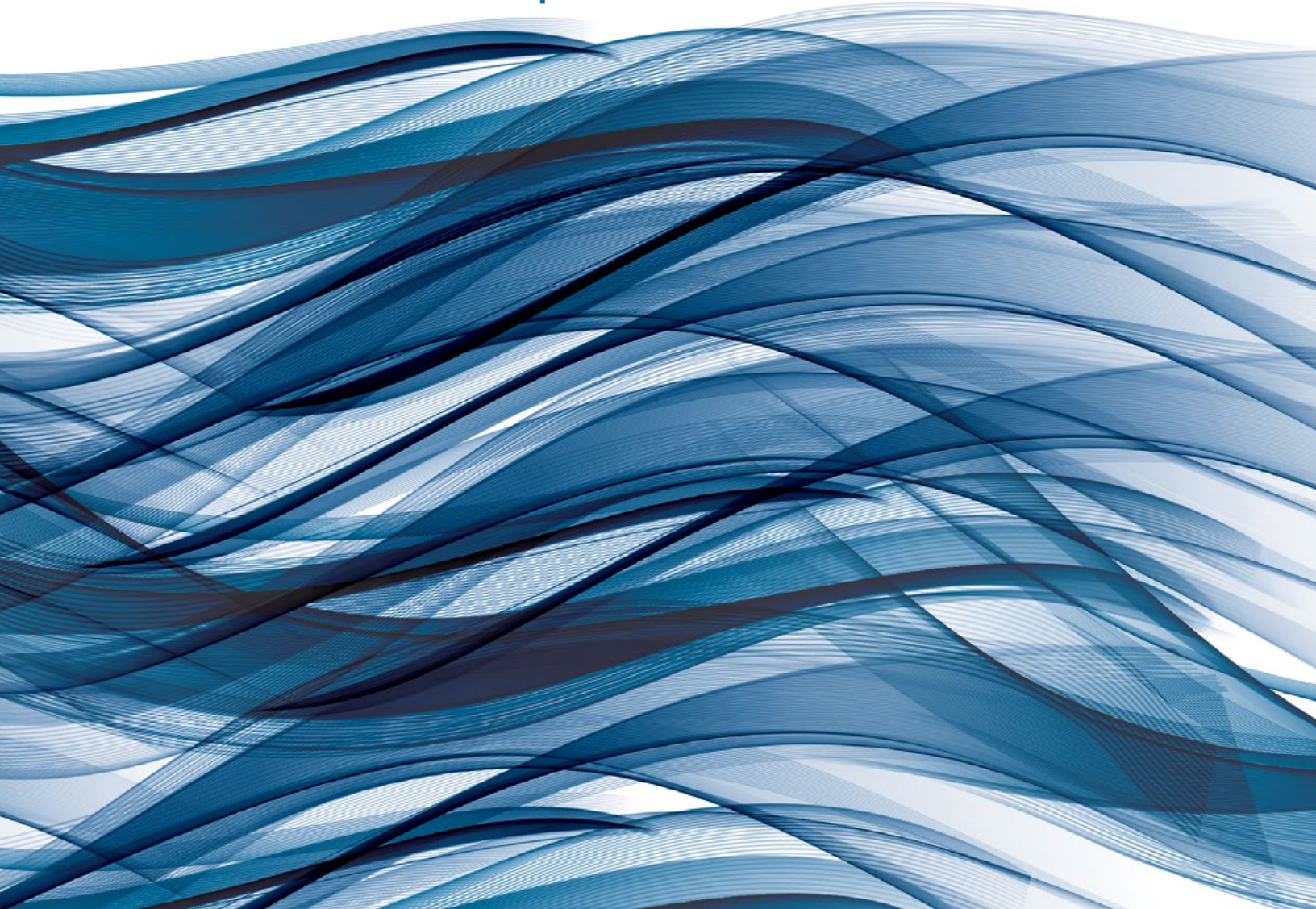




Newsletter #8  
January 2019

# RANGER

**RA**dars for lo**NG** distance maritime surveillance**E**  
and Search and Rescue ope**R**ations



[www.ranger-project.eu](http://www.ranger-project.eu)

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Dear Readers,

Welcome to the eighth issue of the RANGER newsletter.

