SafeShore Newsletter

Issue 3

November 2018

Content:

www.safeshore.eu

Welcome

For SafeShore project, this has been an exciting year full of challenges and intense moments. The past 7 months have seen SafeShore system put to the test in a series of trials, two of which have already been held (in Belgium and Israel respectively), and one which is currently in full swing!

We are proud to be able to report on these trials, to present recent work performed as well as our findings in this latest and last edition of our Newsletter.

As always, our SafeShore Newsletter brings you topical 'behind the scenes' insights and keeps you updated on what happened over these final project months. We look at SafeShore system's future and inform about upcoming events of interest. We also continue our series of partner-interviews.

SafeShore is offering an innovative solution for border and security forces to tackle ongoing problems related to terrorism, addressing increased potential for misuse of UAVs, trafficking of people or illegal substances. We aim at filling the yet-to-be-closed gap between regulation and law enforcement capacity. SafeShore system is a step towards increasing safety around coastal border regions by improving detection of threat agents (or of victims) in maritime environment. Data fusion derived from combining data input from various types of detector will enable Safeshore stakeholders to easily spot smaller targets e.g. low-altitude UAV and their remote control equipment, small vessels or humans coming to shore. SafeShore System focuses on effectiveness, efficiency, affordability, flexible deployment, and environmental sustainability.

SafeShore team would like to thank all our readers, especially those who provided valuable feedback. We hope that you will approve of this last Newsletter No.3 just as much. We also welcome readers with further questions to get in touch. Contact details can be found at the back of this Newsletter.

Your SafeShore Team

SafeShore Trials Part 1

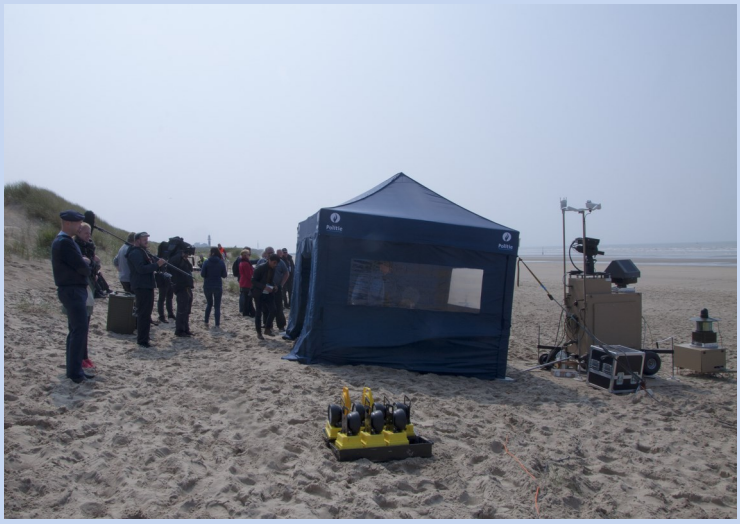
Nieuwpoort, Belgium (May 2018)

by Geert De Cubber

From May 14th until May 25th, the SafeShore project conducted its first series of field validations of the SafeShore detector on the North Sea shore in Nieuwpoort, Belgium.

The Belgian West Coast Police and the Royal Military Academy jointly organized these trials in the military base of Lombardsijde. The main objective of this trial was to validate the performance of the SafeShore detector prototype in real operational conditions. To this end, the SafeShore detector was installed on the beach and a number of scenarios were "played" to evaluate qualitatively and quantitatively how well the detector was able to detect and track the different threat agents. For the North Sea trials, both the aspects of maritime safety and maritime security were taken into consideration.

Concerning the aspect of maritime safety, the main task of the SafeShore prototype was to detect other recreational users coming too close to swimmers and thereby posing a risk to them.



To this end kite surfers, wind surfers, peddlers, jet skis and even a fishing vessel were sent out to sea in sometimes very tough conditions (high sea with wind up to 7 Bft) and the SafeShore detector tried to detect these maritime threat agents.

