



## ROBORDER WEBSITE AND COMMUNICATION MATERIAL



ROBORDER  
740593

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The project website is the face of the ROBORDER project to the world. This document describes the objectives of the website and then presents its structure, the different sections and functionalities and how it is going to be used throughout the project lifecycle. In addition, it presents the required dissemination materials such as factsheet, leaflet and the project's presentation.



## Document History

| Date       | Version | Remarks                  |
|------------|---------|--------------------------|
| 25/07/2017 | 0.1     | Initial structure        |
| 26/07/2017 | 0.2     | 1 <sup>st</sup> Revision |
| 27/07/2017 | 0.3     | 2 <sup>nd</sup> Revision |
| 31/07/2017 | 1.0     | Final Draft              |

## Document Authors

| Entity | Contributors           | Contact information |
|--------|------------------------|---------------------|
| CERTH  | Konstantinos Ioannidis | kioannid@iti.gr     |

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## **Executive Summary**

The document describes the project website (Deliverable D7.2) that will be used by the consortium to present ROBORDER to the community. The website will be the focal point for all people interested in project news, as it will be the fastest way to disseminate new information. This document describes the overall purpose of the website, its structure and how it is going to be used to disseminate the project developments. In addition, the document includes the descriptions of all the additional materials for optimized dissemination of the project.



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# 1 Introduction

The success and impact of a large research project such as ROBORDER is intrinsically connected with the definition and implementation of an efficient connection with interested research and user communities that enables information exchange between the three parties. A well established and attractive communication will have a large impact on the dissemination of the new developments and of the achieved results.

During the current era, this can be efficiently achieved by exploiting digital channels, such as traditional and social media but also through a classic website. The website has the advantage of simultaneously presenting information to a large group on demand as well as providing static information e.g. a project description and its envisioned outcomes. Moreover, it can deliver reoccurring and constantly changing pieces of information such as project progress reports or new results from the project.

In addition, further activities regarding the dissemination of the project's results will be engaged so that the community will be aware of the project's purpose and vision. The consortium will develop additional dissemination materials such as presentation, brochure, factsheet and newsletters.

The purpose of this document is to provide additional details, an abstract presentation and insights of ROBORDER website as part of the first section of this deliverable (Section 4). Section 5 presents thorough details about the additional dissemination materials that will be exploited for the dissemination and exploitation plan of the ROBORDER project. Section 6 concludes this deliverable with a summarization of the presented materials.



## 2 Objectives

The project website has been designed to provide a sufficient overview and point out highlights. It will present information about concepts, vision, objectives and expected outcomes of the ROBORDER project.

More specific, the project's website main page will describe the goals of the project in an understandable way. There will be up-to-date information on intermediate and final project results, including public reports and publications deriving from the project work. In addition, specific tabs of the website will provide an overview on planned project events, including e.g. user group meetings, conferences and workshops, but also offer links to other relevant projects and links to partners' websites. The project will furthermore establish a presence in relevant social media channels such as Facebook<sup>1</sup>, LinkedIn<sup>2</sup> and Twitter<sup>3</sup>. All publicly available results of the project (such as code snippets, datasheets and publications) will be available on the website for download. Finally, ROBORDER website will also include contact details, for proper communication between the community and the project team.

In the context of the dissemination activities, the corresponding additional material aims at raising the community's awareness, informing and promoting outputs and results. The consortium created a presentation where the main objectives and the vision of the project are presented. An initial overview of the ROBORDER architecture based on what the consortium aims to achieve is also included. Besides the project's presentation, the developed communication kit also includes a leaflet which presents the project's vision, the expected impact and results. Three main demonstrators and the general use cases are especially highlighted in order to introduce the system's main application scenarios. A more concise presentation of the project is included in the created factsheet. The factsheet targets at presenting basic aspects of the project nonetheless, its main task is to promote the communication information. Finally, the use of a frequent newsletter will enhance further the promotion of the project's results.

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<sup>1</sup> <https://www.facebook.com/robordereu/>

<sup>2</sup> <https://www.linkedin.com/in/roborder/>

<sup>3</sup> [https://twitter.com/roborder\\_eu](https://twitter.com/roborder_eu)

### 3 Main goals of the website and the dissemination material

The website<sup>4</sup> will be the showcase of the ROBORDER project to the world. It is expected to operate as a central point of attraction for everyone who is interested in the activities of the consortium regarding the project goal. The main goals of the website are:

- **Informing** an interested public about ROBORDER and its progress.
- **Attracting** an audience of people interested in ROBORDER.
- **Connecting** to the community of experts in the research field of ROBORDER.

The website was developed based on a clear structure and uses common language to describe all the aspects of the project. This facilitates the presentation of information regarding the envisioned goals, the current state, as well as the ongoing activities of the project. The website also accords the capability of downloading the additional dissemination material files. Figure 1 depicts a snapshot of the homepage of the website.



