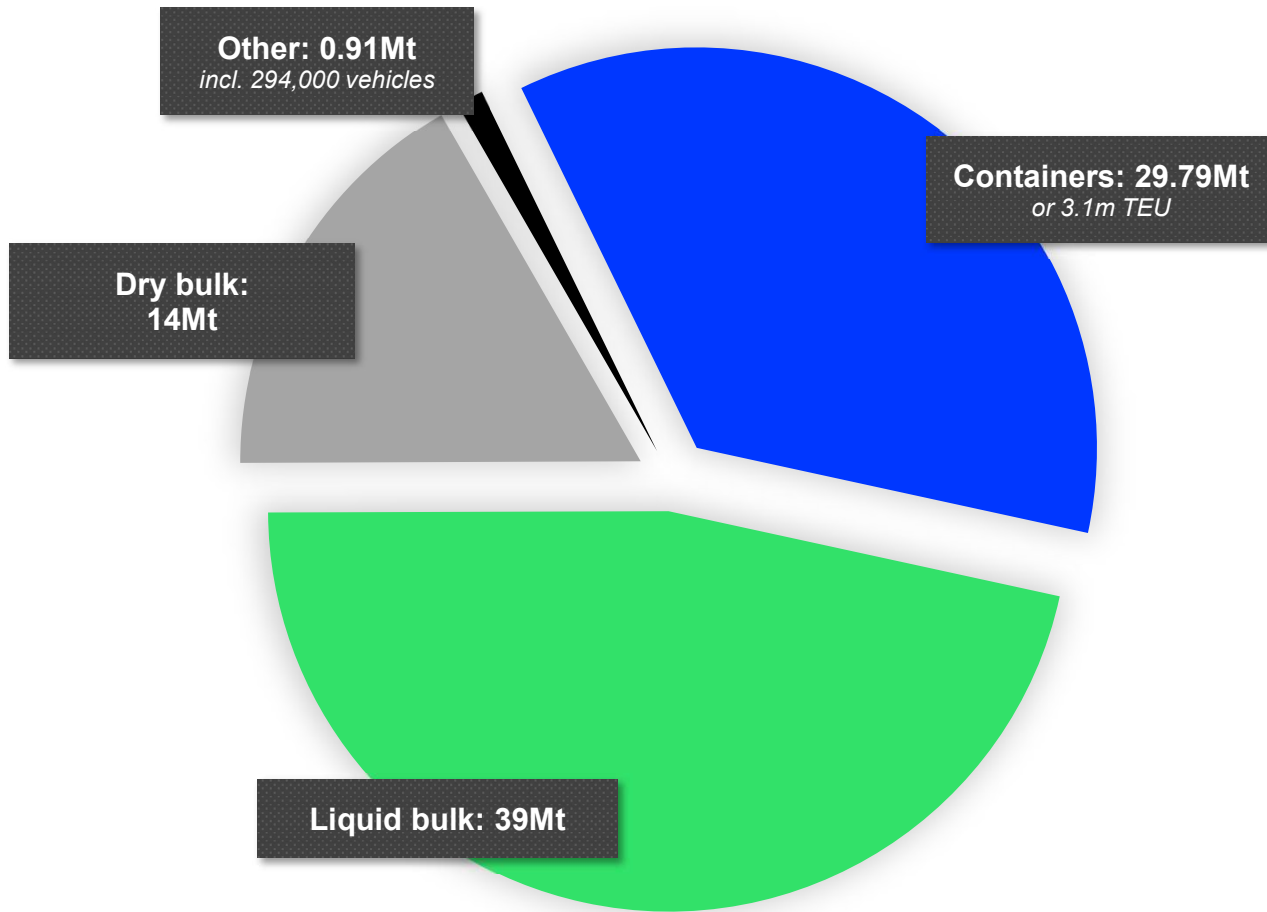


The HAROPA PORT complex

- 500 kilometres navigable waterways
- over 16 000 hectares total port area
- approx. 5 000 hectares on land land dedicated to natural habitats

Key statistics for 2021

Total maritime traffic | 83.6Mt



HAROPA PORT

POSITIONING

- **No. 4 port** in Northern Europe
- **No. 1 French port** for foreign trade
- **No. 1 European river port** for passenger transport

TRAFFIC**

- **83.6Mt** maritime traffic
- **30.9Mt** river traffic
- **3.1M TEU**
- **52.7Mt** dry and liquid bulk traffic

ATTRACTIVENESS

- **€7.3bn*** generated income
- **160,000*** associated jobs
- A population catchment area with **25m consumers**:
The **no. 1 consumer market in France** and **no. 2 in Europe**
- **The no. 1 logistics region** in Europe

A RIVER/MARITIME COMPLEX

- **Nearly 650 ports of call** worldwide
- **500km** of navigable waterways

LAND/REAL ESTATE

- **Over 16,000 hectares** in total port area
- **2,660 facilities** based on port land
- **Over 2.5m sq. m.** of warehousing in operation
- Around **5,000 hectares** of land dedicated to natural habitats

