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# SAFESHORE PROJECT OVERVIEW

Geert De Cubber



SafeShore – ALFA Workshop,  
04/12/2018, Brussels, Belgium

# Why? H2020 Call BES-02-2015 Maritime Border Security

*Topic 2: Affordable and easily deployable technologies for EU coastal border surveillance with reduced impact on the environment*

## Specific challenge

- The use of **low cost and “green” technologies** is expected to become mandatory for future border control systems in environmentally sensitive areas. Passive systems fit this application, due to **electromagnetic invisibility, lower detectability** and **cost** and the **possibility of use practically anywhere**.

## Scope

- further development of **devices and sensors for maritime targets and environment** (e.g. fit for mobile platforms) easily deployable on field and with **limited impact on spectrum environment**.
- development of specific, **early identification, tracking and fusion** algorithms
- operation in **network configurations** together with other systems for improved performances

Safeshore Project started on 01 May 2016 – until 31 December 2018



# SafeShore Consortium

Academia Partners	Country	Scope
Royal Military Academy of Belgium	Belgium	Consortium coordinator, passive radio detection
Queen Mary University	UK	Algorithms development
University of Salento	Italy	Requirements analysis

Industry Partners	Country	Scope
Dr. Frucht Systems Ltd.	Israel	Laser detection systems and algorithms
UTI Grup	Romania	Video analytics, data fusion, GIS & C2
TG Drives	Czech Republic	Laser detection systems platform
Optix	Bulgaria	Visible & thermal camera systems

Research Partners	Country	Scope
Institute of Optoelectronics	Romania	Visible & thermal camera systems

End User Partners	Country	Scope
The Protection and Guard Service	Romania	Field trial of the system (Black Sea)
Ministry of Public Security	Israel	Field trial of the system (Mediterranean Sea)
Police Region West Coast	Belgium	Field trial of the system (North Sea)
Romanian Border Police	Romania	Field trial of the system (Black Sea)



# SafeShore Solution Mission / Capabilities

- **Detection of low altitude RPAS** and their remote control equipment involved in unauthorized surveillance and offensive actions (delivery of explosive charges or small projectile attacks), launched from boats, ships or land, in border area harbours, in coast radar locations, at river border crossings and on-board oil platforms and large ships.
- **Detection of small vessels** coming to shore
- **Detection of humans emerging from the sea**



# SafeShore Usage Scenarios

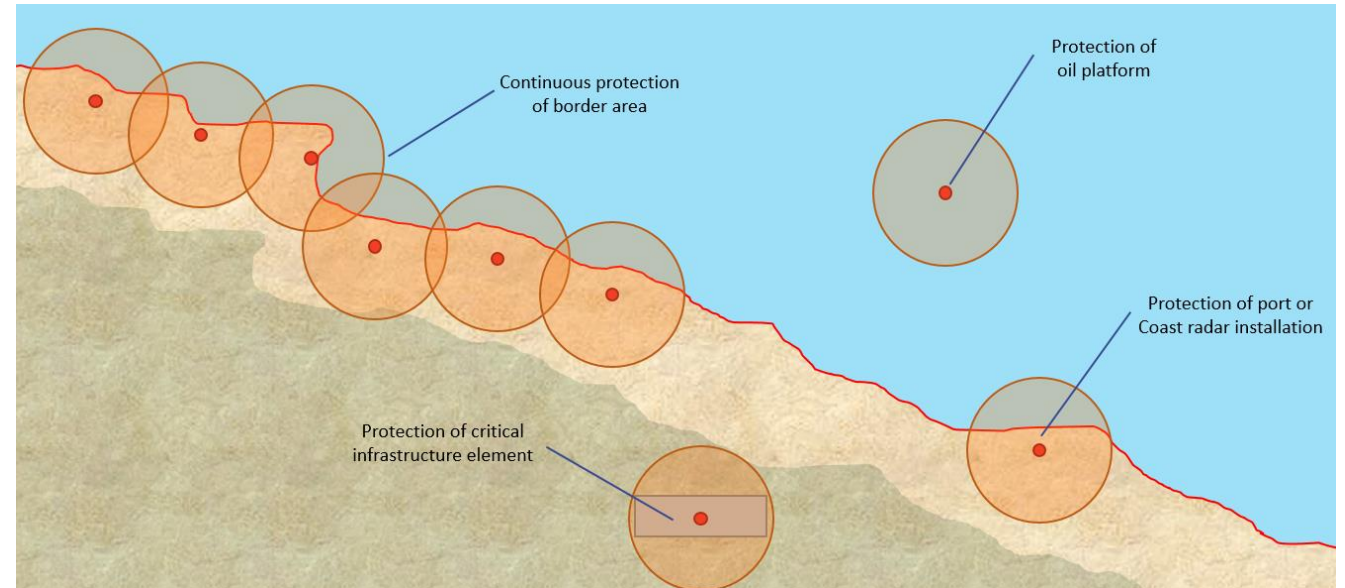
## SafeShore can be used as:

- **stationary detection point**

- in harbour areas, at river border crossing, to detect remote delivery of explosives or chemical weapons, and border trafficking of drugs
- for coast radars, to detect remote delivery of explosive charges

- **stationary chain-of-detectors** along high-risk border areas, to provide long term protection in areas with persistent problems

- **mobile deployable system** in areas where intelligence predicts higher volume of illegal or threatening activities.



# What is the proposed SafeShore solution?

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SafeShore developed a **system integrating multiple commercially available detection technologies** to ensure detection of low-altitude flying RPAS and small boats

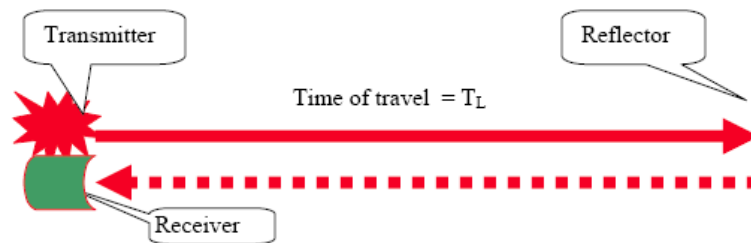
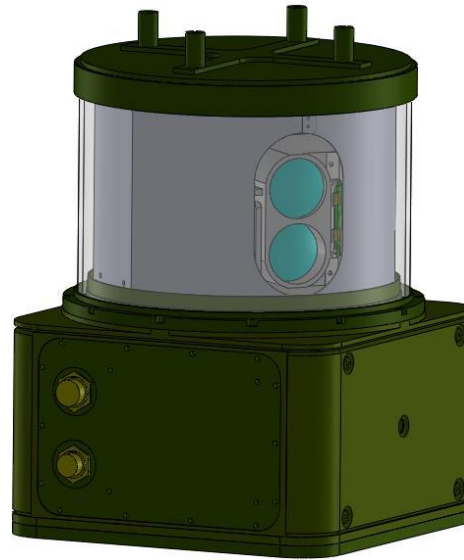
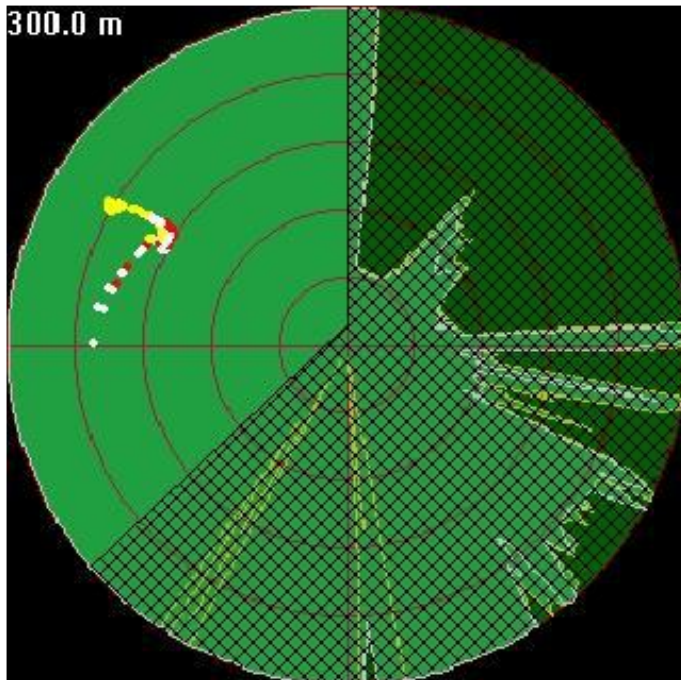
- **Laser ranging (LIDAR) detection** of small RPAS at low altitude, where radars cannot ensure detection due to altitude radar limitation and small radar cross section of the target, and detection of boats and humans emerging from the Sea, using the 2D LIDAR



