

MARITIME SEARCH AND RESCUE 2018:  
DEVELOPING CAPABILITIES FOR SAR  
OPERATIONS, HELSINKI

# RADAR SYSTEMS FOR THE SURVEILLANCE OF COASTAL AND PRE-FRONTIER AREAS

**RA**dars for lo**NG** distance maritime  
surveillanc**E** and sa**R** operations - RANGER

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- ▶ **Overview of RANGER**
- ▶ **Goals and Objectives**
- ▶ **The platform**
- ▶ **Impacts on R&D**
- ▶ **Impacts on SAR**
- ▶ **How RANGER technology is validated?**

- RANGER is an **EU funded** project, within the H2020 Horizon programme.
- RANGER innovates by combining **novel and ground-breaking Radar technologies** with innovative supporting technological solutions for early warning, in view of delivering a **surveillance platform** that will offer tracking as well as detection, recognition, and identification of vessels **far beyond** existing legacy radar systems, seamlessly fitting and contributing to the **CISE framework** through the provision of on-demand CISE compliant services.

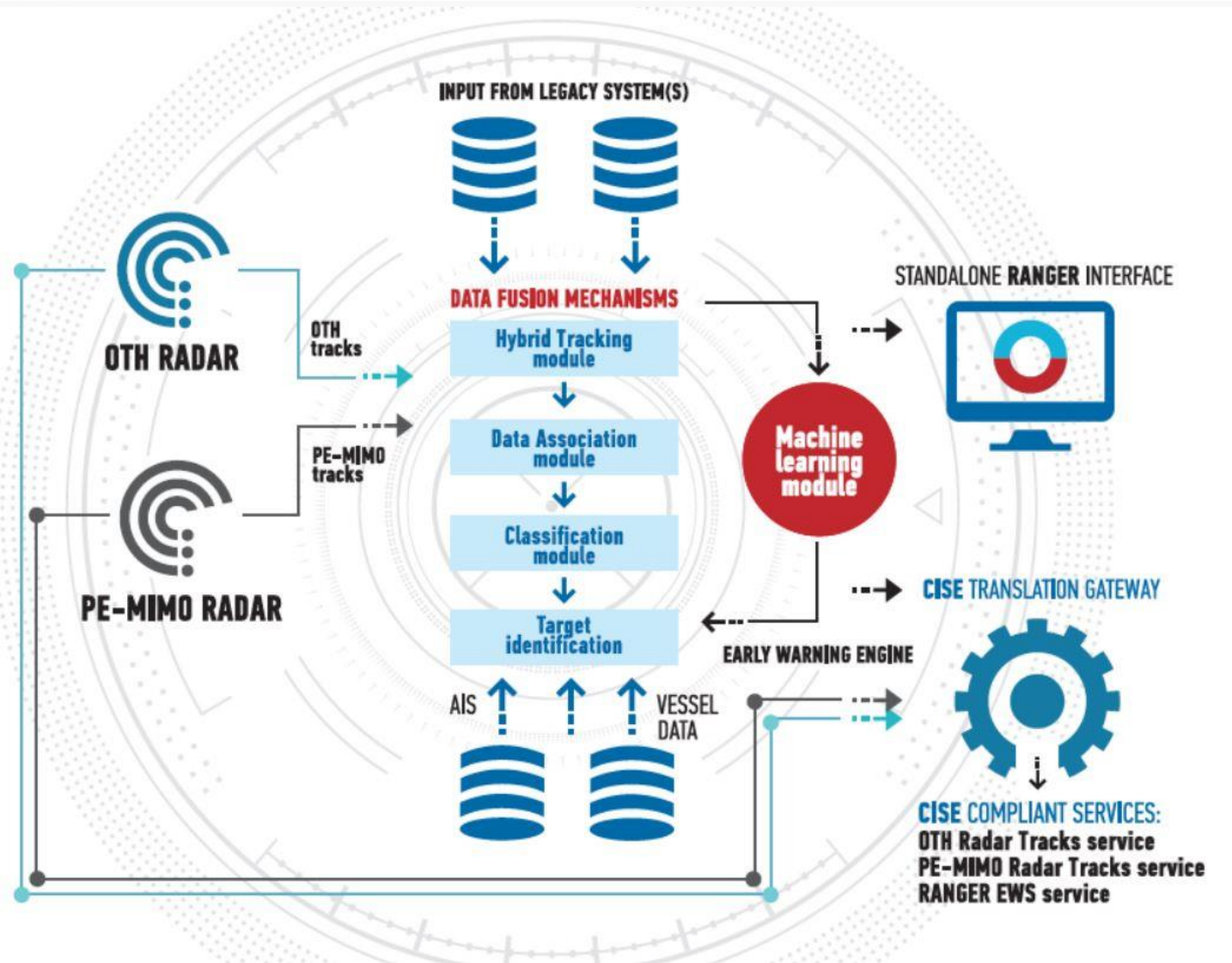
## Capability of seeing Over The Horizon (OTH)