RANGER is a 42-month European project, co-funded by the European Union’s Horizon 2020 research and innovation programme. The consortium comprises 10 partners from 7 countries, in Correction: a balanced blend of Radar technology industrial organizations, academic/research institutes, high-tech SMEs, and highly relevant end-user organizations. RANGER combines innovative Radar technologies with novel technological solutions for early warning, in view of delivering a surveillance platform offering detection, recognition, identification and tracking of vessels, beyond current radar systems’ capabilities, thus drastically improving the response and intervention capacity of European Search and Rescue operations.

**This issue features an article about the RANGER project’s 1st Pilot demonstration and another one about RANGER Rx receiver installation. It also includes project news and updates as well as related conferences & events.**

Enjoy reading and don’t forget to visit our website for more information!

The Project Coordinator



## For more Information

Please visit the RANGER website [www.ranger-project.eu](http://www.ranger-project.eu)

You can also keep up with more of what is happening at RANGER project by following us on:



## RANGER Paper Publication

RANGER partners Johannes M. Eckhardt, Niko Joram, Adrian Figueroa, Bastian Lindner and Frank Ellinger from Technische Universität Dresden (TUD) published a paper entitled “[FMCW multiple-input multiple-output radar with iterative adaptive beamforming](#)” in the renown IET Radar, Sonar & Navigation journal on September 2018.



### RANGER @ BCICTS 2018

RANGER partner Technische Universität Dresden (TUD) participated in the 2018 IEEE BiCMOS and Compound Semiconductor Integrated Circuits and Technology Symposium which was held on 14th-17th October 2018 in San Diego, USA and presented the paper “1.5-54 GHz High Dynamic Range LNA and Mixer Combination for a MIMO Radar Application”.

[The paper is available here](#)

## RANGER WP6 integration meeting

26-28 November, 2018 | Dresden, Germany

RANGER WP6 integration meeting in Dresden, Germany among partners Technische Universität Dresden (TUD) and LEONARDO.

RANGER partners implemented the photonic enhancements namely, the optoelectronic oscillator and the fibre-optic distribution network, from LEONARDO together with the electrical components prepared by TUD. In this frame, they tested the functions of all the components in a first complete integration of the photonic enhanced (PE)-MIMO system.



## RANGER 1st Pilot

After two years of hard work the first version of the RANGER maritime surveillance platform was successfully demonstrated during the 1st pilot in France (16 October 2018) hosted by the French End-User Directorate of Maritime Affairs (DMA) and Diginext. This first French pilot was conducted off the shore of Marseille. The PE-MIMO Radar was installed in the Cap Bear site, while the OTH transmitter and receiver were installed close to Narbonne and Salins-de-Giraud, respectively. The RANGER control room was located at Diginext premises in Aix-En-Provence.

The complete RANGER system was integrated, deployed and demonstrated for the first time in a real operational environment, consisting of:

- **Over The Horizon (OTH) Radar:** A (HF surface wave) long range (several hundreds of kilometers) radar with detection capabilities over the horizon
- **PE-MIMO Radar:** A first short range (app 10 km) small scale mobile MIMO radar prototype
- **Uniform Communication Gateway (UCG):** The interoperability layer of the RANGER platform and responsible for data aggregation, translation and sharing of RANGER radar tracks as well as legacy data (legacy radar and AIS)
- **Early Warning System including the Data Fusion and Machine Learning Module:** An advanced early warning system that employs data fusion algorithms of multiple tracks, machine learning algorithms for clustering and outlier detection and early warning engine for initiation of alerts and warnings
- **Advanced User Interface (AUI):** The user interface for visualization of track information and trajectories of vessels from multiple radars (OTH and MIMO Radar), fused tracks and early warnings.
- **CISE translation Gateway:** The gateway/adaptor that permits to integrate RANGER data services (OTH tracks, MIMO tracks, Fused tracks and early warnings) into the CISE network.