*INSEE studies 2014 and 2017

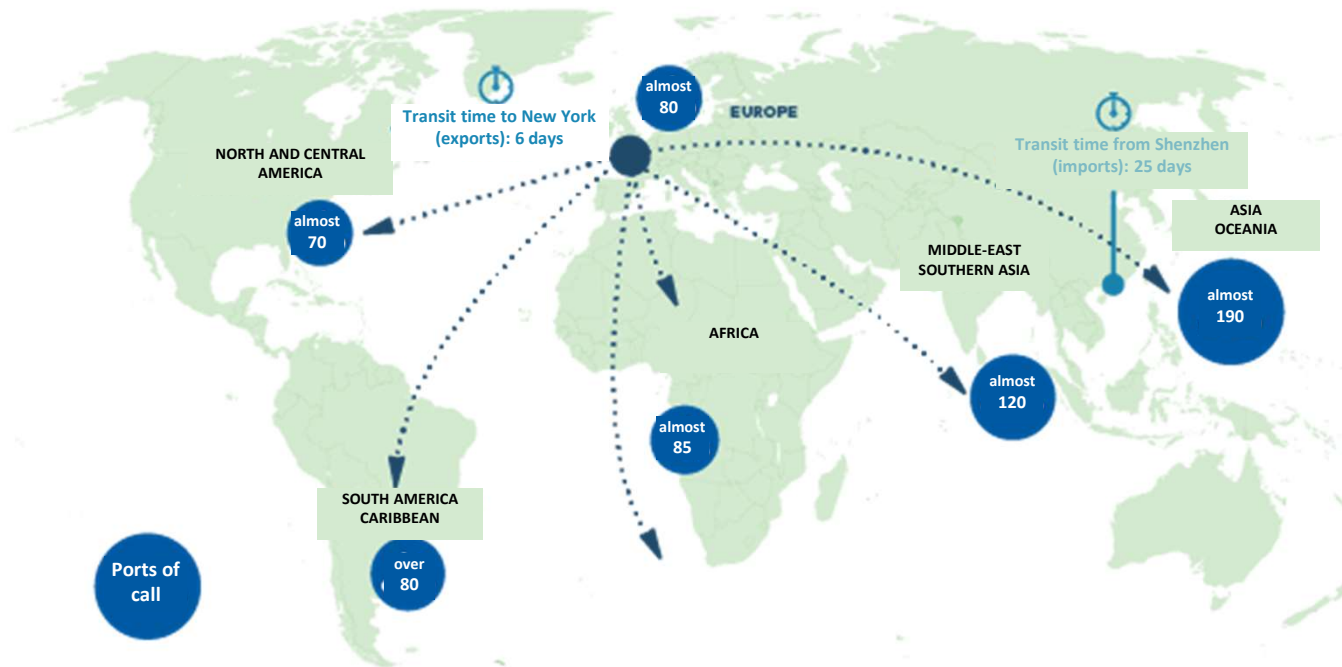
**2019 figure





A maritime offering
IN THE FIRST RANK

A competitive, sustainable logistics system at the gateway to Europe



The first major port of call in Northern Europe for imports and the last for exports

A port free of congestion with deepwater access

Accessible 24/7 with no tidal constraints for the world's largest ships fully loaded (Mégamax-24, new-generation bulk carriers, etc.)

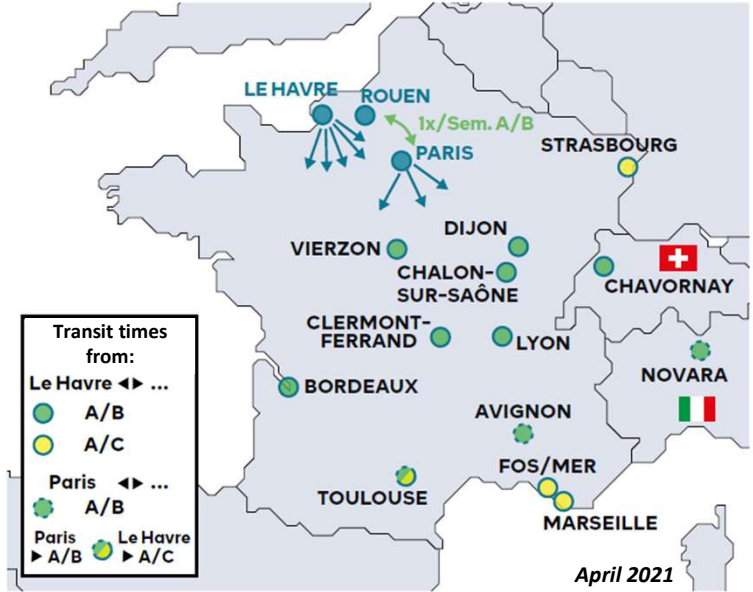
Less than 90 minutes between vessel arrival on the roads and commencement of cargo handling operations (Rotterdam and Antwerp: between 5 and 10 hours)

Presence of the biggest shipping alliances THE Alliance, 2M Alliance, Ocean Alliance

Almost 3,800 commercial propositions and 157 direct connections (ranked as the world's 16th best connected port*)

*2020 ranking by the United Nations Conference on Trade and Development (UNCTAD), based on a sample of over 900 international ports

Serving the hinterland by river and rail





REALESTATE

An attractive and dynamic market offering in Europe

Port real estate summarized in figures

A wide variety of sites

from 5,000 to 175,000 sq. m.:
from vacant lots for construction to turnkey
warehouses and office buildings

over 500 current propositions
on port land

Nearly one million sq. m. of planned warehousing space

on and adjacent to port land along the entire Seine Axis

By 2025: an additional 21% sq. m.

of logistics warehousing offered on port land (1,545,000 sq. m. in 2019,
1,870,000 sq. m. in 2025).