- To provide **a complete solution** for traffic surveillance and search and rescue operations offering **vessel detection, recognition, and identification** capacities far beyond existing radars in terms of both target size and range for traffic surveillance and **search and rescue operations SAR.**



- The main goal of RANGER is to provide **innovative solutions** for early warning and distant border surveillance to **support SAR operations and tackle illegal conduct** in the marine environment.
- The value to the end-users and society: the solution will drastically **improve the performance of existing Radar systems**, by employing a blend of Over the Horizon Radar system and Photonics Enhanced MIMO radar system with other novel supporting technologies for data fusion and early warning and existing infrastructures, validated in the context of real pilot exercises.

1. to provide **a complete solution** for maritime surveillance and SAR operations.
2. to **lower the total cost of ownership** compared to existing marine surveillance platforms and radar solutions.
3. to ensure **compatibility** of the RANGER platform **with** the Common Information Sharing Environment – **CISE**.
4. to **validate and demonstrate the effectiveness** of the integrated RANGER platform.
5. to **define** a multilevel **compliance framework** (ethical - legal - societal) that RANGER solution will be aligned with



## Installations of the Stradivarius OTH Radar (Tx/Rx stations) in Southern France



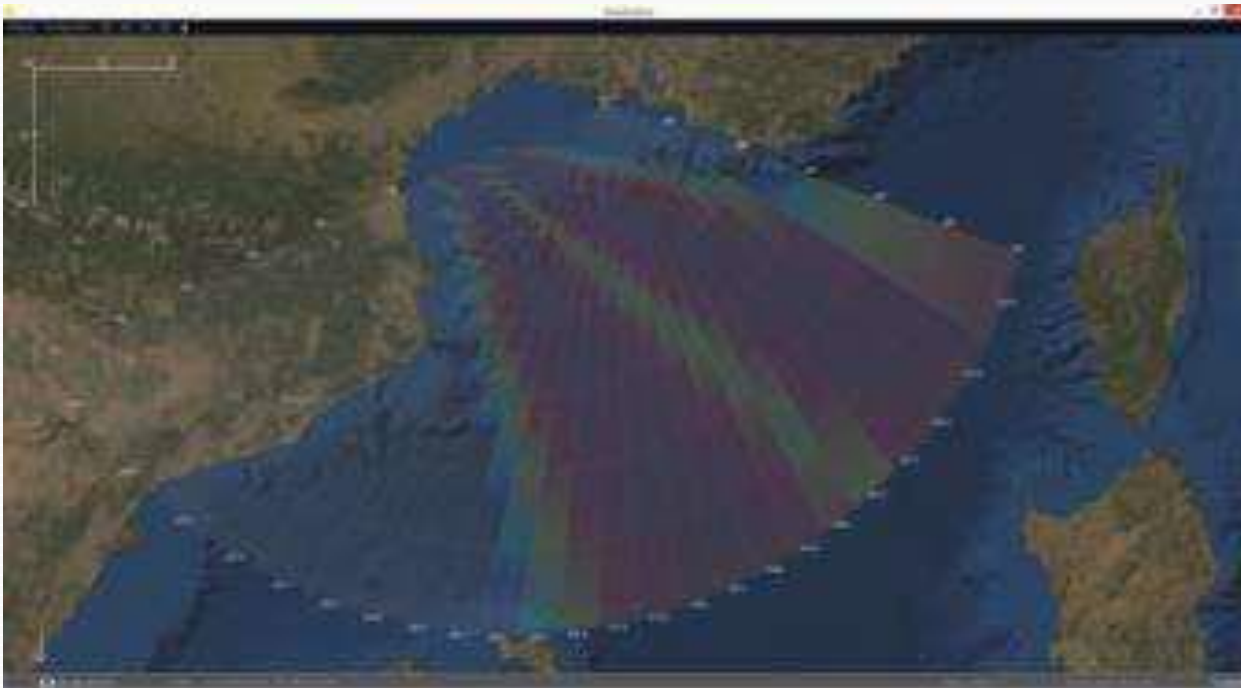
– Courtesy of DXT



## Research and Innovation (R&D)

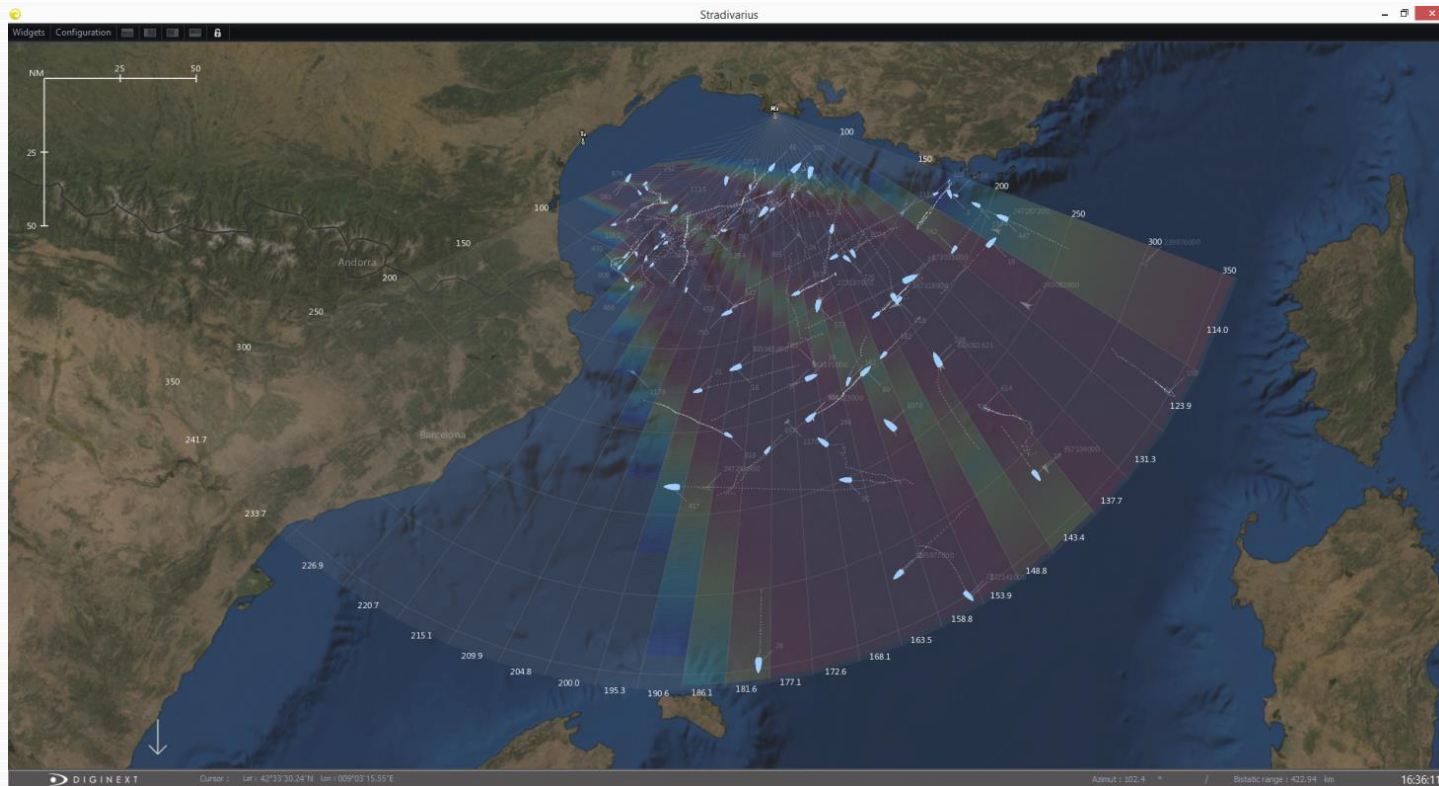
- **OTH (Over-The-Horizon) Radar**
- **Photonics Enhanced MIMO (PE-MIMO) Radar**
- **Data fusion and Machine Learning**
- **Early Warning Engine (EWE)**

- Both radar solutions (OTH and PE-MIMO) as part of developed RANGER platform, are going to cover clear operational needs creating an “24/7, all-weather surveillance” system that it can track small and even unseaworthy crafts over a wide maritime zone of **up to 200 nautical miles**.
- RANGER will add to the implementation of a common intelligent operational traffic picture.