The preparations of the RANGER platform pilot execution started several days before the actual pilot, in order to install, configure and set-up the necessary hardware, software, network and communication infrastructure and in order to run several integration tests. During the official pilot, several demonstration scenarios were executed aiming at testing and validating the

capabilities of the RANGER system in real operation, namely the continuity of detection and discrimination of vessels of different sizes at different speeds and the provision of early warnings and identification of abnormal behavior at sea. Different use cases such as trafficking of illegal products, a Search and Rescue operation around a ship requiring assistance, and early warnings of suspicious incidents such as rendezvous of vessels at sea, abnormal speed change etc. were demonstrated.

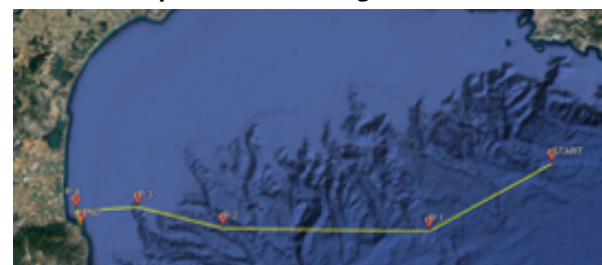
DMA in close cooperation with the French Navy provided the following vessels which participated in the pilot activities:

Vessel	Type
A	Rigid-hulled inflatable boat of 10 m
B (Feeder)	Vessel of 30 m (Tug)
C (Mother Ship)	Vessel of 75 m
E	Rescue boat of 12 m

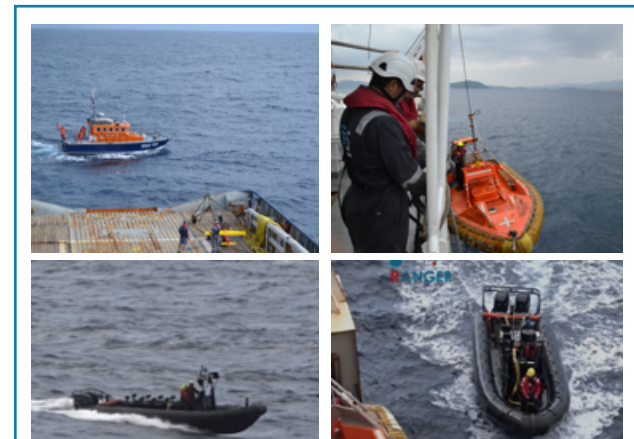
The following actors participated in the pilot demonstration:

- A DMA Officer at the RANGER control center in Aix-En-Provence, who coordinated all the vessel activities at sea
- Crew members of participating vessels
- Members/technicians at Cap Bear Site, for the control of the PE-MIMO radar and respective communication infrastructure
- Members/technicians at Control Centre in Aix-En-Provence which controlled the RANGER platform (SW modules, IT Infrastructure and communications) as well as the remote OTH Tx and Rx site
- The Italian Navy as advisory board member

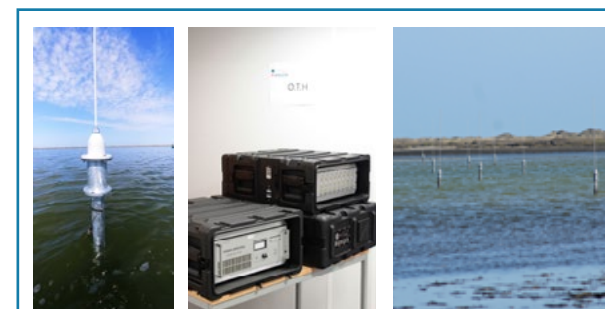
*The vessel routes, and the location of the PE-MIMO radar, are depicted in the image below:*



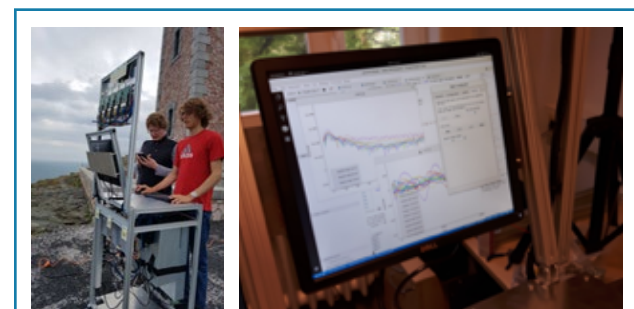
*The Advance User Interface: Radar tracks, AIS and fused tracks, early warnings*