# LIDAR Technology in SafeShore

## 2D LIDAR

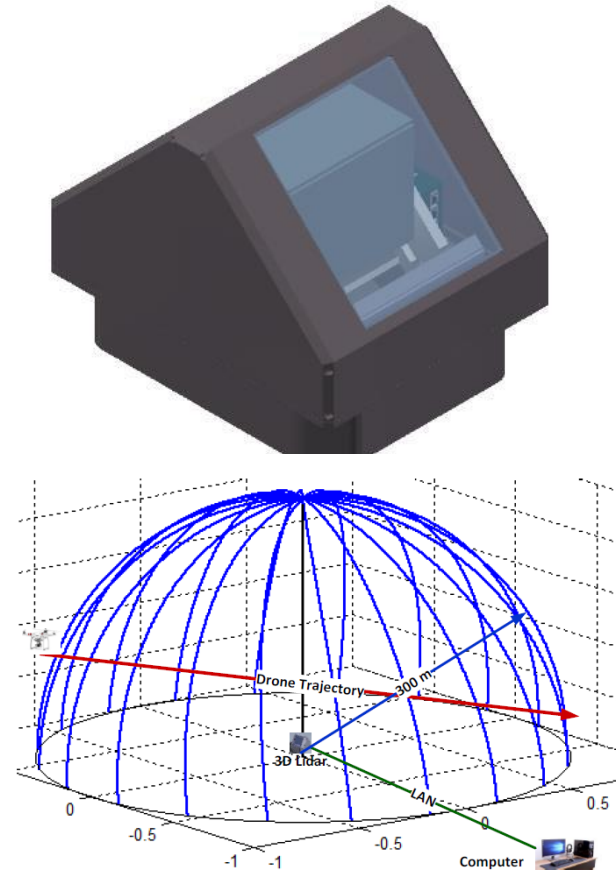
- Detection of targets on the surface (boats, humans)



# LIDAR Technology in SafeShore

## 3D LIDAR

- Detection of targets in the air (RPAS/UAV/drones, birds, helicopters)





# What is the proposed SafeShore solution?

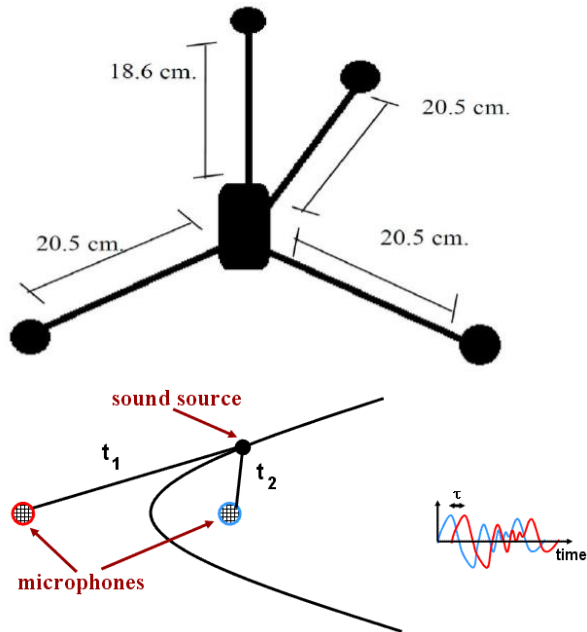
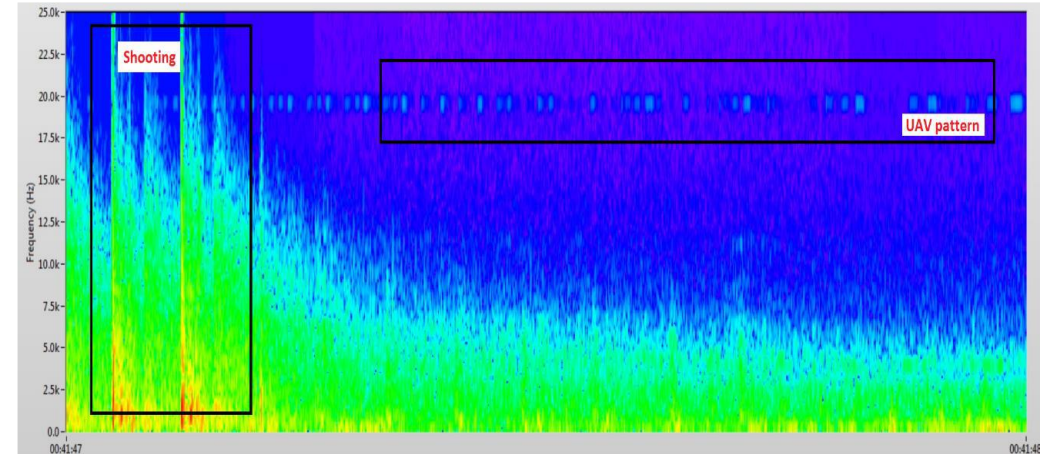
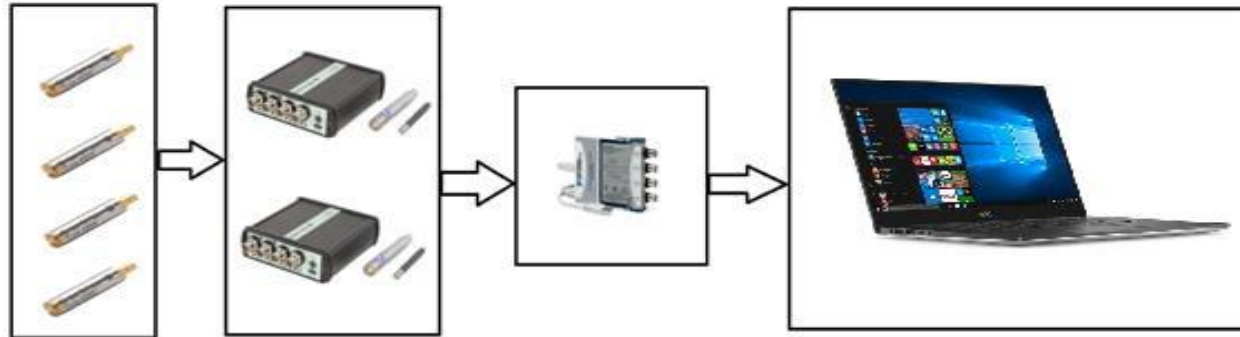
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- **Laser ranging (LIDAR)** detection
- **Passive acoustic detection**, to offer a complementary detection technology that is not affected by the same adverse effects as the laser scanner, and to provide means for acoustic target classification