INDUSTRY

A traditionally strategic region



Sustainable, rational reindustrialization protective of resources

The goal of HAROPA PORT is to become the leading center for industrial ecology in France by creating a virtuous ecosystem along the entire Seine Axis, one in which all port-based enterprises operate in synergy:

- sharing resources and infrastructure
- optimizing flows of materials and energy
- recycling the waste and co-products of some to supply the needs of others



DRONE ACTIVITY

An emerging topic

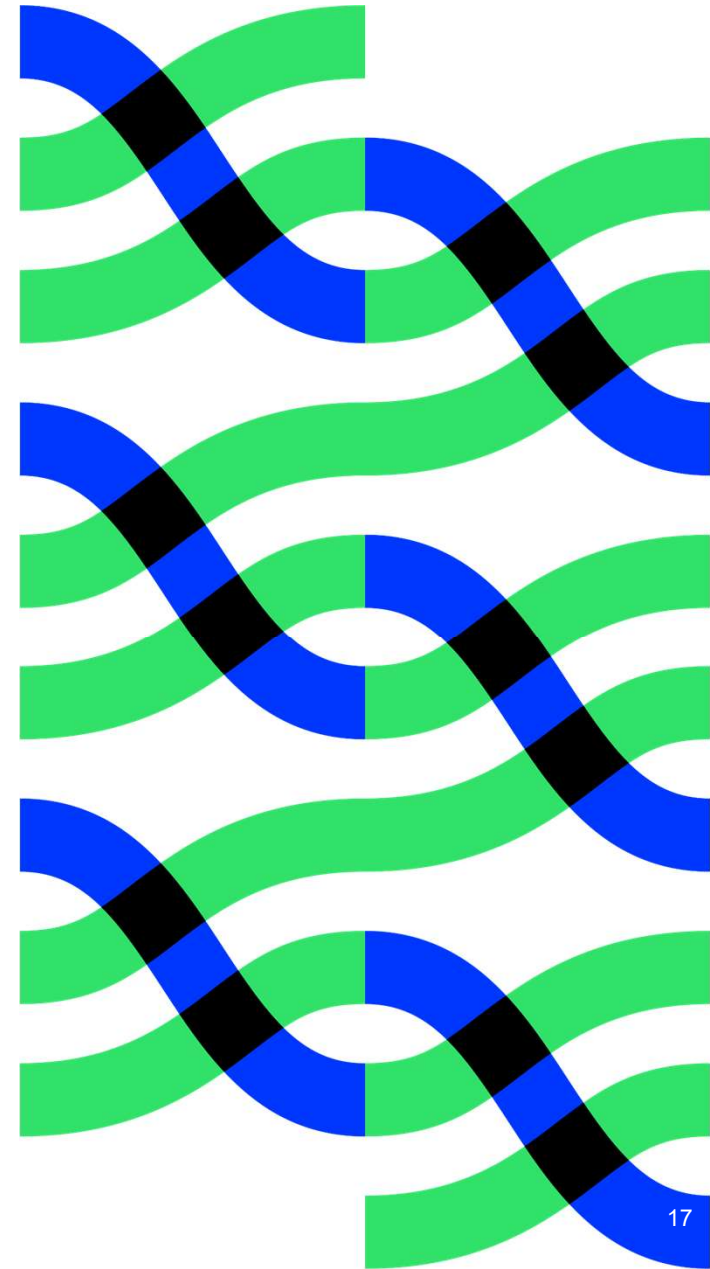


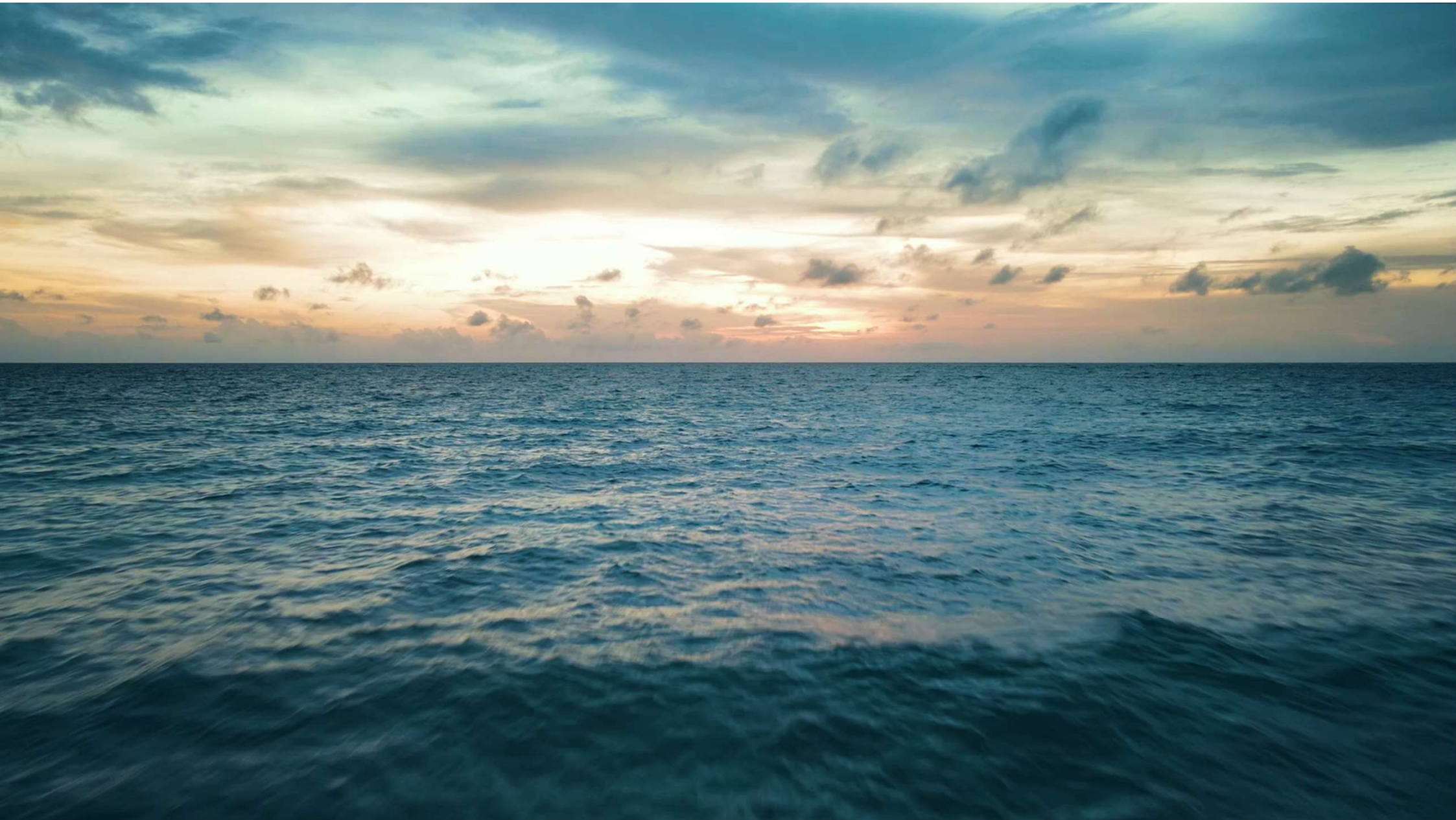
A specific regulation for drone activity



Scenarios in security activity

- **Diffuse threat** – General surveillance
- **Specific threat** – Securing ships on approach
- **Potential threat** – Verification
- **Sticky situation** – Decision making







**HAROPA
PORT** Le Havre
Rouen
Paris

Connection makers

www.Haropaport.com

     #HAROPA PORT



PASSport status review – Intro by EUSPA

Pablo Haro, Manuel López, EUSPA

14th September 2023, Le Havre, France



GNSS PVT plays a central role for drone' operations

- position determination for navigation, to fly an intended trajectory within and outside U-space airspace, in all risk categories;
- reporting of positioning for e-identification, geo-awareness and collision avoidance functions;
- mission-specific needs, such as geo-tagged images/data collected with other sensors/payload onboard drones.