**ROBORDER** aims at developing and demonstrating a fully-functional autonomous border surveillance system with unmanned mobile robots including aerial, water surface, underwater and ground vehicles which will incorporate multimodal sensors as part of an interoperable network. Our intention is to implement a heterogenous robot system and enhance it with detection capabilities for early identification of criminal activities at border and coastal areas along with marine pollution events.

**Figure 1** - Home page of the ROBORDER website.

Additional dissemination material will be exploited in order to further raise the community's awareness in a variety of events. More specific, communication kit (flyer and presentation) will be used in conferences/workshops as well as in any related seminar/meeting or any other event for promoting the ROBORDER system in a wider research and industrial community. Factsheet will also be available for such cases depending on the desired dissemination objective and the corresponding event.

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<sup>4</sup> <http://www.roborder.eu>



## 4 The project's website

### 4.1 Overview

When entering the website, the most recent information about the project along with the basic information is presented to the user. The foremost information is prominently placed in a slider that displays the headers of the three operational scenarios in order to trigger the interest of people in further reading. The slider can include different type of information. All the available elements will be used to present the desired information regarding the project in an attractive manner to visitors.

Below the slider there are additional entries about the main objectives and challenges of the project as well as a schematic representation of the system's architecture. Both slider and text entries are going to report about the project and also publish news from the community surrounding ROBORDER. Additionally, the members of the consortium are presented along with their logo. By clicking a single logo, the visitor is redirected to the corresponding partner's website.

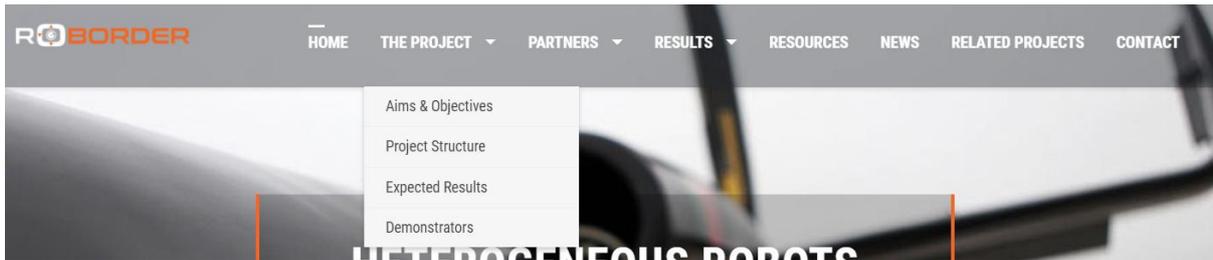
At the same time, the user is offered a well-structured site menu leading to webpages with more detailed information as shown in Figure 2. The categories shown give additional insights into the project and present details about the consortium and its current achievements. An overview is also provided of the public events as well as links to other relevant projects and expert groups cooperating with ROBORDER. Finally, contact information is also provided.



Figure 2 - Header of the website with the navigation bar.

### 4.2 Project Information

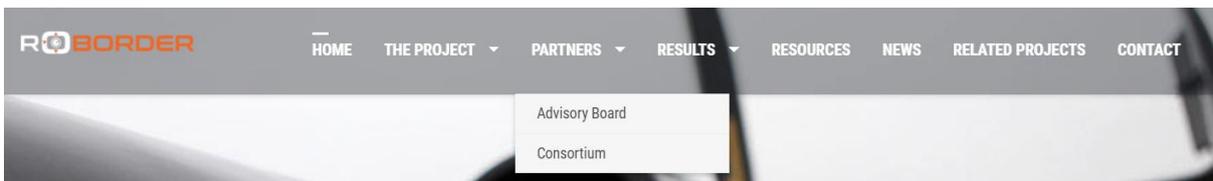
Following "THE PROJECT" tab (Figure 3), the visitor can read an analytic description about the project's main aims and objectives ("Aims & Objectives" subtab) as well as the pilot use cases based on which the system will be validated. In the case visitors would like to be informed about the structure of the project's implementation, subtab "Project Structure" was created where a brief description of every work-package and the lead partner are included. The expected results, both from technical and societal point of view, are thoroughly presented in subtab "Expected results". The last subtab "Demonstrators" describes extensively the real scenarios and applications based on which the final system will be tested and evaluated.



**Figure 3 - "THE PROJECT" tab and the corresponding subtabs.**

### 4.3 Partners

The external advisory board of the project is presented in the subtab “Advisory Board” of the tab “PARTNERS” (Figure 4). Additionally, every member of the consortium with a brief description of their profile are given in the subtab “Consortium”. A visitor can click over the logos and the website redirects the user to the partner’s site for further information.