# Passive Acoustic Technology in SafeShore

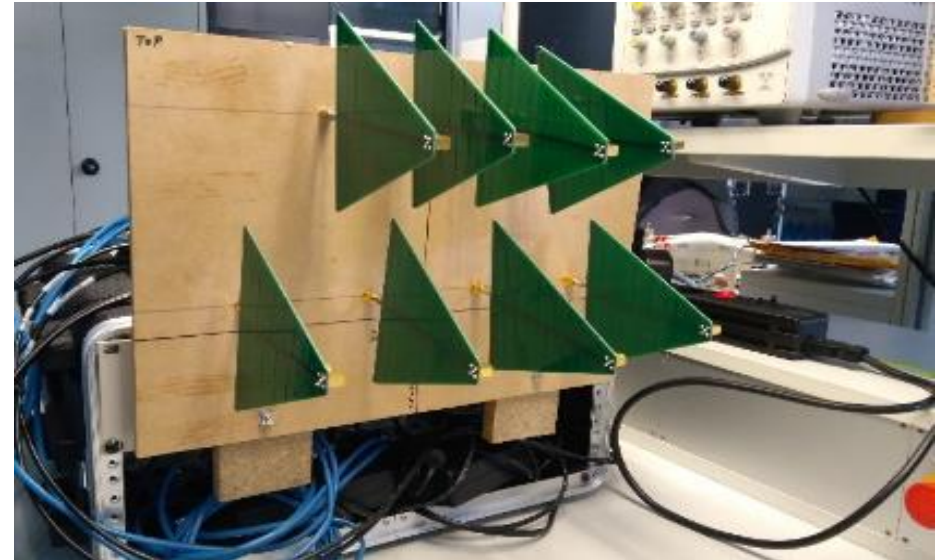


# What is the proposed SafeShore solution?

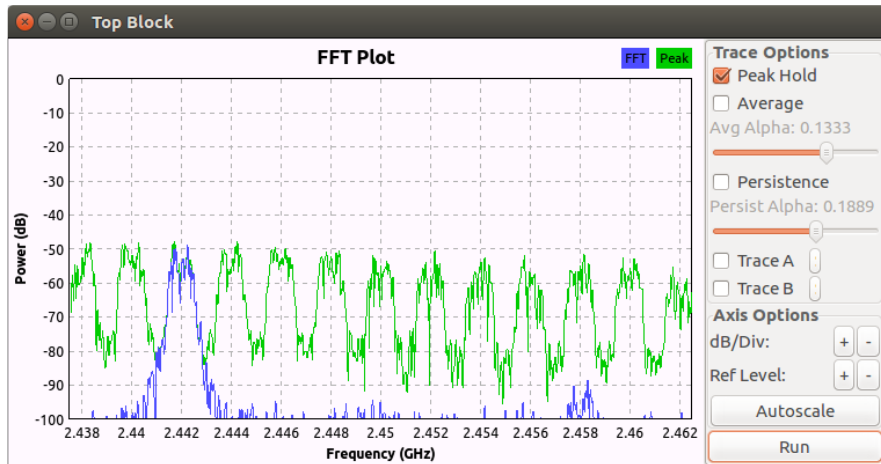
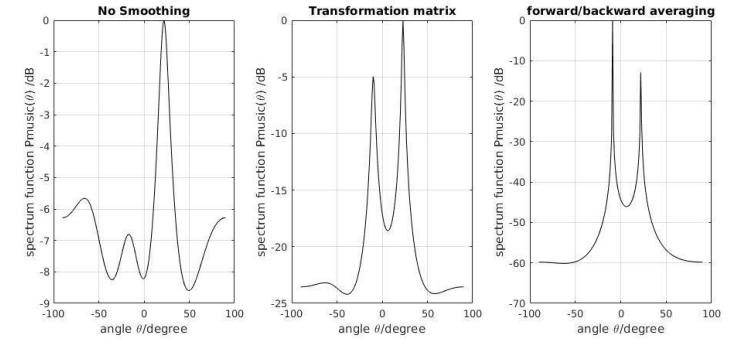
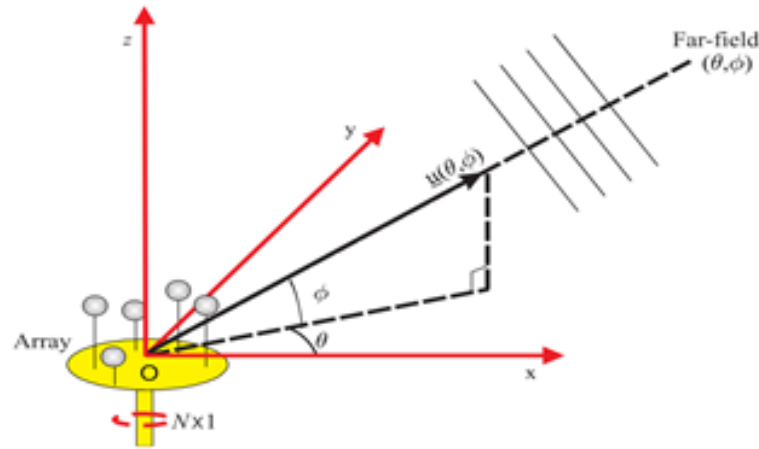
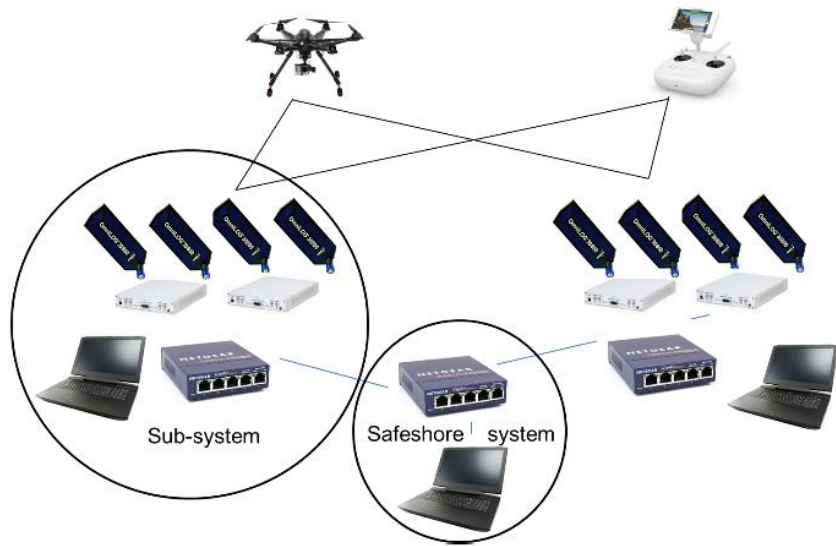
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SafeShore developed a **system integrating multiple commercially available detection technologies** to ensure detection of low-altitude flying RPAS and small boats

- **Laser ranging (LIDAR) detection**
- **Passive acoustic detection**
- **Passive radio communication detection and localization** of remote control stations on sea or land, by passive spectrum monitoring and triangulation



# Passive Radio Technology in SafeShore



# What is the proposed SafeShore solution?

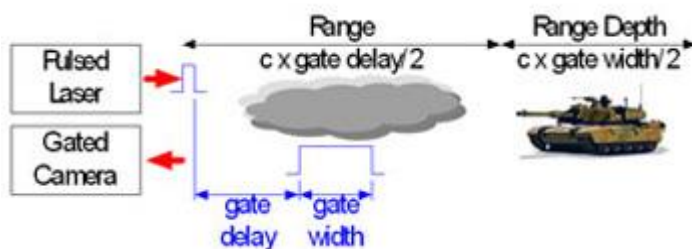
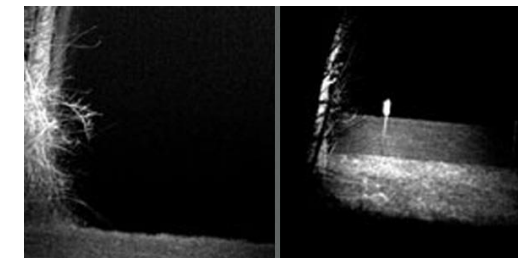
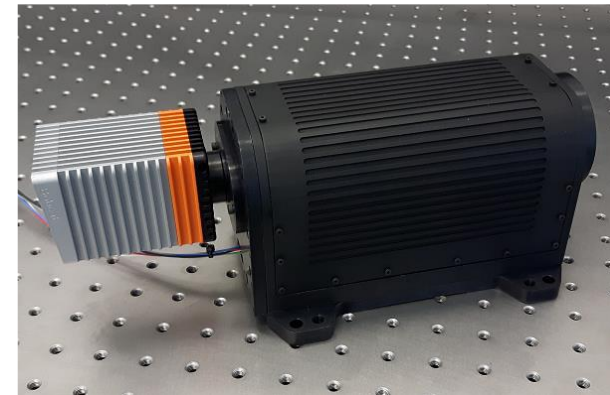
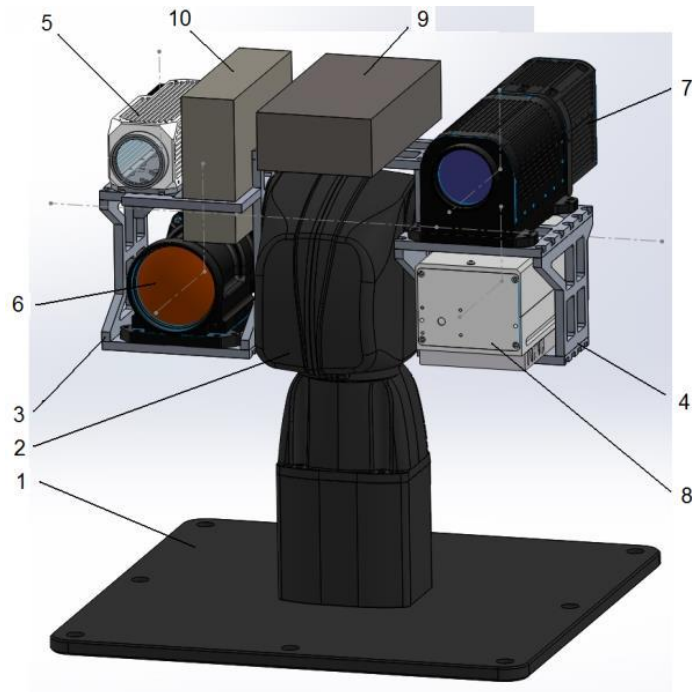
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- **Laser ranging (LIDAR) detection**
- **Passive acoustic detection**
- **Passive radio communication detection and localization**
- **Visible and thermal CCTV** to provide means of verifying the detection



# CCTV Technology in SafeShore



What is the proposed SafeShore solution?