*Vessels participating in the first French pilot*



*The OTH Radar*



*The first mobile prototype version of the Pe-MIMO radar*



*The pilot itself was a great opportunity to show how RANGER platform works. The consortium reached to conclusions of great worth and took feedback from all the participants. The valuable results are going to be assessed so that the very successful outcomes of the 1st Pilot will form a useful step towards the 2nd RANGER Pilot that will follow in the next months.*



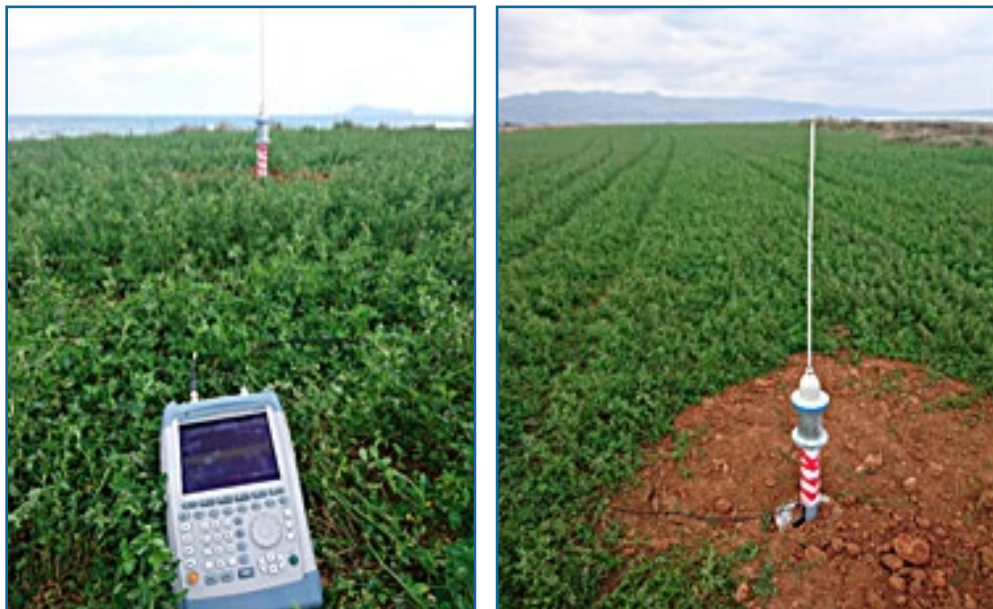
### Rx receiver installation

The civil and installation works for the OTH Rx (receiver) RANGER site of the Greek Pilot started in mid-November 2018, close to Chania, Greece.

The works that will support both the OTH and MIMO radars include the digging of more than 1.2 Km of trenches and the installation of more than 5km of power and coaxial cables.

The corresponding electrical connections will result in the construction of a dense cables network to support 16 receiving OTH antennas together with the MIMO infrastructure.

In parallel, electromagnetic compatibility measurements took place in various locations of the Rx site to identify potential sources of interference.



The RANGER Rx constitutes the first step to the installation and demo-operation of the RANGER system that will monitor the Greek Archipelago. Looking forward to a successful result!



### 2019 IEEE Data Science Workshop

June 2-5 2019, Minneapolis, USA

<https://dsw19.rutgers.edu>



### International Radar Symposium 2019

26-28 June 2019, ULM, Germany

<https://www.dgon-irs.org/en/home/>



### IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting

2-5 July 2019, Atlanta, Georgia, USA

<https://www.2019apsursi.org>



European Microwave Association

### European Microwave Association

9 September 2019, Paris, France

[https://www.eumwa.org/en/22nd-eumw-2019.html?cmp\\_id=20&news\\_id=176&vID=50](https://www.eumwa.org/en/22nd-eumw-2019.html?cmp_id=20&news_id=176&vID=50)



The international society for optics and photonics

### SPIE Security & Defence 2019

9-12 September 2019, Strasbourg, France

<https://spie.org/conferences-and-exhibitions/security-and-defence?SSO=1>



### International Radar Conference

23-27 September 2019, Toulon, France

<https://www.radar2019.org>



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## For more Information

Please visit the RANGER website

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You can also keep up with more of what is happening at RANGER project by following us on:



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## THE CONSORTIUM



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