**Figure 4 - "PARTNERS" tab and the relevant subtabs.**

### 4.4 Results

In order to provide the visitor a better understanding of the current state of the ROBORDER project, all relevant project results will be delivered under the tab “RESULTS” (Figure 5). The website offers a subtab named “Public Deliverables”, where a concise table is provided. The table will include all the project’s deliverables with information like name, description, level of confidentiality and month of completion. According to every deliverable’s security level, the final documentation will be publicly available. Two extra subtabs are included, “Presentations” and “Publications”. These sections will include all publications like academic papers, public presentations on the project, press releases issued by the project team or project reports. All information will be downloadable under specific license agreement. In addition, “Software” and “Datasets” subtabs will provide any developed code denoted as open source and based on the level of its confidentiality as well as potential datasets that could be used for testing the individual algorithms.

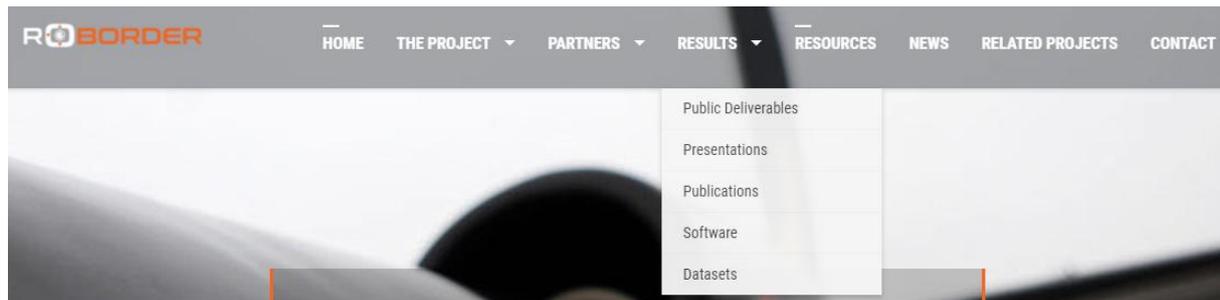


Figure 5 - "RESULTS" tab and the corresponding subtabs.

## 4.5 Resources

The main menu of the website also includes a "RESOURCES" tab where the visitor has access to the additional dissemination materials. The corresponding tab includes multiple pdf files available for downloading which correspond to the project's presentation, leaflet and factsheet. Additional information for these files can be found in Section 5 of this deliverable.

## 4.6 News

The website includes a dedicated tab named as "NEWS" where the visitor can be informed of the latest news, relevant to the project. In order to retain the community's interest, the tab will include news regarding both the technical implementation and various dissemination events. The "NEWS" tab will be continuously updated and function also as a "repository" of older news.

## 4.7 Related projects

ROBORDER exploits technologies that were initially used in relevant innovation and research projects. Technologies and approaches like sensor fusion and advanced radar systems were developed under the scope of other EU funded projects. The tab "RELATED PROJECTS" lists all related projects including their links, a short description and their relevance with the ROBORDER project (Figure 6). ROBORDER will collaborate with these project teams to assure the reuse of project results wherever it makes sense, gain from synergies and modify module properties when required.



|  |                  |
|--|------------------|
| <p><b>TENSOR (H2020-SECURITY)</b><br/>Retrieval and Analysis of Heterogeneous Online Content for Terrorist Activity Recognition</p>  | <p>TENSOR</p>    |
|   | <p>RAWFIE</p>    |
| <p><b>Project Description</b><br/>Law Enforcement Agencies (LEAs) across Europe face today important challenges in how they identify, gather and interpret terrorist generated content online. The Dark Web presents additional challenges due to its inaccessibility and the fact that undetected material can contribute to the advancement of terrorist violence and radicalisation. LEAs also face the challenge of extracting and summarising meaningful and relevant content hidden in huge amounts of online data to inform their resource deployment and investigations.</p> | <p>GAMALINK</p>  |
|  | <p>BODEGA</p>    |
|  | <p>SCOUT</p>     |
|  | <p>HOMER</p>     |
|  | <p>SAFESHORE</p> |

**Figure 6 - Overview of related EU projects.**

### 4.8 Contact

For people interested in more details or in submitting questions or inquiries, the website affords a separate “CONTACT” tab. The tab is enriched with all the required information in order to get in touch with the desired consortium member. In particular, the contact info of the project manager, the scientific and technical manager, the project’s security officer and the innovation manager are included. For successful communication, the visitor must provide his/her credentials in order to identify himself/herself and submit the desired question.