EGNOS/Galileo is already integrated in most commercial receivers for UAS

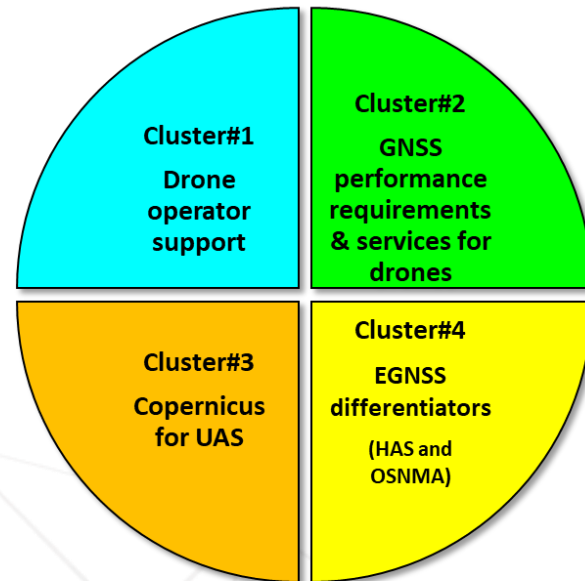
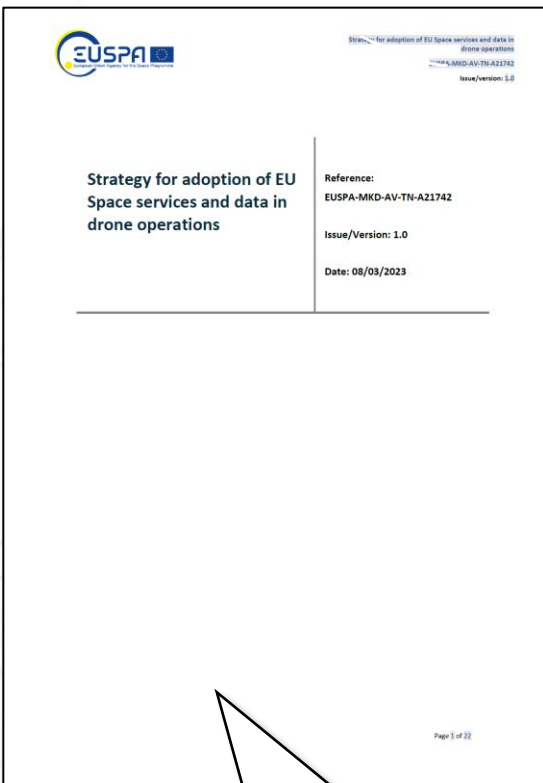
- MCMF GNSS including Galileo open service on E1/E5, with increased performances and robustness;
- EGNOS enabling improved positioning accuracy and reliability thanks to the integrity feature;
- Galileo High Accuracy Service (HAS) on E6, enabling new opportunities for navigation solutions with higher accuracy;
- position's authentication with Galileo's Open Service Navigation Message Authentication (OSNMA) will further strengthen the system resilience against spoofing events.

EUSPA strategy on Space for UAS & EC's Drone Strategy 2.0



“Strategy for adoption of EU Space services and data in drone operations”, March 2023

‘Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Eco-System in Europe’, Nov 2022



Considers relevant OSNMA use cases.



- Objective A1 ‘Improving airspace capabilities’**
 - [...] leveraging services and data of the EU Space programmes (EGNOS, Galileo, Copernicus and Secure Connectivity)
 - [...] synergies with the EU Space Programme will be further explored ... to support resilient and robust drone navigation.
- Objective B2 ‘Identifying strategic technology building blocks and technology enablers’**
 - key underlying technology enablers such as [...] EU space services
- Objective B5 ‘Increasing counter-drone capabilities and system resilience’**
 - leverage resilient navigation enabled by EU space services
 - Drones could be eligible for a voluntary “European Trusted Drone” label.

The Galileo OSNMA service can support robust and resilient navigation and positioning.

User Consultation Platform 2022 – Aviation and Drones



EU SPACE WEEK 2022
#EUSpace

Aviation and Drones Panel
Results Summary

User Consultation Platform 2022: Plenary Session
Jaime del Molino, IATA & Thomas Markert, FlyingBasket
04 October, Prague

2023

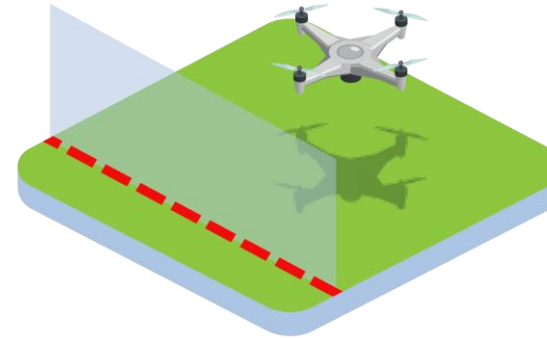
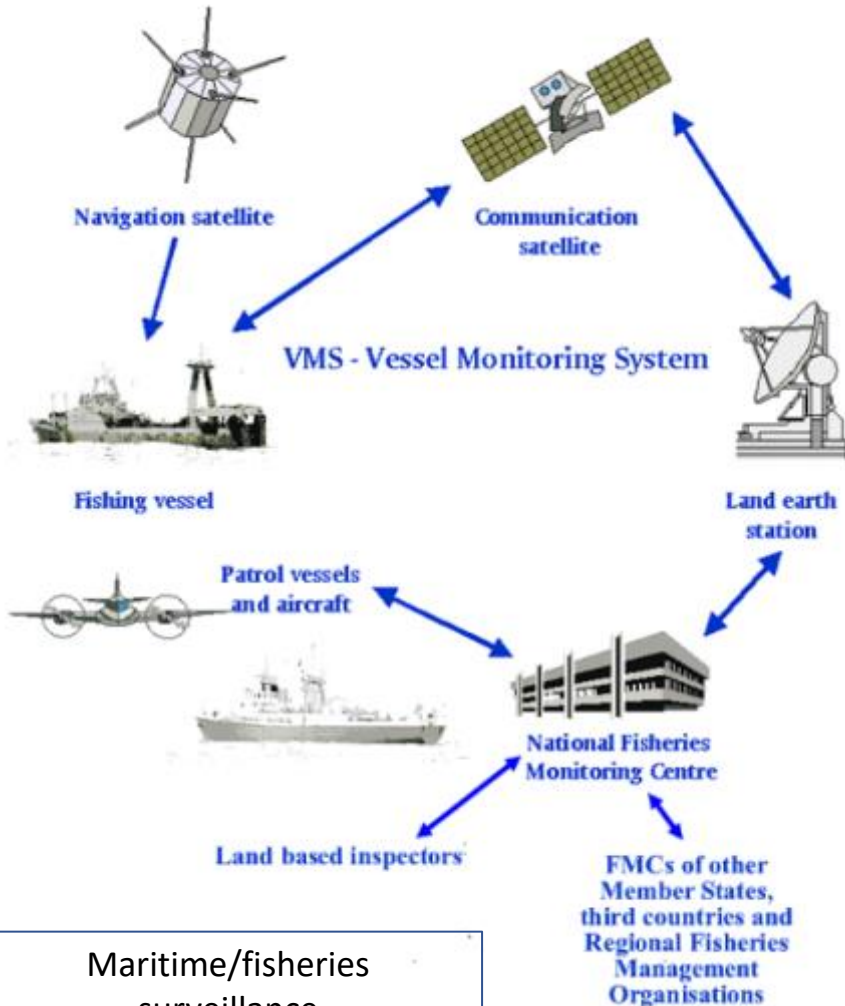
**Report on
Aviation
and Drones**