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**Big problem**



# What is the proposed SafeShore solution?

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# What is the proposed SafeShore solution?

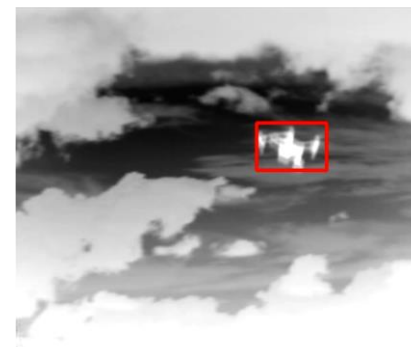
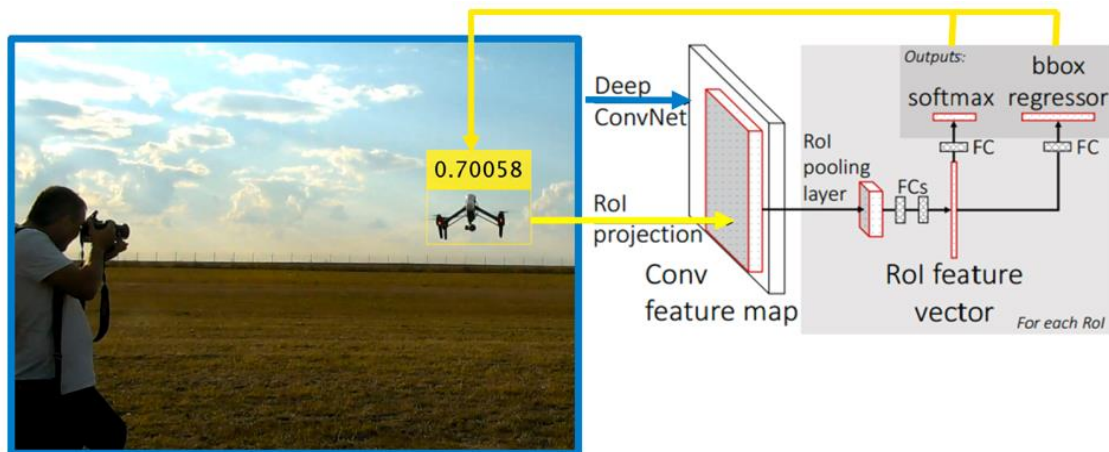
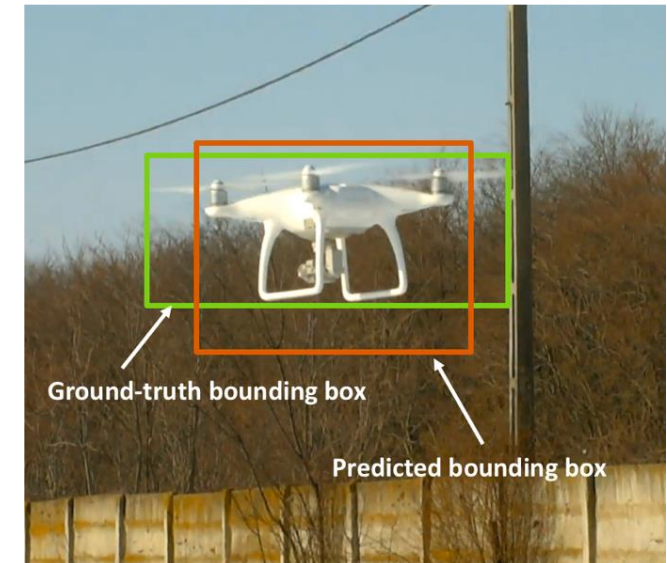
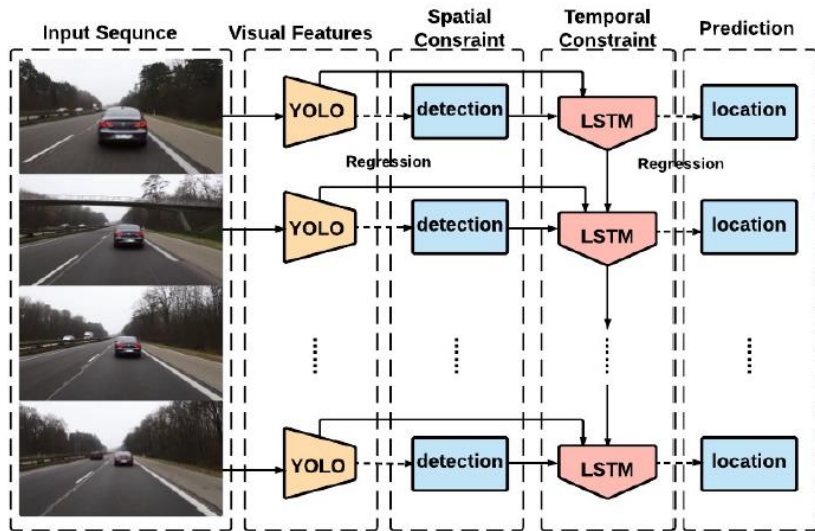
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- **Laser ranging (LIDAR) detection**
- **Passive acoustic detection**
- **Passive radio communication detection and localization**
- **Visible and thermal CCTV**
- **Video analytics engine** for target classification based on deep neural networks



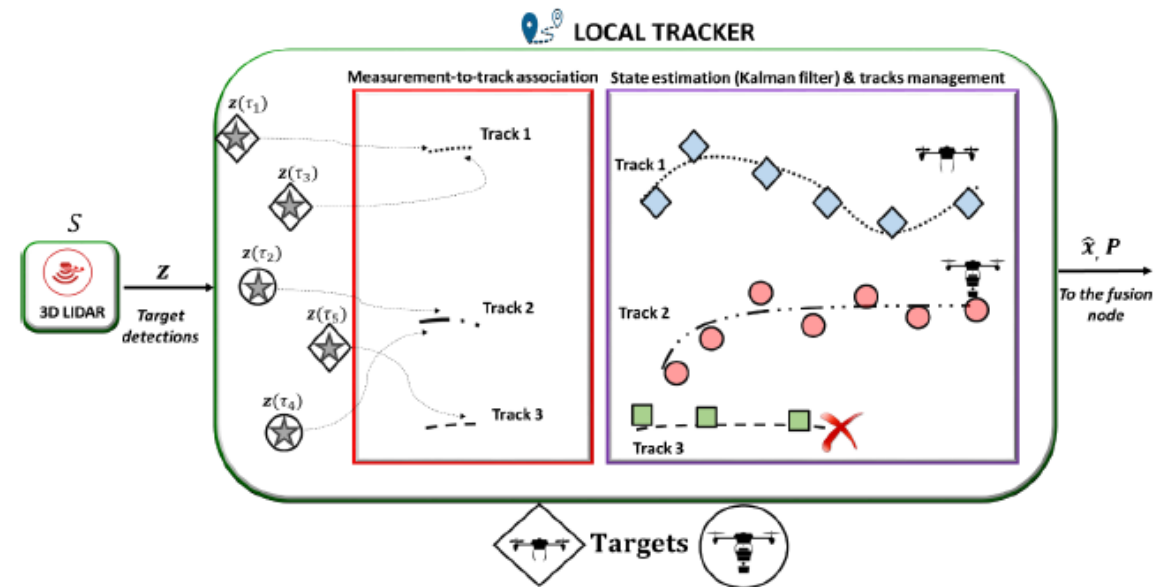
# Video Analytics Technology in SafeShore