In respect of maritime security, we looked more closely at the main security threats for Europe these days: terrorist attacks, (drugs) smuggling and human trafficking. For each of these aspects, a full-blown real-life scenario

was organised where "criminals" conducted certain operations that had to be detected by the SafeShore prototype.

The results of the 2-week validation campaign already showed great promise for the SafeShore detection technology. As this was the first ever test of the fully assembled prototype, with two more to follow, quite a few "teething problems" were noted with the detector and particularly with its operation in rough weather conditions. All these problems were carefully quantified and recorded by the SafeShore team, in order to further increase the performance of the different subsystems and of the global detector for the subsequent trials.

Continue with Trial Part 2 on p.11

Partner Feature

University of Salento, Lecce (academic), IT

The University of Salento's "Dipartimento di Ingegneria dell'Innovazione" (Engineering for Innovation) focuses on new technologies and is devoted to promoting and disseminating technology innovation. It is involved in renewable energies, materials science and technology, bio-applications of materials and ICT, nanotechnologies, manufacturing technologies, robotics, and design and testing in Mechanical and Civil Engineering. Research activities are supported by the EU (through FP6, FP7, H2020), the Italian Ministry for Education University and Research, regional authority, main Italian research centers (ENEA, ASI CNR, INFM, INFN), and private companies. Facilities are on 1500 sqm of laboratories. The Department organizes an average of three international conferences and workshop each year and several national conferences.

The department's research group for Telecommunications and Statistical Signal Processing is engaged in the design and analysis of algorithms for adaptive radar processing and other signal processing applications, including communication receivers for DS/CDMA. It is also active in the field of traffic measurements in IP

networks and anomaly detection. Development activities are in the DSP implementation of localization and tracking algorithms through acoustic array and FMCW radars. The research group has experience in specific topics in the area of security, monitoring, detection and tracking. It is part of a long-tradition school in signal processing, in particular for radar/sonar applications. Research activities over the years have focused on high-resolution radar clutter modelling, detection of radar signals in Gaussian and non-Gaussian disturbance, oil spill detection from SAR data, track-before-detect algorithms fed by space-time radar data, and localization. Recent topics are in the field of electronic counter-countermeasure strategies against jamming interferers, as well as different applications of tracking methodologies, including localization tasks in multi-sensor networks for both homogeneous and non-homogeneous environments. The group has been involved in several research projects with international partners. One of them, in particular, was in the context of UAVs. Other projects in the avionic field were carried out together with industrial partners, including Selex ES from the Finmeccanica group. Research collaborations are with the University of Colorado at Boulder, USA; the Colorado State University, USA; ISAE-Supaero (former Ensica), Toulouse, France; the University of Connecticut, USA; Forschungszentrum Telekommunikation Wien, Austria; Austrian Institute of Technology Vienna, Austria; University of Lubijana, Slovenia.

Website: https://www.unisalento.it/

Interview with Angelo Coluccia (UNLE)

SafeShore: What is your capacity at UNLE and how long have you been working there?

A. Coluccia: Since 2011 I have held a Researcher position at the Department of Engineering, University of Salento, in Lecce, Italy. Currently I am concluding the tenure-track phase for the rank of Associate Professor in Telecommunications. My research interests are in the broad area of statistical, array and multi-agent signal processing, including sensing and estimation in wireless networks, statistical learning, detection and localization.

SafeShore: How is UNLE's expertise relevant to SafeShore?

A. Coluccia: One of the main application areas where my research group is active is the field of surveillance systems (especially radar/sonar) and sensor networks; this has a strong match with the scope of SafeShore. In particular, I am responsible of the design of the data association, data fusion, and multi-target multi-sensor tracking algorithms, which are an important part of the SafeShore system.

SafeShore: What, in your opinion, will be the greatest accomplishment of SafeShore project as a whole for end-users?