User Needs and Requirements

#EUSpace

https://www.euspa.europa.eu/sites/default/files/report_on_aviation_and_drones_user_needs_and_requirements.pdf

Galileo OSNMA provides additional trust in drone position reporting: use cases



Airspace Infringement / E-Conspicuity



Last mile delivery

Some OSNMA use cases:

- 4D authentication of image's position and time; legal value highlighted by EFCA for fisheries control;
- authentication of the path for BVLOS operations;
- last mile authentication of position as proof of delivery.

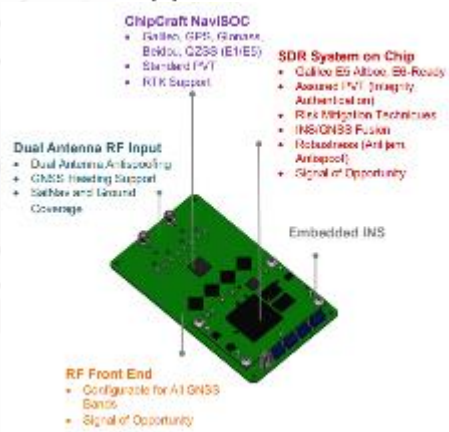
Maritime/fisheries surveillance

DEGREE & GEODESY - prototyping of Galileo OSNMA drone receivers and integration in autopilot

Two projects DEGREE and GEODESY targeting for commercial solution in a box.

Objectives:

- Integrate OSNMA in a receiver suitable for drone operation.
- Define contingency operational procedures in case of authentication failure.
- Contribute to standardization.



Rokubun drone OSNMA & HAS flight demo

BCN Drone Center, 29th March 2023

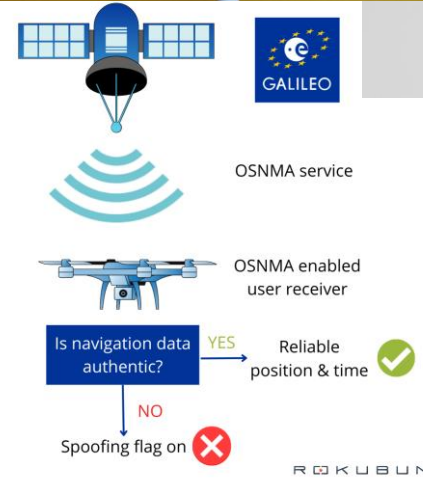
<https://www.rokubun.cat/>



EUSPA ATMOS-8 fixed-wing drone



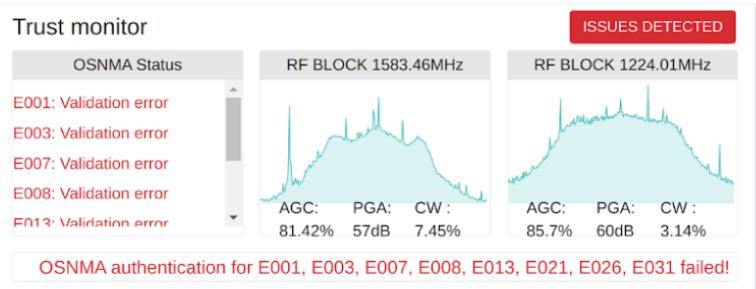
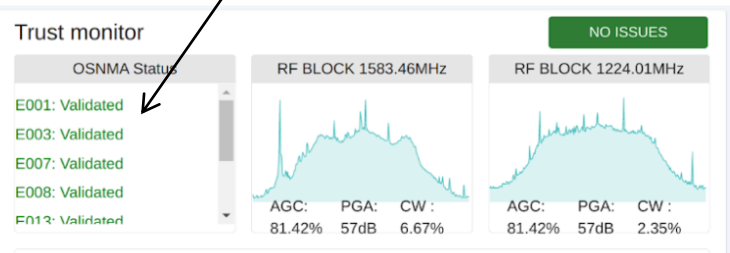
MEDEA GNSS receiver (onboard the drone)



Next steps:

- 'Guidelines for OSNMA position reporting and images timestamping in drones' applications' under consolidation.
- Drone's HAS positioning being derived in post-processing.
- Information to be made available by GSC at the User Space platform.