### 4.9 Additional elements

The footer (Figure 7) of the website offers the capability to a visitor to be subscribed to the project’s newsletter. By providing a valid e-mail address, the corresponding visitor will receive the newsletter once it is available. Moreover, the footer offers also social media connection to ROBORDER to underline the social presence of the project. Finally, it contains the H2020 funding information.

|   |  |  |
|---|--|--|
| <p><b>ROBORDER</b><br/>Autonomous swarm of heterogeneous robots for border surveillance<br/> This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 740593.</p> | <p><b>SUBSCRIBE TO OUR NEWSLETTER!</b><br/>Email Address<br/><input type="text"/><br/><input type="button" value="Subscribe"/></p> | <p><b>FOLLOW US ON SOCIAL MEDIA!</b><br/>  </p> |
|---|--|--|

**Figure 7 - Website footer.**

## 5 Dissemination material

The dissemination material includes the following instruments:

- Communication kit including a leaflet and an overview presentation;
- Fact sheet;
- Newsletter.

### 5.1 Project communication kit

A project “communication kit” has been designed and includes **(a)** a presentation (Figure 8) and **(b)** a leaflet (Figure 9). This will aid the dissemination activities and ensure a consistent communication of the project concept, objectives and results. The leaflet and the fact sheet will be distributed at project workshops and conferences, where project members will participate. The entire presentation and the leaflet are included in the Appendix A.1 and A.2, respectively.

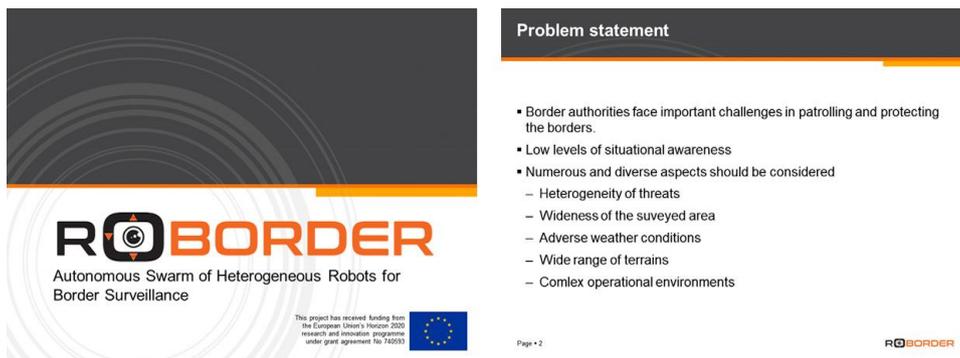


Figure 8 - ROBORDER Presentation.



Figure 9 - ROBORDER leaflet.

During the lifetime of the project, the leaflet and the presentation will be constantly updated. The first version will disseminate the objectives, the concept and vision of ROBORDER. When project results, outcomes and findings become available, they will be included in a subsequent version. This material will be used to all public events (conferences, workshops, exhibitions, etc.), where ROBORDER partners will participate. Both files are in a downloadable form from the project's website<sup>5</sup>.

## 5.2 Factsheet

The designed document describes in a concise way the project's outline, its goals, the pilot use cases, expected achievements and impact; in addition it contains the organizational information such as list of participants, timeline, contact details and information on the European Commission Funding. The factsheet (Figure 10) will be available and published both in an online version<sup>6</sup> and in printed version, when required for specific occasions. Appendix A.3 includes the factsheet as a larger representation.

**ROBORDER** Autonomous Swarm of Heterogeneous Robots for Border Surveillance

**Project Coordinator**  
 TEKEVER Autonomous Systems  
 Rua das Musas 3.30  
 1990-164 Lisbon, Portugal  
 Mr. Andre Oliveira (project coordinator)  
 T: +351213304300  
 E-mail: [andre.oliveira@tekever.com](mailto:andre.oliveira@tekever.com)  
 Prof. Elias Kosmatopoulos (scientific manager)  
 T: +302310464160  
 E-mail: [kosmatop@iti.gr](mailto:kosmatop@iti.gr)

**Website:** <http://www.roborder.eu>  
**Duration:** 05/2017-04/2020  
**Total cost:** € 8.997.781

**Description**  
 Border authorities and Law Enforcement Agencies (LEAs) across Europe face important challenges in how they patrol and protect the borders. Their work becomes more problematic considering the heterogeneity of threats, the wideness of the surveyed area, the adverse weather conditions and the wide range of terrains. The vision of ROBORDER is to develop and demonstrate a fully-functional autonomous border surveillance system with unmanned mobile robots equipped with multimodal sensors. Our intention is to implement a heterogeneous robot system and enhance it with detection capabilities for early identification of criminal activities at border and coastal areas along with marine pollution events.

**Objectives**  
 ROBORDER addresses the following objectives:  
 1) Autonomous border surveillance system with unmanned mobile robots.  
 2) Incorporate multimodal sensors as part of an interoperable network.  
 3) Enhanced static networked sensors.  
 4) Early identification of criminal activities.  
 5) Accurate operations in a wide range of operational and environmental settings.

**Pilot use cases-Demonstrators**  
 1) Unauthorised sea border crossing.  
 2) Unauthorised land border crossing.  
 3) Detecting pollution accidents.