A. Coluccia: I think that multidisciplinary projects like SafeShore are very interesting from

an academic point of view, because they help disciplines to find mutual connections and a common language. The resulting cross-fertilization of the different fields is a major outcome of such a process.

SafeShore: Which is your favourite time of year for visiting a beach? What is your favourite beach-related activity?

A. Coluccia: I live close to beaches and I like them in all seasons, because each one gives peculiar colours and feelings. I like sitting on the beach to read or think, and also taking long walks, all activities that are possible (or even better) outside summertime.

Royal Military Academy of Belgium (academic), BE

The Royal Military Academy is a military institution of university education responsible for the academic, military and physical training of future officers, and for the continuing advanced training of officers during their active career in the Defence department. Two entities within RMA are participating to the SafeShore proposal: The Unmanned Vehicle Centre and the Signal and Image Centre.

The Unmanned Vehicle Centre of the Department of Mechanics of RMA is a research laboratory specialising in the design, development and control of unmanned systems for both, ground and aerial vehicles. The lab conducts research in varied domains, ranging from very fundamental aspects to the development of prototype products. Research activities include robotics for crisis management operations and humanitarian demining.

The Signal & Image Centre SIC is a research centre focusing on signal and image processing applied to the fields of remote sensing, pattern recognition, data fusion, image restoration and image compression. The research activities include the processing of panchromatic, multi-spectral, hyper-spectral and full polarimetric SAR remote sensing data.

RMA not only acts purely as research institute, but is also closely committed to end-users and has a proven track record of operating on the field with end-users.

As a military institute, RMA has access to an international network of relevant end-users (border protection agencies, procurement agencies).

Website: http://www.rma.ac.be/en/

Interview with Geert De Cubber (RMA)

SafeShore: What is your capacity at RMA and how long have you been working there?

G. De Cubber: I have been working for 11 years now at the department of Mechanics of the Belgian Royal Military Academy. At first, I was still a PhD student and later I became more involved as a researcher in all kinds of projects. From 2012 on, I became a project coordinator for a series of EU research projects.

SafeShore: How is RMA's expertise relevant to SafeShore?

G. De Cubber: The Belgian Royal Military Academy is a the university of Belgian Defence, so our vocation is to do research within the security and defense domain. Within the department of Mechanics of the Belgian Royal Military Academy, we have formed a research unit which is called "Robotics for High-Risk Applications. Within this research unit, we look at several aspects related to robotics: from developing robotic tools to do good stuff (like what we did in previous EU research projects on search and rescue robots and humanitarian demining robots) to preventing robotic tools to do bad stuff (like what we're doing now in SafeShore).

SafeShore: What, in your opinion, will be the greatest accomplishment of SafeShore project as a whole?

G. De Cubber: Within the Counter-UAV domain, we see that most solutions are relying on (often expensive) RADAR technology. By choosing explicitly NOT to use RADAR technology, SafeShore is exploring really the technological feasibility limits of what is possible to achieve without relying on RADAR technology. This know-how will be essential for the development of future Counter-UAV systems.

SafeShore: Which is your favourite time of year for visiting a beach? What is your favourite beach-related activity?

G. De Cubber: In general, when I'm in the neighborhood of a beach, I'll try to pass by there for a stroll and to catch a breath of fresh air, irrespective of the time of the year. Of course, I do also like the sun and good weather like anybody else, so summer is certainly the time of year when you'll find me on a beach most often, not doing anything special, really, just playing and relaxing with my family.

Protection and Guard Service (end-user), RO

According to Romanian National Law, "Protection and Guard Service (SPP) is a state institution with tasks in the field of national safety, specialized in providing protection for

Romanian dignitaries, foreign dignitaries during their stay in Romania, and for their families, as well as in providing guard for the dignitaries' work places and residences, in accordance with the decisions of the Supreme Council of National Defence."