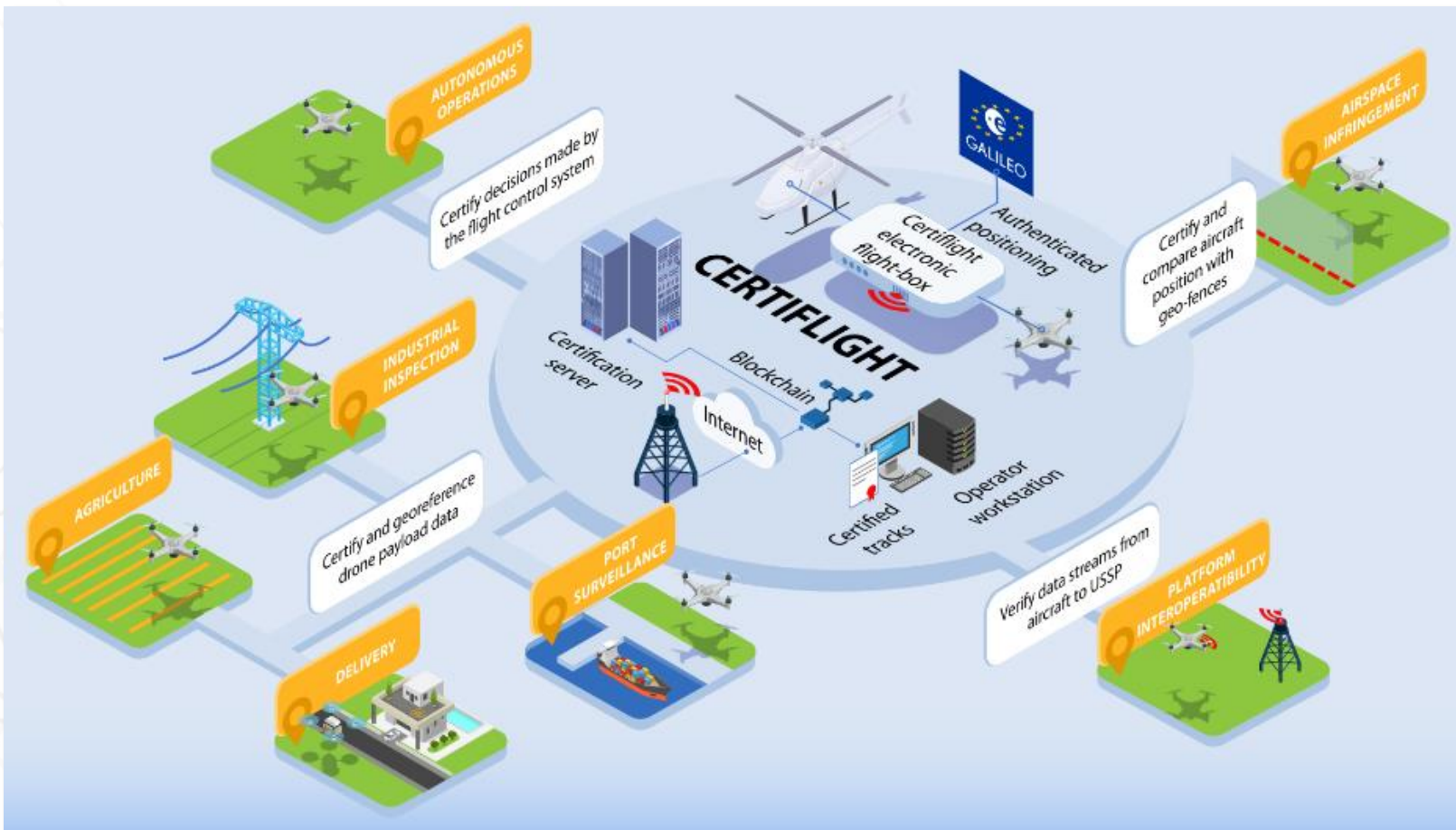
Galileo satellites with authenticated navigation message



Trust monitor of the MEDEA front-end

CERTIFLIGHT- Certified E-GNSS remote tracking of drone and aircraft flights

Galileo OSNMA feature to certify the flight tracks of drones and ultralight aircraft inside VLL airspace.



Objectives:

- Liability chain for UAS operations
- UAS mission data traceability
- Safety enhancement for operations at VLL
- Interoperability with several UTM/U-space platforms

PASSport - Operational Platform managing drones exploiting GNSS high Accuracy and Authentication to improve Security & Safety in port areas



4th Validation campaign, Le Havre, France

Protection against non-cooperative small craft approaching the port areas (security)

- Complementary use of rotary-wing & fixed-wing drones.
- E-GNSS authentication service (OS-NMA) will add a reliable and accurate tracking of drones that allows ensuring and increasing trust of information and videos captured.
- This will globally demonstrate the possibility to use RPAs data to establish some legal records (staying in forbidden areas, dangerous comportments, illegal fishing, etc).