**Impact**  
 The ROBORDER system is expected to:  
 • Enhance the protection of human lives exposed at land and sea.  
 • Improve identification and tracking of illegal activities.  
 • Accurately detect marine pollution incidents.  
 • Support governmental agencies for improving environmental protection.

**Outcomes**  
 Main results of the final deployed system can be summarised as:  
 • Provide an overall border security solution.  
 • Effective operation of heterogeneous multi-asset system by a single operator.  
 • Improved payloads and contributions to UxV cyber-security.  
 • Improved automatic threat recognition.  
 • Photonic radar network and passive radar onboard UAV.

**Consortium**  
 TEKEVER, iti, Information Technologies Institute, Fraunhofer IPA, EVERIS, VTT, Robotnik, CENTRIC, OceanScan, CEPTING, csem, cniit, LST CapriTech, S&T, CMAL E, and various national research institutions.

Figure 10 - ROBORDER Factsheet.

<sup>5</sup> <http://roborder.eu/resources/>

<sup>6</sup> [http://roborder.eu/wp-content/uploads/2017/07/Roborder\\_Factsheet.pdf](http://roborder.eu/wp-content/uploads/2017/07/Roborder_Factsheet.pdf)



### **5.3 Newsletter**

The ROBORDER project partners will promote the results of the project through an informative newsletter. The project information consisting of updates and information regarding the progress of the project will be included in the newsletter, produced based on the dissemination plan. The news regarding ROBORDER initiation and objectives are expected to be published in the forthcoming period based on the completion of specific tasks.

## **6 Summary**

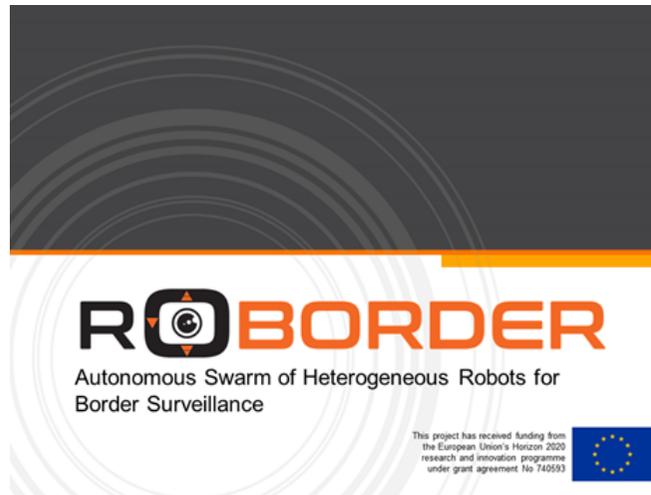
In this deliverable, we presented the ROBORDER website as well as the dissemination material in order to promote and raise awareness in the community. More specific, the website will help ROBORDER to keep in contact with the surrounding research, user and industrial community. Its success will strictly rely on how often it is updated and used by the project members. Therefore, it is necessary to continuously provide status updates on the project's progress but also news and topics discussed in the community. Thereby, making the ROBORDER website a focal point for people interested not only in the project but also in the broader research areas.

Except the project's website, several other products will be exploited for the dissemination process. Every material will be used for different events nonetheless, aiming at the same objective. The presentation will be used as a mean of introduction to the community of the objectives and the main characteristics of ROBORDER. The leaflet and the factsheet will be exploited in a variety of events so that the promotion of the project could be achieved in personal with the interested individuals.



## A. Appendix

### A.1. ROBORDER presentation



#### Problem statement

- Border authorities face important challenges in patrolling and protecting the borders.
- Low levels of situational awareness
- Numerous and diverse aspects should be considered
  - Heterogeneity of threats
  - Wideness of the surveyed area
  - Adverse weather conditions
  - Wide range of terrains
  - Complex operational environments

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#### Context & Vision

- The overall framework for the Roborder project includes multiple domains
  - Border surveillance
  - Marine pollution detection
  - Situational awareness
- Vision
  - Develop and demonstrate a fully-functional autonomous border surveillance system
  - Unmanned mobile robots equipped with multimodal sensors
  - Enhanced detection capabilities for early identification of criminal activities and marine pollution events