The SPP has a military structure and is part of the national defence system providing guard and protection at permanent and temporary venues, with a view to preventing, deterring and mitigating the effects of any hostile acts or actions, against persons, venues, adjacent areas, means of ground, air and naval transportation, as well as against the travel routes used by the dignitaries in question.

The SPP performs (independently or in cooperation with other bodies of law) search, identification and secure removal of relevant suspicious objects, in order to prevent and counter actions meant to endanger the life, physical integrity, health or freedom of action of the respective persons. SPP tackle elements of terrorist and/or aggressive nature. SPP organises and conducts, during missions of guard and protection, the activity of all participating forces. Moreover, the SPP ensures optimal security conditions for events attended by foreign dignitaries (e.g. European and international summits) held in Romania.

Considering the needs of the United Nations for training its close protection security personnel so that they meet global security requirements, a close protection training program is carried out in accordance with all applicable standards and procedures of safety and security of the UN. At their request, the SPP trained the protection and guard personnel from other countries, and also organized training sessions for certain structures of the national system of defence, public order and national security. In parallel with the activities carried out on national territory, the SPP cooperates with foreign intelligence services and departments with tasks in the field, having signed protocols and agreements of cooperation with these institutions. The SPP is an active member of ENPPF (European Network for the Protection of Public Figures) and APPS (Association of Personal Protection Services).

The personnel of the SPP are internationally acknowledged as highly-trained, and they participate in UN missions. Within the same context, the officers of the SPP participate in protection missions for UN high officials who work in operation fields like Afghanistan, Sudan, Syria, Libya, and Centrafrican Republic.

Website:

http://www.spp.ro/?p=124&lang=en

Interview with Dr Razvan Roman (SPP)

SafeShore: What is your capacity at SPP and how long have you been working there?

R. Roman: I graduated with a degree in engineering from the Military Technical Academy in 2001, being specialized in "Arms, missiles, air-

craft ammunition and rescue systems". Since then, I worked in Romanian Air Forces for several years and after that I joined the SPP. Starting from 2013, I was involved directly in research and innovation activities (H2020 projects) and I am very proud that SafeShore is my first financed project, so I consider this project as ''my child''. Since then, we succeeded to be partners in other five H2020 projects and beneficiaries in other two national funded projects. At this moment I am leading the Projects Implementation and Coordination Unit.

SafeShore: How is SPP's expertise relevant to SafeShore?

R. Roman: The main objective of the SafeShore project is to cover existing gaps in coastal border surveillance and increase internal security by preventing cross-border crime such trafficking in human beings and the smuggling of drugs. At a first view, it may looks that SafeShore is a dedicated project for border security, but as we highlighted from the project proposal stage, the same technology is extremely suitable and needed for other use cases such detection of RPAS, boats and human intruders onto the sea shore, in order to protect critical infrastructures, VIP working and living places.

The SPP is a state body with functions in the field of national security, specialized in providing protection for the Romanian dignitaries, the foreign dignitaries during their stay in Romania, and their families, within its legal competence. It also provides guard for the headquarters and residences of the above-mentioned dignitaries in accordance with the decisions of the Supreme Council of National Defence. Unfortunately, during the recent years, many dignitary protection organisations have faced with the illegal use of small commercial drones, against the protected dignitaries, as for instance in Germany, Japan and lately in Venezuela.

The profile and the relevant field experience of my organisation was very relevant for the project, during the entire development cycle, starting with the mission requirements definition and regulations & methodologies assessment. As we have people with strong expertise also on technical issues, we are very proud that we strongly contributed also in the technical part of the project, as for instance is the GIS platform development, C2 server, interfaces and GUI development. The participation and preparation of the final tests is also a strong commitment and contribution in the project of the SPP. It should be mentioned also, the strong involvement of SPP in dissemination activities, using our networks like ENPPF (European Network for the Protection of Public Figures) and APPS (Association of Personal Protection Services), through direct discussions with our counterparts and interested stakeholders. Even though SPP is considered an end-user, the involvement in academic activities is relevant and it should be mentioned that one of our team members contributed with two academic papers linked with the project and we succeeded to organize the 1st International Workshop on Research & Innovation for Secure Societies - RISS 2018. This workshop was a component of COMM 2018 International Conference, and SafeShore was a contributor to this success.