# What is the proposed SafeShore solution?

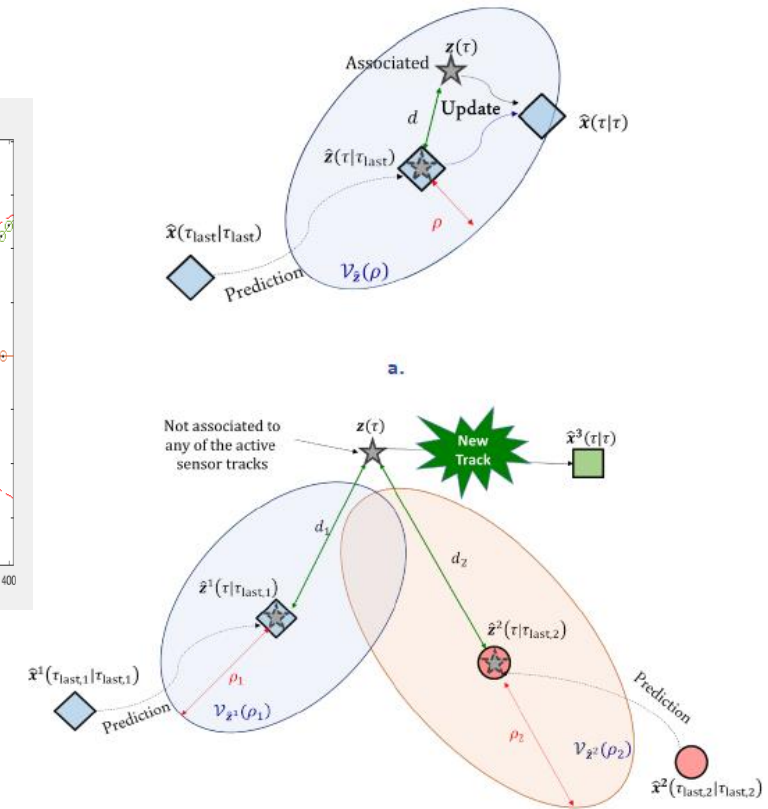
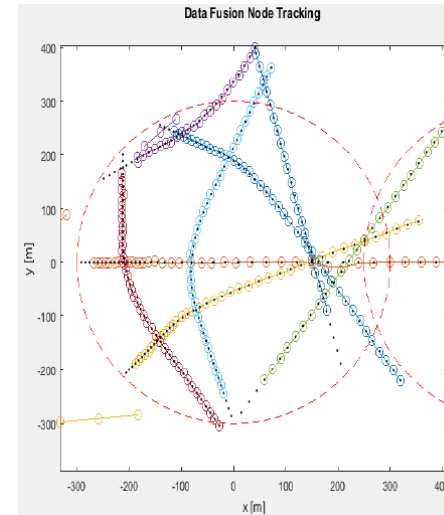
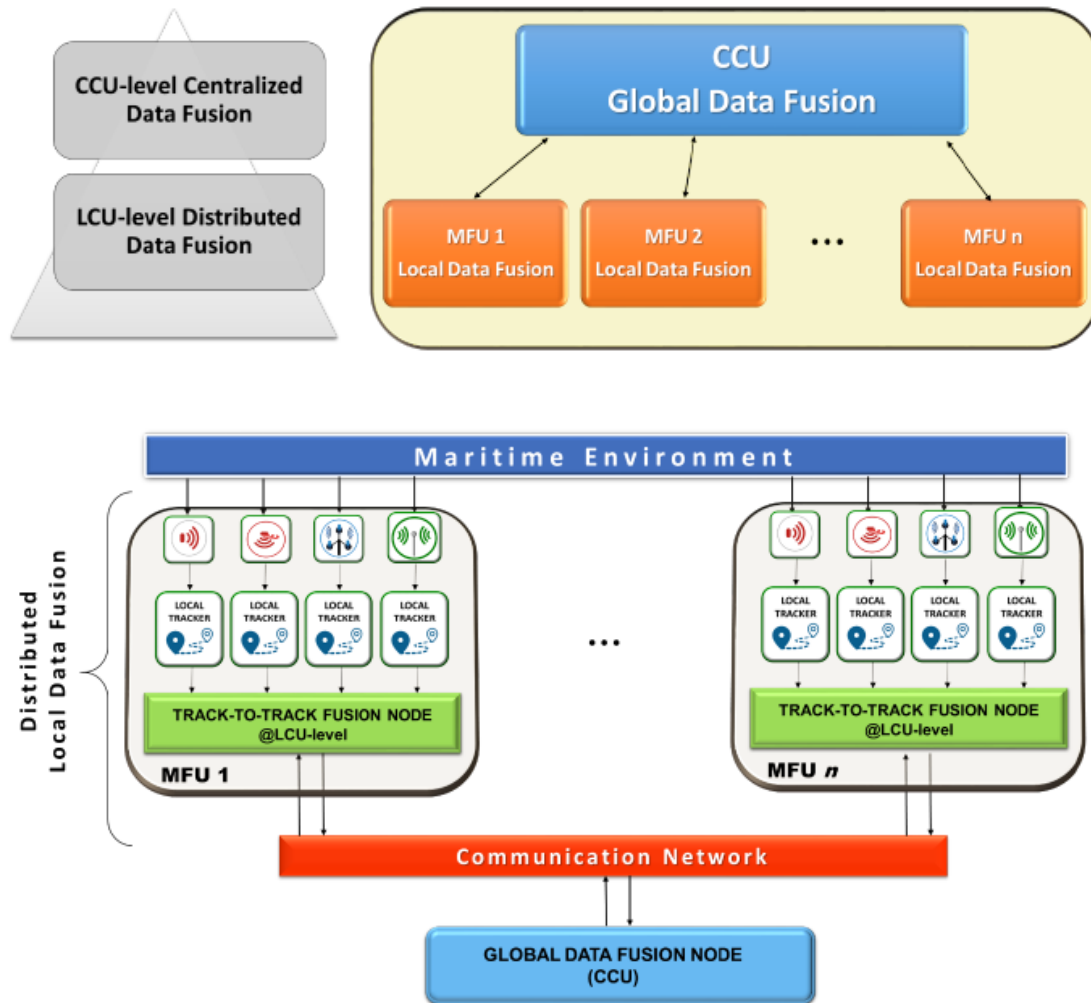
SafeShore developed a **system integrating multiple commercially available detection technologies** to ensure detection of low-altitude flying RPAS and small boats

- Laser ranging (LIDAR) detection
- Passive acoustic detection
- Passive radio communication detection and localization
- Visible and thermal CCTV
- Video analytics engine
- Data fusion for correlating data from multiple sensors