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#### Objectives

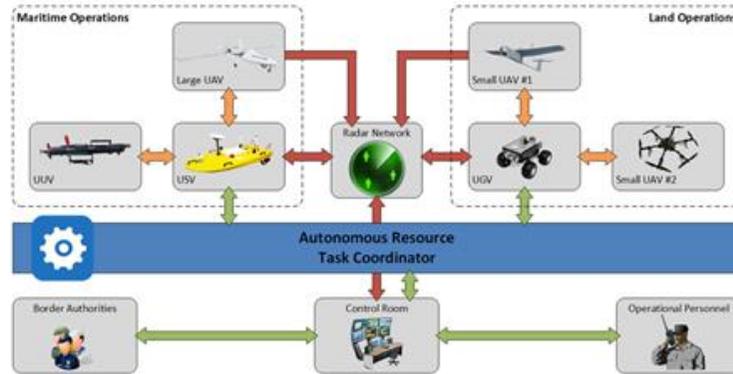
- Main objectives
  - Autonomous border surveillance system with unmanned mobile robots
  - Incorporate multimodal sensors as part of an interoperable network
  - Wide range of operational and environmental settings
  - Enhanced static networked sensors
  - Complete and situational awareness picture
  - Early identification of criminal activities and hazardous incidents
- Innovation objectives
  - Adaptable sensing, robotics, and communication technologies
  - Tele-operation of autonomous agents through a 3D user interface and decision support

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### ROBORDER Architecture



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### Use case scenarios

- Early identification and tracking of illegal activities
  - Detecting unauthorized sea border crossing
  - Detecting unauthorized land border crossing and signals trespassers
  - Detecting unauthorized land border crossing
  - Tracking high-tech smugglers
  - Detecting the terrorist coming through cross border
  - Early and effective identification of passive boats moving offshore
  - Tracking organized crime activity in remote border areas
- Early identification and tracking of illegal communications
  - Detecting jamming attacks
- Detection of pollution and other accidents occurred in the borders
  - Detecting pollution accidents

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### Demonstrators

- Unauthorized sea border crossing
  - Monitoring sea passages and islets
  - Plethora of sensors: Coastal radars, optical cameras etc.
  - Interaction of mobile devices with static infrastructure
- Unauthorized land border crossing
  - Patrol hardly accessible territories
  - Tracking illegal activities to mitigate personal risks
- Detecting pollution accidents
  - Tracking pollutants spilled at sea
  - Determining key environmental conditions

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### Impact

- Expected impact
  - Enhance the protection of human lives exposed at land and sea
  - Improve identification and tracking illegal activities
  - Influence positively anti-drug and anti-smuggling operations
  - Perform improved search and rescue operations
  - Improve environmental protection for governmental agencies
- Expected results
  - Provide an overall border security solution
  - Effective operation of heterogenous multi-asset system
  - Photonic radar network and UAV onboard passive radar
  - Threat recognition and identification of cyber physical attacks

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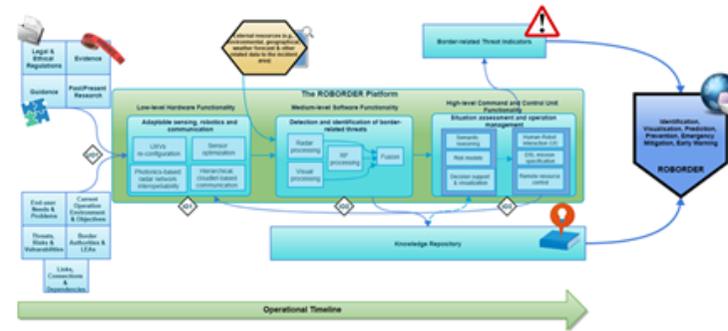


### Work plan

|  |       |       |       |       |       |  |       |       |       |       |  |       |       |       |       |       |
|--|-------|-------|-------|-------|-------|--|-------|-------|-------|-------|--|-------|-------|-------|-------|-------|
| IO1 Adaptable sensing, robotics and communication technologies for different operational and environmental needs |       |       |       |       |       | IO2 Detection and identification of border-related threats |       |       |       |       | IO3 Tele-operation of autonomous agents through a 3D user interface and decision support |       |       |       |       |       |
| IA1.1  | IA1.2 | IA1.3 | IA1.4 | IA1.5 | IA1.6 | IA2.1  | IA2.2 | IA2.3 | IA2.4 | IA2.5 | IA3.1  | IA3.2 | IA3.3 | IA3.4 | IA3.5 | IA3.6 |
| WP2 Sensing, robotics and communication technologies   |       |       |       |       |       | WP3 Detection and identification of border-related threats |       |       |       |       | WP4 Command and control unit functionalities   |       |       |       |       |       |

|   |  |                                      |  |                                    |        |        |        |        |
|---|--|--------------------------------------|--|------------------------------------|--------|--------|--------|--------|
| IO4 ROBORDER platform development and integration | UD1 User requirements definition, end-user evaluation and validation | IMO1 Dissemination and collaboration | IMO2 Exploitation and sustainability model |                                    |        |        |        |        |
|   | UA1.1  | UA1.2                                | UA1.3                                      | IMA1.1                             | IMA1.2 | IMA2.1 | IMA2.2 | IMA2.3 |
| WP5 Integration of ROBORDER platform              | WP1 User requirements and pilot use cases                            |                                      | WP6 Demonstrations and evaluation          | WP7 Dissemination and exploitation |        |        |        |        |