Linking space to user needs

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PASSport Campaign C4

Le Havre (France)

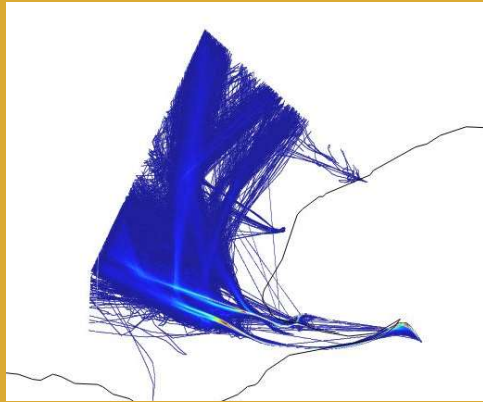
Emilie Miquel – M3S Belgium



Campaign Scenarios

Scenario 1

patrolling and general surveillance



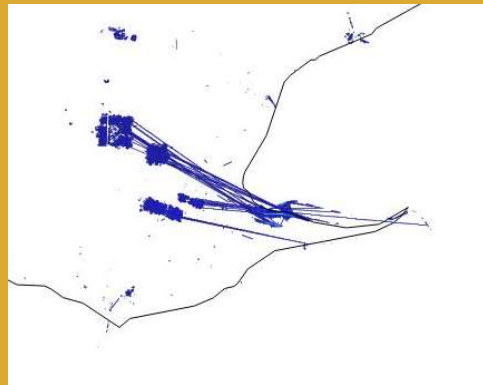
Scenario 2

Surveillance of a specific target



Scenario 3

Securing the boarding of pilot



Scenario 4

securing entrance and exit of the port

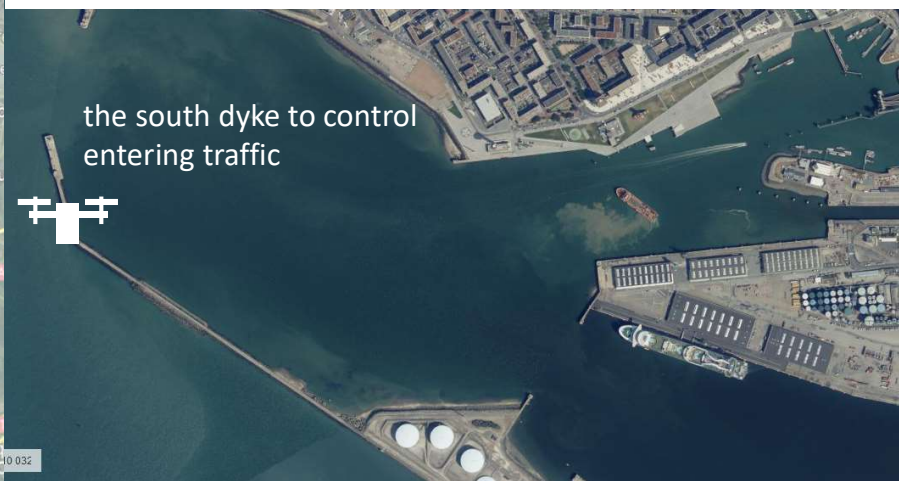


Campaign Setup - Details

Le Havre Historical Port waiting area – fixed wing Drone

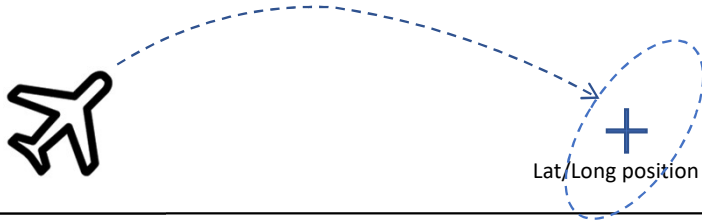


Le Havre Historical Port vicinity – rotary Drone

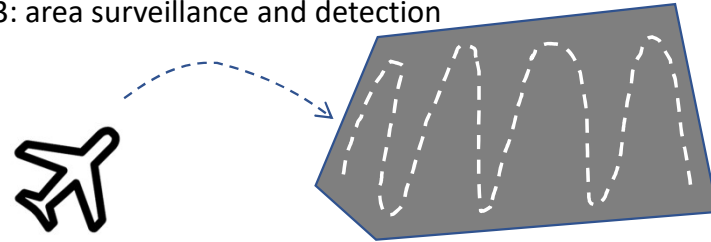


Mission types

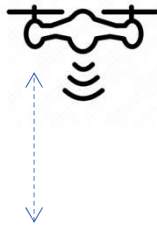
Type 1: target position + follow



Type 3: area surveillance and detection



Type 2: third eye



Combination of multiple source of information

+

Image treatment

+

Single coordination tool



Demo Scenario

- 14h: Port Operator requests mission
- 14h15: Boreal take off to be on area + confirms take off via PGS
- 14h45: Boreal arrive at area and enters waiting pattern + inform Port operator via PGS
- 14h45: Gendarmerie Vessel in area
- 15h: Port controller requests first mission via PGS (follow ship, detect boat, ...)
- 15h20: Boreal returns home



An integrated solution for the port Authorities