# Data Fusion Technology in SafeShore

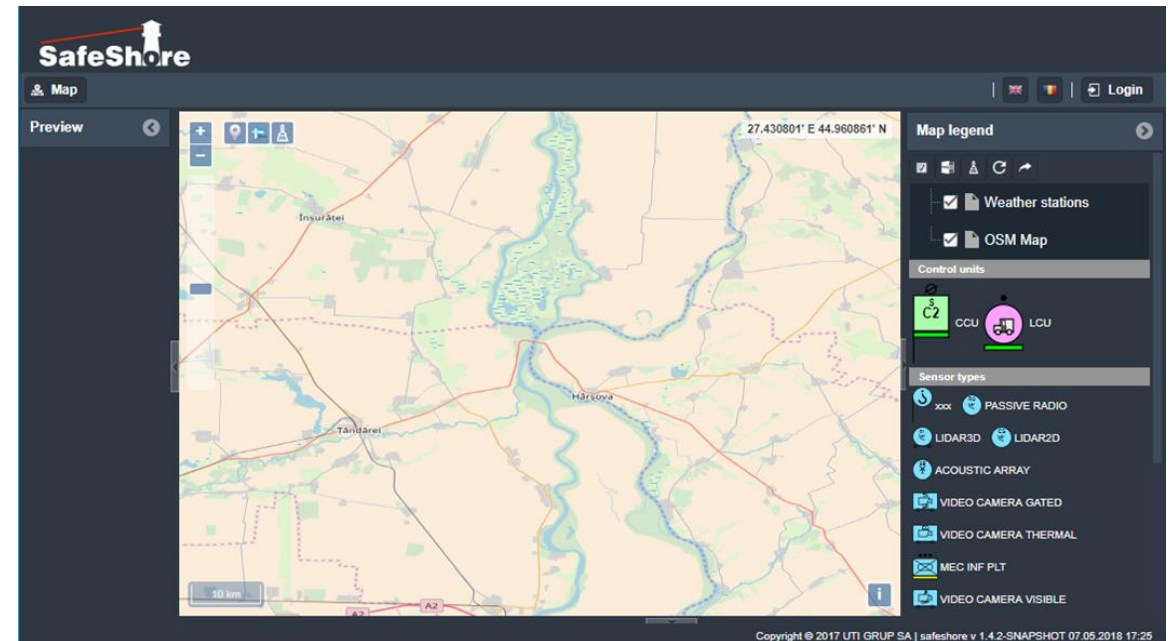
**SAFESHORE DATA FUSION OVERALL HIERARCHICAL ARCHITECTURE**



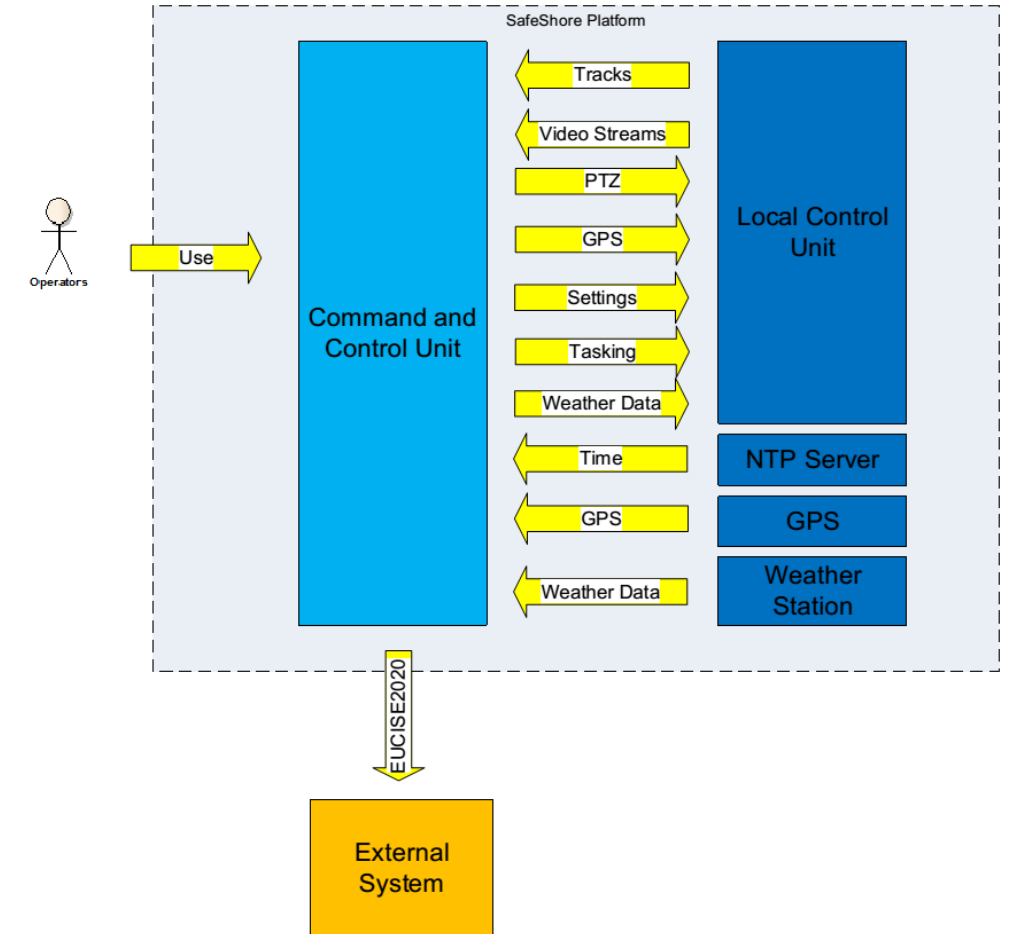
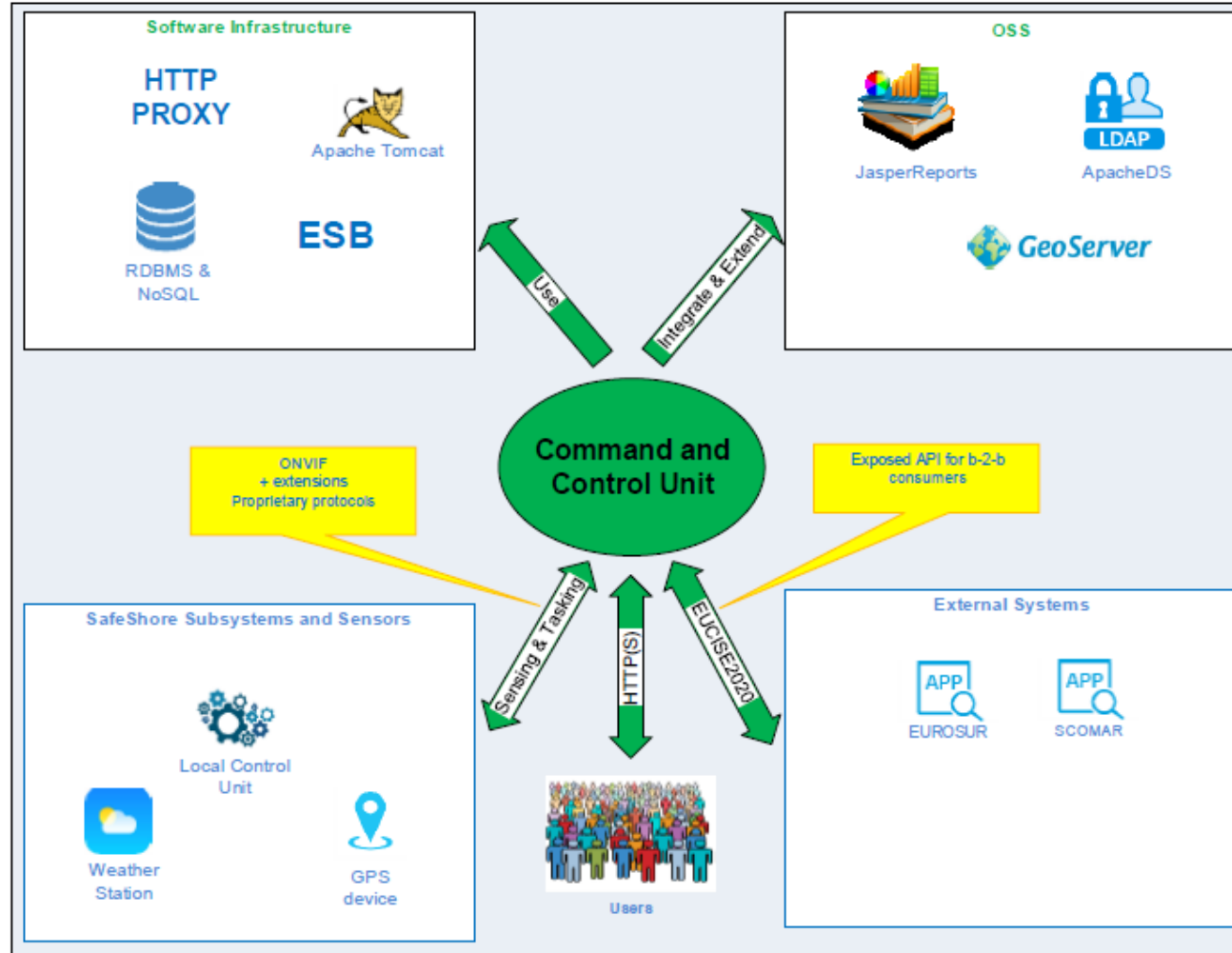
# What is the proposed SafeShore solution?