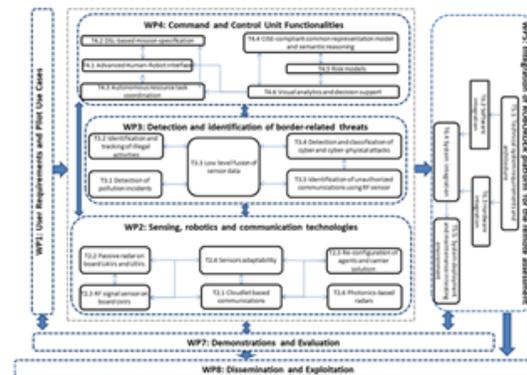
### Operational timeline



### Overall structure

- Package list
  - WP1: User requirements and pilot use cases
  - WP2: Sensing, robotics and communication technologies
  - WP3: Detection and identification of border-related threats
  - WP4: Command and control unit functionalities
  - WP5: Integration of Roborder platform for the remote assessment of border threats
  - WP6: Demonstrations and evaluation
  - WP7: Dissemination and exploitation
  - WP8: Project management
- Milestone List
  - MS1: Project setup and platform development roadmap
  - MS2: Operational prototype
  - MS3: 1<sup>st</sup> prototype
  - MS4: 2<sup>nd</sup> prototype
  - MS5: Final system

### Work packages interplay





## Evaluation & Outcomes

- Prototype and final system
  - User-oriented evaluation (end-users group etc.)
  - System-centric evaluation (metrics, indicators etc.)
  
- Outcomes
  - Final system dealing with 3 use cases
  - Fully operational and autonomous border surveillance system
  - Enhanced detection and classification capabilities
  - CISE-compliant representation model and semantic reasoning
  - Decision support and situational awareness

## Exploitation and Dissemination

- Exploitation of results
  - Development of proper modules and tools
  - Modules to be exploited by the technical partners
  - Business plan to exploit the final system
  
- Dissemination of results
  - Publications in scientific conferences and journals
  - Visits of website and social media (<http://roborder.eu/>)
  - Downloads of publicly available online material
  - Participation/attendance in workshops
  - Demonstration of results in end-users group

## Consortium



## Contact

- **Project coordinator:** Mr. Andre Oliveira  
Address: Rua das Musas 3.30, Lisbon, 1990-113, Portugal  
Email: [andre.oliveira@tekever.com](mailto:andre.oliveira@tekever.com)  
Phone: +351213304300
  
- **Scientific and technical manager:** Prof. Elias Kosmatopoulos  
Email: [kosmatop@iti.gr](mailto:kosmatop@iti.gr)
  
- **Project security officer:** Mr. Zoltan Szekeley  
Email: [dr.szekeley.Zoltan@gmail.com](mailto:dr.szekeley.Zoltan@gmail.com)
  
- **Innovation manager:** Mr. Miguel Gomez  
Email: [miguel.angel.gomez@everis.com](mailto:miguel.angel.gomez@everis.com)



## A.2. ROBORDER Leaflet

ROBORDER leaflet is a double sided three-folded A4 paper. Both sides of the leaflet are illustrated below.

### OBJECTIVES

The main objectives of the **ROBORDER** project are:

- Autonomous border surveillance system with unmanned mobile robots.
- Exploit aerial (UAV), water surface (USV), underwater (UUV) and ground (UGV) vehicles.
- Functioning as both standalone and in swarms.
- Incorporate multimodal sensors as part of an interoperable network.
- Accurate operations in a wide range of operational and environmental settings.
- Provide a complete and detailed situational awareness picture.
- Enhanced static networked sensors (passive radars, passive RF-signal sensing devices, thermal cameras).
- Detection capabilities for early identification of criminal activities and hazardous incidents.
- Additional command and control functionalities for optimized composition and operation of hardware.
- Design and demonstrate three large scale pilot use cases.

The innovation objectives of the **ROBORDER** project are:

- Adaptable sensing, robotics, and communication technologies.
- Detection and identification of border-related threats.
- Tele-operation of autonomous agents through a 3D user interface and decision support.
- Platform development and integration.

**Project Coordinator**  
 TEKEVER Autonomous Systems (TEK-AS), PT  
 Andre Oliveira (Project Coordinator)  
 T: +351213304300  
 E: andre.oliveira@tekever.com

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### VISION

Border authorities and Law Enforcement Agencies (LEAs) across Europe face important challenges in how they patrol and protect the borders. Their work becomes more problematic considering the heterogeneity of threats, the wideness of the surveyed area, the adverse weather conditions and the wide range of terrains. The vision of **ROBORDER** is to develop and demonstrate a fully-functional autonomous border surveillance system with unmanned mobile robots equipped with multimodal sensors. Our intention is to implement a heterogeneous robot system and enhance it with detection capabilities for early identification of criminal activities at border and coastal areas along with marine pollution events.