OTH Diginext

- RANGER generates a **common situational picture**, improved **detection** and **on-time identification** of non-collaborative and/or suspicious small boats.



## RANGER Early Warning System (EWS)

EWS will be built upon **advanced Data fusion** algorithms and architectures as well as **novel deep machine learning** structures to provide:

- A **threat classification** of all simultaneously detected targets based on AIS data, historical data in available databases as well as maneuvering patterns of detected and tracked vessels.
- **Automatic Target Recognition (ATR)** through cross correlation of Radar and AIS data.



- The (EWS) as well as maneuvering patterns of detected and tracked vessels.
- **Target Continuous Tracking**, especially valuable for high-threat vessels.
- **Alarms** including collision warning, boundary violation and proximity alerts.
- **Recommendations** on required interventions based on risk assessment and self-training of threat detection models.



## Maritime Surveillance & Operations

- **Improvement of SAR Operations**
- **Early detection of small vessels**
- **Optimization of end-user resources**
- **Efficient coordination of SAR operations**
- **Automated and self-learning platform**
- **Early warnings and detection alerts**

## Maritime Surveillance & Operations

- **Timely response & appropriate measures**
- **Reinforcement of European and National Coordination Centres position**
- **Generation of a common situational picture**
- **Improved detection and on-time identification of non-collaborative small vessels**

# Current Shortfalls

- **Small Vessels or vessels with suspected behavior cannot be detected properly by radar systems used for today's maritime surveillance (no or late detection).**
- **Such type of irregular immigration and drug trafficking activities can only be detected by visual means. This cannot guarantee the actions to be taken on time.**





# Future impact of RADAR surveillance systems in the SAR community

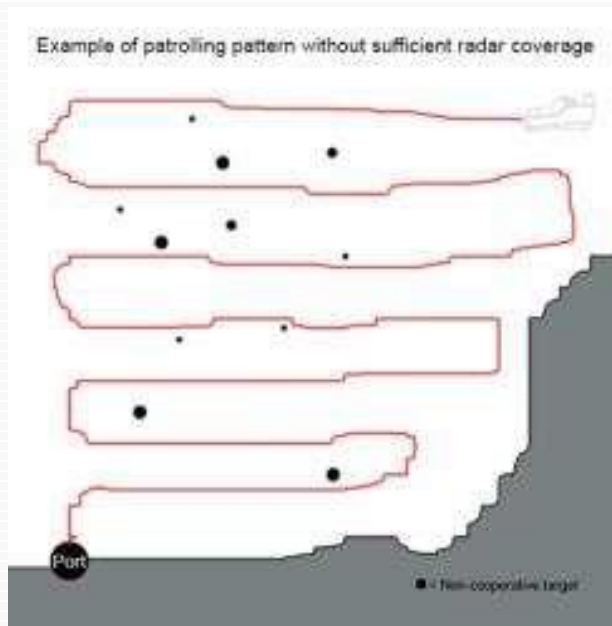
- RANGER will **facilitate** the improvement of the **sea-border surveillance operations** by overcoming the limitations of existing sensing means and the inherent difficulties of the task at hand.
- RANGER will elevate the accuracy, long distance detection, identification and recognition capacity for small boats, thus drastically **improving the response and intervention**.





# RANGER RADAR systems and response operations

- **Early detection of vessels** with unusual behavior allowing interventions to occur before any incident occurs, thanks to its wide Radar coverage (RANGER's OTH Radar coverage is close to 100,000 km<sup>2</sup>)
- **Optimization of end-user resources** under SAR Operations: by tracking the exact location of all vessels will have best possible response time by reaching the incident location faster distribution of resources
- **Efficient coordination of SAR Operations throughout CISE-ready RANGER Platform** will enhance accuracy and interoperability, in transnational SAR.



## Socio-economic benefits

- ***Citizens***
  - Improved maritime security
  - Enhanced SaR capability
  - Protection of human rights
  - Opportunities stemming from technological breakthroughs
- **Maritime surveillance market**
  - Delivery of an economic and operationally viable solution
- **Environment**
  - Friendly and unobtrusive solution to the deployment environment

## Pilot 1

**The first pilot will be implemented in France with the collaboration of technical partners and French end-user partners (DMA)**

## Pilot 2

**The second pilot will be implemented in a completely different maritime environment, in Greece (Aegean Sea). It will be conducted by Hellenic Ministry of National Defence with the support of the technical RANGER partners.**



# Thank You!

# Questions?

Visit: <https://ranger-project.eu/>

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