SafeShore developed a **system integrating multiple commercially available detection technologies** to ensure detection of low-altitude flying RPAS and small boats

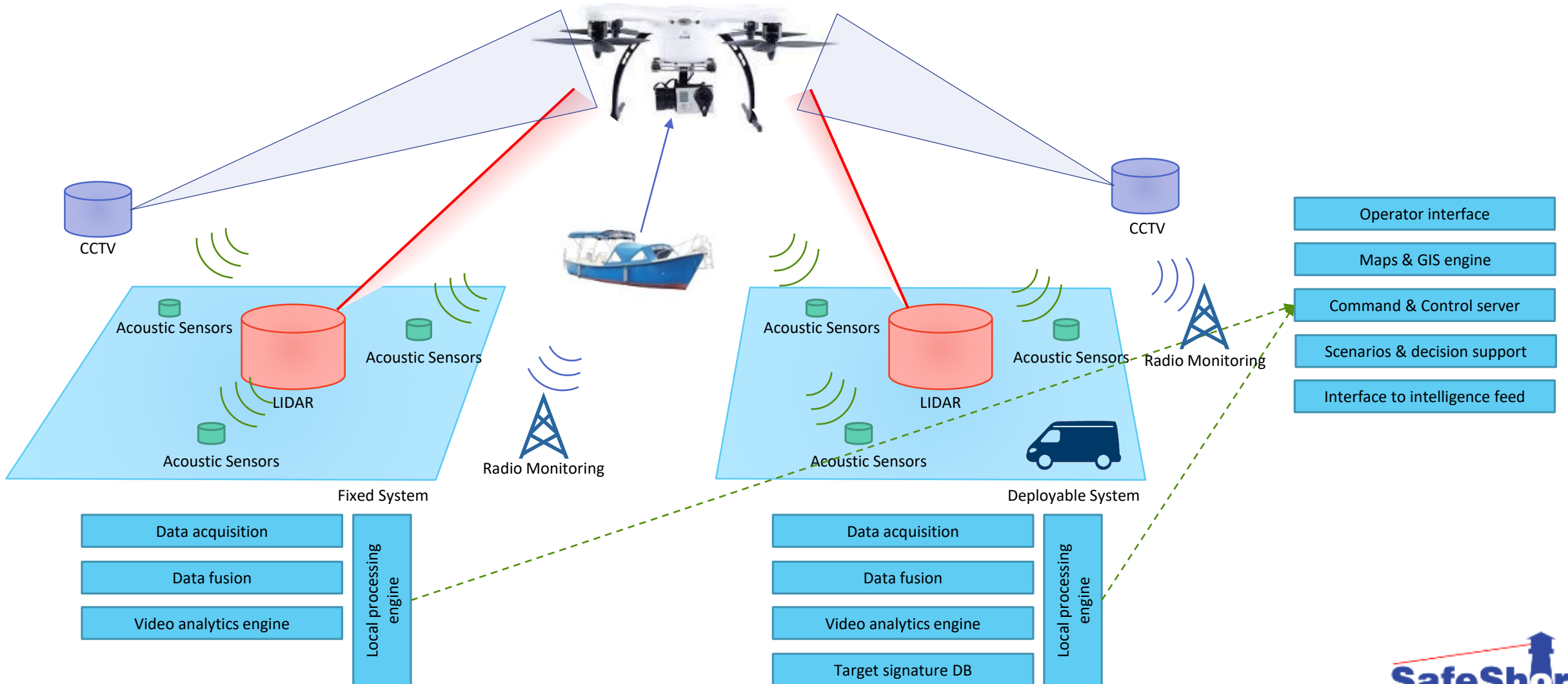
- Laser ranging (LIDAR) detection
- Passive acoustic detection
- Passive radio communication detection and localization
- Visible and thermal CCTV
- Video analytics engine
- Data fusion
- **Command & Control** for creating a unitary operating interface for the users



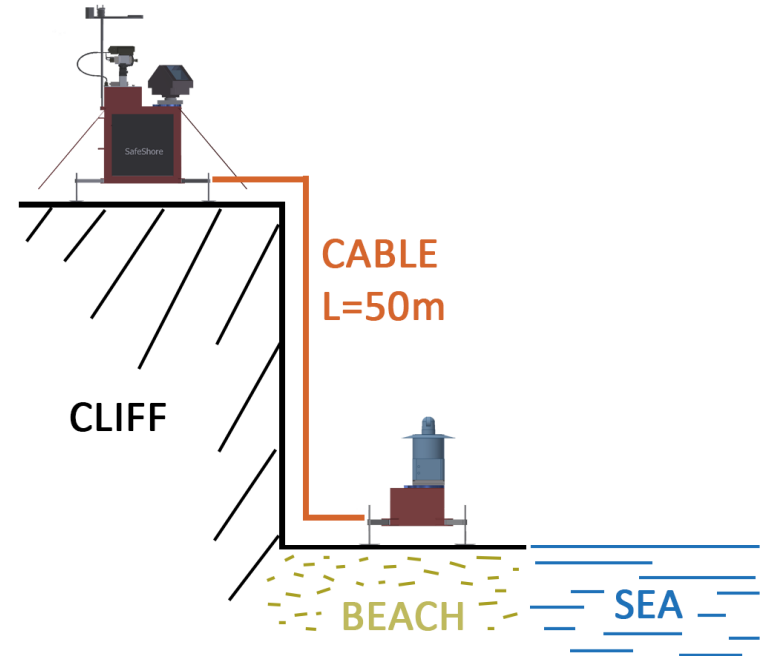
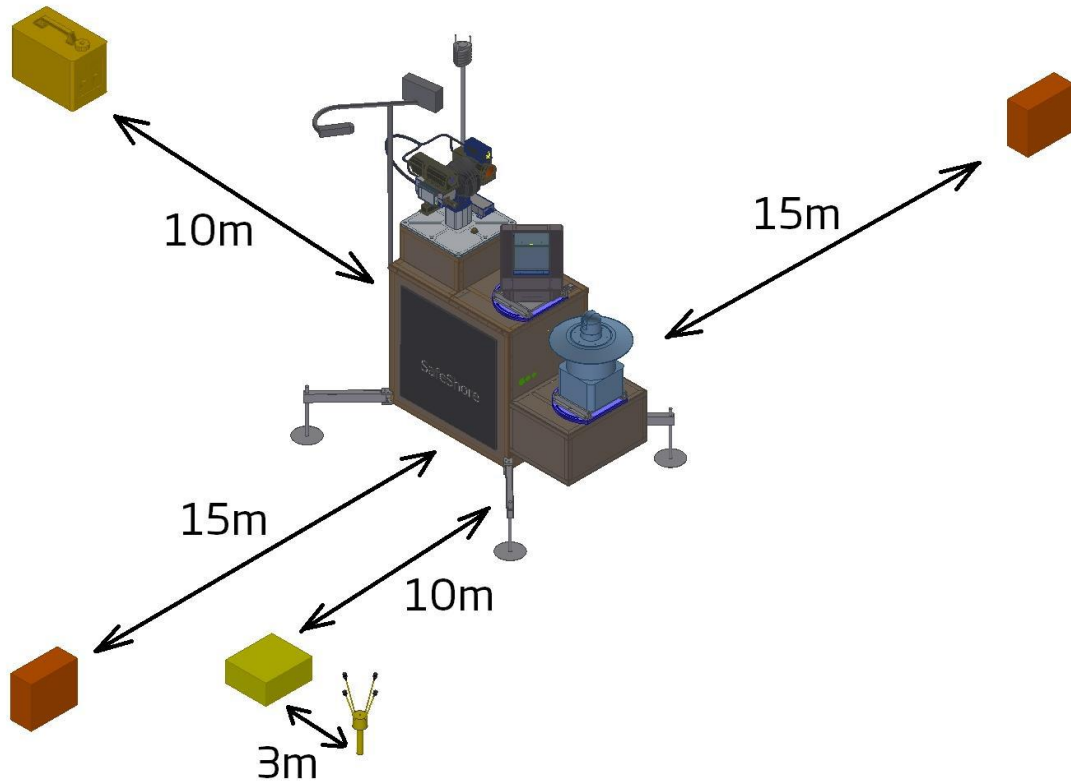
# C2 Software Technology in SafeShore