### EXPECTED IMPACT

Societal impact describes the improvements that an innovative border surveillance system like **ROBORDER** will bring to the early detection of illegal activities and pollution incidents. Our system is expected to:

- Enhance the protection of human lives exposed at land and sea.
- Improve identification and tracking of illegal activities.
- Influence positively anti-drug and anti-smuggling operations.
- Perform improved Search and Rescue (SAR) operations.

The proposed system incorporates adaptable sensing, robotics, and communication technologies for different operational and environmental needs.

- Environment-friendly platforms and operations.
- Accurate detection of marine pollution incidents.
- Business solution for governmental agencies for improving environmental protection.

### DEMONSTRATORS

**Unauthorized sea border crossing**

The use case involves the monitoring of sea passages and slits in the Greek archipelago. The role of the data mule is assigned to heterogeneous autonomous vehicles equipped with a plethora of sensors like coastal radars, optical cameras etc. The mobile devices interact with static infrastructure enabling the commander to determine whether an alarming situation is developing.

**Unauthorized land border crossing**

The autonomous systems will allow to patrol hardy accessible territories leading to an optimized surveillance and control situation system with a maximum coverage. The exploited surveillance units will be the source for directing the patrols and tracking illegal activities in order to mitigate personal risks and increase monitoring capabilities.

### EXPECTED RESULTS

**ROBORDER** will generate technical outputs with significant impact to the field of border security. Main results of the final deployed system can be summarised as:

- Provide an overall border security solution.
- Enabling response to threats within minutes.
- Effective operation of heterogeneous multi-asset system by a single operator.
- Improved payloads and contributions to UAV cyber-security.
- Photonic radar network.
- Passive radar onboard UAV.
- Improved automatic threat recognition and identification of cyber physical attacks.

### CONTEXT

The overall framework for the **ROBORDER** project lies in the domain of border surveillance, marine pollution detection and situational awareness. The main objective is to detect and recognize illegal border activities, assess conditions and properly indicate and inform the border authorities and operational personnel about the area status.

### USE CASE SCENARIOS

- Early identification and tracking of illegal activities
- Detecting unauthorised sea border crossing.
- Detecting signals from trespassers.
- Detecting unauthorised land border crossing.
- Tracking high-tech smugglers.
- Detecting the terrorist attack coming through cross border.
- Identifying passive boats moving offshore.
- Tracking organised crime activity in remote border areas.
- Early identification and tracking of illegal communications
- Detecting jamming attacks
- Detection of pollution and other relative accidents.

### ROBORDER Architecture

### A.3. ROBORDER Factsheet

## Autonomous Swarm of Heterogeneous Robots for Border Surveillance

### Project Coordinator

TEKEVER Autonomous Systems  
Rua das Musas 3.30  
1990-164 Lisbon, Portugal

Mr. Andre Oliveira (project coordinator)  
T: +351213304300  
E-mail: [andre.oliveira@tekever.com](mailto:andre.oliveira@tekever.com)

Prof. Elias Kosmatopoulos (scientific manager)  
T: +302310464160  
E-mail: [kosmatop@iti.gr](mailto:kosmatop@iti.gr)

Website: <http://www.roborder.eu>

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### Description

Border authorities and Law Enforcement Agencies (LEAs) across Europe face important challenges in how they patrol and protect the borders. Their work becomes more problematic considering the heterogeneity of threats, the wideness of the surveyed area, the adverse weather conditions and the wide range of terrains. The vision of ROBORDER is to develop and demonstrate a fully-functional autonomous border surveillance system with unmanned mobile robots equipped with multimodal sensors. Our intention is to implement a heterogenous robot system and enhance it with detection capabilities for early identification of criminal activities at border and coastal areas along with marine pollution events.

### Objectives

ROBORDER addresses the following objectives:

- 1) Autonomous border surveillance system with unmanned mobile robots.
- 2) Incorporate multimodal sensors as part of an interoperable network.
- 3) Enhanced static networked sensors.
- 4) Early identification of criminal activities.
- 5) Accurate operations in a wide range of operational and environmental settings.

### Consortium



### Pilot use cases-Demonstrators

- 1) Unauthorised sea border crossing.
- 2) Unauthorised land border crossing.
- 3) Detecting pollution accidents.

### Impact

The ROBORDER system is expected to:

- Enhance the protection of human lives exposed at land and sea.
- Improve identification and tracking of illegal activities.
- Accurately detect marine pollution incidents.
- Support governmental agencies for improving environmental protection.

### Outcomes

Main results of the final deployed system can be summarised as:

- Provide an overall border security solution.
- Effective operation of heterogeneous multi-asset system by a single operator.
- Improved payloads and contributions to UxV cyber-security.
- Improved automatic threat recognition.
- Photonic radar network and passive radar onboard UAV.