SafeShore: What, in your opinion, will be the greatest accomplishment of SafeShore project as a whole for end-users?

R. Roman: The main accomplishment of the SafeShore project is that it has a direct impact to the end-users and indirectly to the wider public. At the end of the ''road'', we succeeded to develop a solution adaptable to many use cases, a very important aspect since for LEAs, every mission is different from the previous one. We are talking about a sort of "all in one" and "one for all" system, usable for border security, critical infrastructure protection, VIPs protection, etc. Another important accomplishment is that the solution was developed by industrial and academic partners, based on detailed specifications, feedback and tests of the end users, so at the end the system is designed to cover in details the needs.

SafeShore: Which is your favorite stretch of beach in Europe and why?

R. Roman: Certainly the summer time and if it is possible for a longer period. I am very in love with the sea, so I am thinking after retirement to have a small house to the sea side. Whether it's the fresh air, the calming colour of it, or the sounds it produces, there's something extremely fascinating about the sea.

I would make a joke here. Since the deadline for H2020 project proposal submission is at the end of August, my favourite beach-related activity is to work on proposals, budgets, online meetings and so on. Now, to be serious, I just like to lay on the sun with my wife and swim with my son. He is in love with the mountains and I always have to convince him to accept 2 weeks at the sea side, but as he likes to swim, I always win. I strongly recommend you one of the most popular travel destinations both in Romania, as well as in Bulgaria - the Black Sea.

SafeShore System "On the Market"

SafeShore system for End-Users

by Susanne Binder (QMUL)

SafeShore project is a Research and Innovation Action running under the H2020 funding framework and thus has its focus set on research into and exploitation of latest technology, along with furthering of such relevant technology. The resulting SafeShore System should be seen as Prototype which is the first of its kind in respect of its specification, i.e. the unique combination of detectors and data technology used. The system and its possibilities represent the first stepping stone towards sophisticated, accurate, economical, and sustainable surveillance of our coastal borders.

However, further to the Prototype which will (in a limited capacity) remain available for demonstration purposes, we are proud to announce that both, the system as a whole as well as individual components are envisaged to be commercialised and ready to be developed to the required level pending demand and funding necessary to take the prototype from TRL6 to the level of a market product, TRL9. One of our reports has set out to concretize such possibility, detailing specification and predicted cost for various scenarios as well as considering options for (initial or ongoing) product support. SafeShore has since also produced related information material in form of brochures, but would like to invite those who rightly recognise SafeShore's use in practice, to get in touch with members of our team who will be able to disclose much greater detail to trusted individuals on a confidential basis.

SafeShore Trial Part 2

Israel (June 2018)

by Susanne Binder (QMUL)

SafeShore System's second trial phase took place at the shoreline of the Mediterranean Sea, in Israel. As per the test case requirements and as expected, both, set-up locations and weather conditions here were different from those at the North Sea and formed different challenges. In terms of climate, these challenges were high temperatures and the very high humidity which are typical for the local summer season.

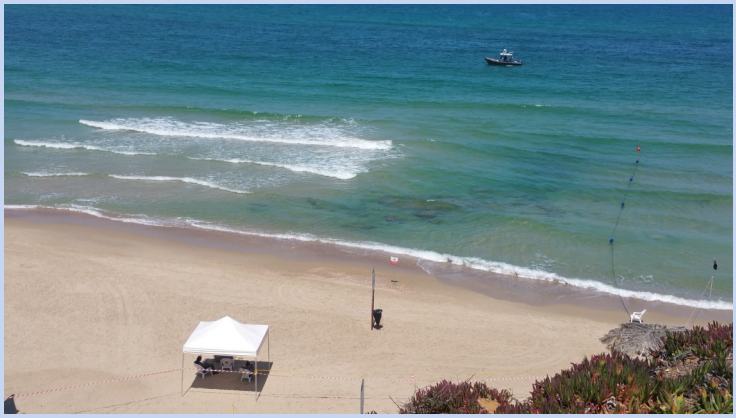
Image of SafeShore detectors on a raised cliff