# SafeShore Solution Overview



# SafeShore Deployment



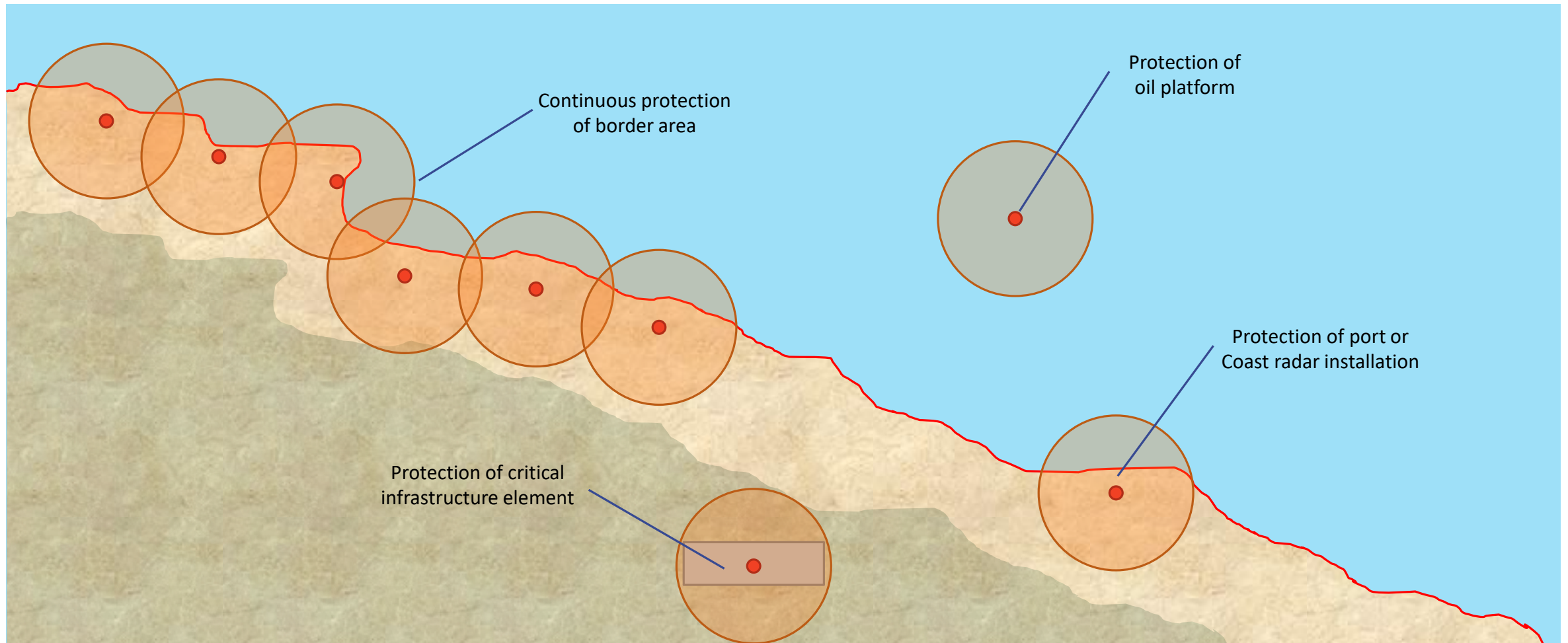


# The SafeShore Research Prototype

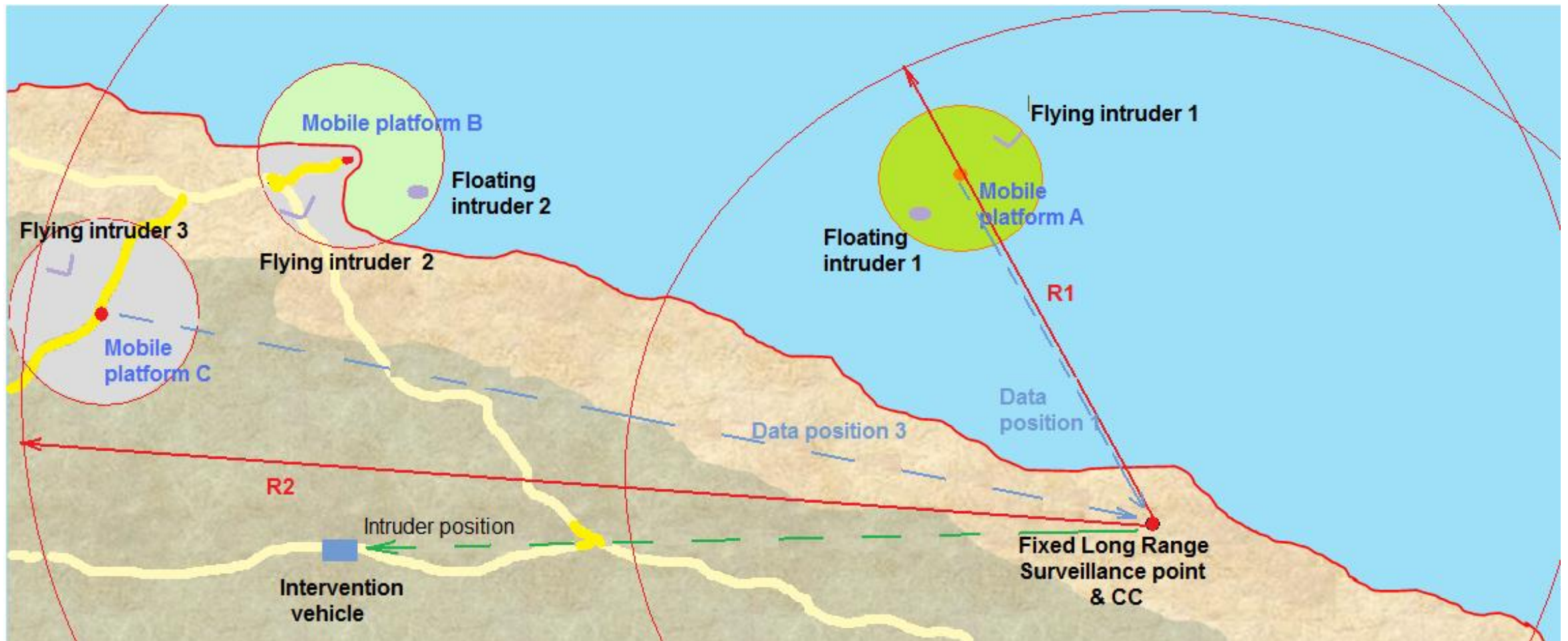
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# How will the SafeShore system be set up?



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# How was the system validated?

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❖ In order to provide & validate pan-European solutions, validation tests were performed in 3 geographically distinct marine environments:

❖ North Sea: Belgium – Lombardsijde



❖ Mediterranean: Israel



❖ Black Sea: Romania - Constanta



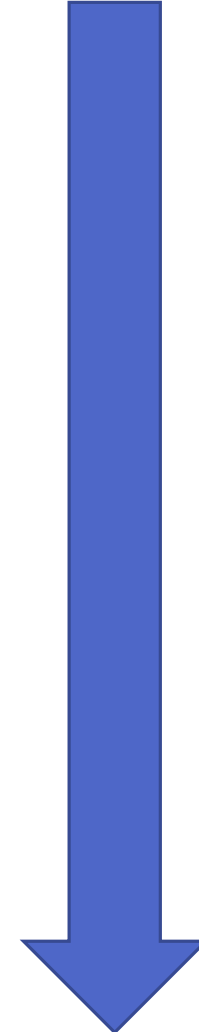
# Way ahead...

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## ❖ Further integration



- ❖ Push from TRL 6 system to a TRL 9 product  
→ Commercial partners within SafeShore



# Way ahead...

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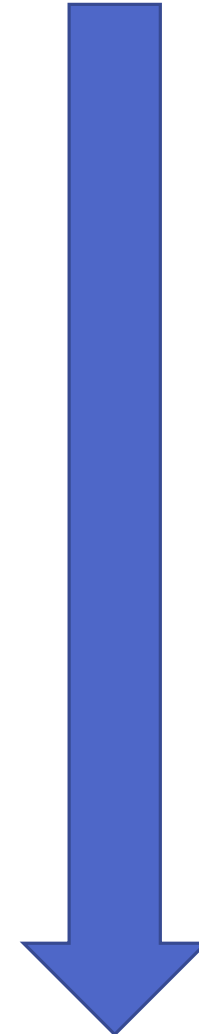
## ❖ Adaptability to Other Use cases:

### Protection of Critical Infrastructure

- Rogue RPAS can be used to deliver explosive charges or CBRN agents as part of a terrorist attack against Critical Infrastructure sites
- Early detection of such RPAS can be used in combination with various counter-RPAS measures (entanglement nets, ballistic)

### Protection of government officials

- RPAS are a risk factor in case of public events where government officials or other VIPs can be the target of attacks using RPAS as means of delivery
- Early detection of such RPAS can be used in combination with various counter-RPAS measures (entanglement nets, ballistic) or evacuation measures





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# QUESTIONS?



SafeShore – ALFA Workshop,  
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