This second phase was pivotal to identifying solutions for some as-yet unresolved issues. As specified in the test case scenarios, the trials were focused on positioning the system on a cliff in order to challenge the system's capabilities in such a topographical environment. In addition, the 2D LIDAR was placed on the stretch of beach below the cliffs to prevent the possibility of blind spots.

Image of the 2D LIDAR at the beach

The trails included scenarios of infiltration from the maritime border environment such as: jet ski riders, boats, swimmers coming from the shoreline.

As in Nieuwpoort, the trial phase culminated in a VIP event, guests of which included officials from INP, the Border Police, the Planning Section and from the Ministry of Public Security, representatives of the European Commission, other representatives from various organizations such as the Israel-Europe R&I Directorate, the Industry and Trade Bureau/ Technological Innovation Department and the Parliament Guard, and also some regional press.



The event commenced with an introduction into SafeShore project's objectives and achievements, then, participants gathered at the shore line to watch a display of the SafeShore detection system in action.
Different types of vessels, and low altitude UAS were tested so that the system could track them.

Continue with Trial Part 3 on p.14

DATES FOR YOUR DIARY:

Here are a few upcoming dates for putting in your calendar!

27/11/2018 - VIP Event to conclude SafeShore Trial 3 in Neptun Town, Romania

04/12/2018 - SafeShore-Alfa End-User-Workshop in Brussels, Belgium

05/12/2018 - SafeShore Presentation at the Security Research Event, Brussels, Belgium

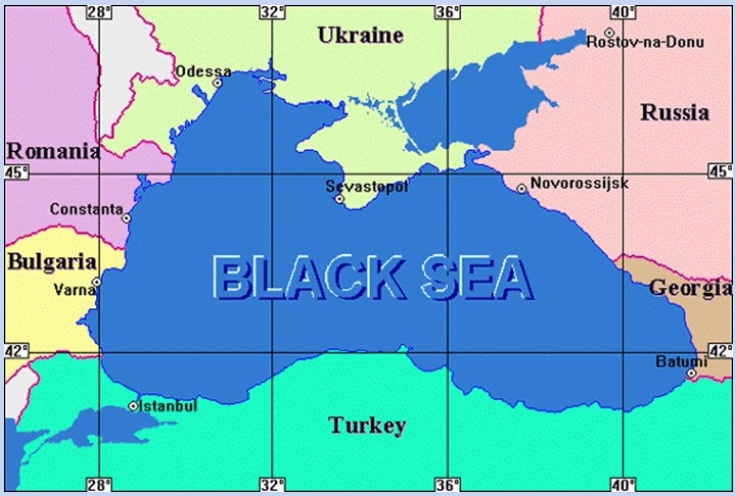
ROMANIA SPECIAL

100 Years Romania

by Razvan Roman (SPP)

The last leg of SafeShore System's test phase coincides with the historic celebrations of its host country, Romania, namely the nation's 100th anniversary. For this reason, we took the liberty to dedicate two pages to some related trivia.

The Black Sea is a large inland sea situated at the south-eastern extremity of Europe. It is bordered by Ukraine to the north, Russia to the northeast, Georgia to the east, Turkey to the south, and Bulgaria and Romania to the west. Since ancient times, the Black Sea was a connection path through which the native population of the Pontic regions encountered the Mycenaean culture



Map of countries bordering on the Black Sea

One of the most intriguing and little known Black Sea trivia questions is the origin of its name, which remains unclear. Theories suggest that at first, the body of water was called "inhospitable Sea", mostly because of the presence of savage tribes on its shores. (The name was changed to "hospitable" once the Greeks took over.) Out of the many names given to it by various tribes and people over time, "Black Sea" was the one that stuck. Some think the Turkish came up with it during medieval times. Further speculation sees the name inspired by the winter storms which make the water appear black, or attribute it to the colour of the flotsam and jetsam commonly found along its shorelines, which is usually covered in black sludge.

Another fascinating fact about the Black Sea is its anoxic water which has a significant absence of oxygen. The Black Sea happens to be the largest water body with a meromictic basin, a rare phenomenon, which means that upper and lower layers of water do not intermix resulting in considerable temperature difference between these layers and in lower layers' absolute lack of oxygen rendering them inactive. While the Black sea receives fresh water from its rivers and rainfall the only water transfer takes place with the Mediterranean Sea, with salt water flowing in at the bottom of the basin, sea life cannot survive in that anoxic zone of Black Sea but only in the oxygen-rich surface waters.

The absence of any high or low tides gives the Black Sea no fluctuation in the water level, lending it a calm, quiet and serene surface. With its clean, freshwater surface layer, swimming in the Black Sea is possible

although it offers a different experience from other water bodies. Due to its high mineral content, even fairly dense or less buoyant objects tend to float easily on the water.

Map of sunken ships near Romanian coastline

The anoxic nature of the water also means that decomposition and decay of sunken material happens at an extremely slow rate so that remains of ships, any decomposable materials like ropes, wood etc. and even dead human bodies can still be found “in tact” at the seabed, hundreds of years after their entry into the waters of the Black Sea.

There are about 180 species of fish in the Black Sea, a fifth of them of commercial importance. Some seasonal migration of fish occurs, notably through the Bosporus.

The Danube Delta is such a unique region in Europe that it can easily be considered one of nature’s wonders. The Delta attracts tourists from around the world yet wildlife and natural charm have remained unspoilt and have successfully been protected from tourist exploitation. The Delta forms part of UNESCO heritage, and received the award for Sustainable Tourism in 2011.

In the context of its 100 year anniversary, it is noteworthy that Romania has another upcoming event to celebrate: It will commence its 6-months presidency at the European Council in January 2019.

SafeShore Trial Part 3

Romania

by Susanne Binder (QMUL)

The Romanian Black Sea trial is the last in a series of 3 evaluation events where the SafeShore Detector Prototype will be put to the test in realistic operational conditions in a maritime environment. The SafeShore trials will be held on a public beach at the summer resort Neptun Town which forms part of Mangalia City local authority. In order to ensure the safety of airspace and so that our test UAV can be navigated according to the

test case requirements, the site is located away from major airports (the “nearest” ones are Bucharest Henry Coanda International Airport, and Constanta "Mihail Kogalniceanu" International Airport repectively).

The trials will be concluded on 27/11/2018 with a VIP event for which the expected attendance includes SafeShore End-User-Board members, EU/EDA Officials, Representatives of FRONTEX and of Romanian National Bodies, Critical Infrastructure and Industry Operators, members of ENPPF (European Network for the Protection of Public Figures) and APPS (Association of Personal Protection Services), and press. We intend to perform a demonstration of SafeShore detection capabilities aimed at covering as many of the detection modalities as possible. The event will commence with an indoor presentation of SafeShore project, followed by a live demonstration of the system which will take place outside at the beach. Due to the late season of year, the exact schedule and content of this second part of the day is weather-dependent and will remain open until shortly before the event. Guests are then invited to a Networking Lunch with press briefing and subsequent Q&A session.

Our team is waiting in eager anticipation for this crowning finale of SafeShore project and is looking forward to sharing the story with you. Also, don‘t forget that in 2019, SafeShore System will be deployed by Romania for the protection of our EU leaders, during Romania‘s presidency in the EU council!

Contact

For further information about the project and SafeShore System / Prototype please get in touch with one of our representatives (below) or contact us via our website.

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SafeShore partners: