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SELF-ASSESSMENT AND DATA MANAGEMENT PLAN V2

ROBORDER
740593

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Abstract:
This document is the second and updated version of the self-assessment plan and the data management plan for the ROBORDER project during these 33 months. The first part presents the project objectives and their respective performance indicators, target values and/or target activities, that are used to evaluate the project's progress. The second part focuses on the data management plan that was drafted according to latest guidelines on 'FAIR' Data Management in Horizon 2020. Lastly, the 'allocation of resources'; 'data security' and ROBORDER 'ethical aspects' are also explained.

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Document History

Date	Version	Remarks
07/01/2020	0.1	First draft of the document
09/01/2020	0.2	Major updates and restructures
26/01/2020	0.3	Final version
30/01/2020	0.4	Updated version addressing the reviewer's comments

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Executive Summary

This document is the second and updated version of the self-assessment plan (SAP) and the data management plan for the ROBORDER project during these 33 months. The first part presents the project objectives and their respective performance indicators, target values and/or target activities, that are used to evaluate the project's progress as part of the new Self-Assessment Plan. The second part focuses on the data management plan which is aligned with the latest guidelines on 'FAIR' Data Management in Horizon 2020. Therefore, respects its recommended template structure; addresses the 'FAIR' data concept unravelling it in four subsections: 'making data Findable', 'making data openly Accessible', 'making data Interoperable', and 'increase data Reuse'. In addition, the 'allocation of resources'; 'data security' and ROBORDER 'ethical aspects' are also outlined.
Compared to the first version of the SAP (reported in D8.2), the assessment strategies, measures, indicators and baselines were completely modified in the current version in order to follow a more detailed approach and effectively establishing all the monitoring tools.

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List of Acronyms

CIRAM	Common Integrated Risk Analysis Model
CISE	Common Information Sharing Environment
CONOPS	Concept of Operations
DMP	Data Management Plan
DPR	Data Protection Rules
EAB	Ethics Advisory Board
FAIR	Findability, Accessibility, Interoperability and Reusability
FPS	Frames per Second
GCS	Ground Control Station
HW	Hardware
IEC	International Electro-technical Commission
KPI	Key Performance Indicator
mAP	mean Average Precision
mIoU	mean Intersection over Union
MS	Milestone
M&S	Modelling and Simulation
NoI	Network of Interest
SAB	Security Advisory Board
SAP	Self-Assessment Plan
SAR	Synthetic Aperture Radar
SoA	State of the Art
SW	Software
TRL	Technology Readiness Level
UAV	Unmanned Aerial Vehicles
UGV	Unmanned Ground Vehicle
UxV	Unmanned Vehicles
VPN	Virtual Private Network

1 Introduction

1.1 ROBORDER in a nutshell

ROBORDER comprises a platform aiming at developing a border surveillance system which will consist of unmanned mobile robots including aerial, water surface, underwater and ground vehicles, while incorporating multimodal sensors as part of an interoperable network: enhanced static network sensors such as border surveillance radars and customised mobile sensors installed on unmanned vehicles. Hence, ROBORDER will be able to operate in a wide range of operational and environmental settings and provide its operator with a complete and detailed situational awareness picture.

The main deployed technologies involve: **(i)** passive radars that can extend the capabilities of the existing border surveillance radars, **(ii)** passive Radio Frequency-signal sensing devices to intercept emission sources that are present in area, enrich the overall situational awareness picture with this information, allowing for further characterizing the nature and behaviour of entities in the picture, and detecting unauthorized signal sources and **(iii)** other mobile sensors like thermal cameras (infra-red) and optical cameras.

The information collected from the field are forwarded to the ROBORDER's Command and Control (C2) unit. The integration of large volumes of heterogeneous sensor data will lead to the provision of a quick overview of the situation. This overview will be visible to its operators and will act as a decision support system (DSS). Translation of the intention of the operators into remote actions, automatic selection of the most appropriate composition of hardware (robots, sensors and communication links) for each given situation and easy deployment and operation of the fleets of heterogeneous robots and sensors are some of the additional C2 functionalities of ROBORDER's platform.

1.2 Purpose of the document

In order to ensure that the project is successfully progressing and completing the foreseen goals stated in the Grant Agreement, the consortium has re-evaluated the utilized methods and planning techniques. This second version of the Self-assessment Plan (SAP) and Data Management Plan (DMP) aims at revising - where needed - deliverable D8.2 submitted in M6, taking into consideration the experiences gained during the project's first 33 months.

Firstly, it focuses on the SAP, by outlining the methodology for the monitoring and evaluation of the quality of the performance of the individual's tasks, as identified in the individual work packages (WPs). In addition, it reports the experience and the performed adaptations for adjusting the initial methodology of the 1st SAP version according to the needs of the project.

Moreover, it assesses the Data Management Plan that was set out in D8.2 following the European Commission's (EC) "Guidelines on 'FAIR' Data Management in Horizon 2020" and adjusts – where required:

- the handling of research data (during and after the project's lifetime)
- the data collected and processed
- the methodologies and data applied
- the sharing of data (e.g. open access)
- the protection and preservation of the collected data (during and after the project's lifetime).

The rest of the deliverable is organized as follows: Section 2 describes the self-assessment management structure and evaluates its usage during the reported period. The analysis is divided for each work package in order to provide a more detailed description. In addition, Section 3 provides an updated description of the settings in which the data is generated, collected and processed. Finally, the document is concluded in Section 4 with respect to the adequacy of the SAP/DMP and their updated version.

2 Self-assessment plan

Towards delivering a fully operational border surveillance system, several supplementary technologies will be integrated in different levels of the ROBORDER architecture. This implies that an efficient self-assessment plan is required in order to ensure a successful outcome. Section 2 provides the relevant updates in reference of the initial self-assessment plan reported in D8.2.

2.1 Introduction

The adopted self-assessment plan described initially in D8.2 along with its updated version (this document) is in accordance with the evaluation methodology presented in D6.1 “Evaluation methodology using benchmarking “. The implemented evaluation methodology is applied recursively to estimate the performance evolution during the project life cycle. Following the initial SAP, the corresponding evaluation methodology involves a four-phase approach: **(i)** Parameter definition for evaluation, **(ii)** Methodology design, **(iii)** Evidence collection and **(iv)** Report and decision making.

The followed evaluation methodology utilizes the developed Key Performance Indicators (KPIs) as an assessment tool for the system’s configuration. The corresponding efficiency metrics are initially identified by the end-users in D1.1 “Draft of concept of operation, use cases and requirements” and D6.1 “Evaluation methodology using benchmarking”. Thus, the methodology involves the assessment of specific characteristics to be utilized in real life tests in relevant Pilot Use Cases (PUCs) in order to identify whether the end-user requirements are quantitively fulfilled.

In order to quantitively have a more complete overview of the evaluation process, the management, control and reporting of the performance of the self-assessment procedures, the evaluation of their outcome and the proper attainment of the usability and evaluation test are monitored mostly by the WP6 leader in collaboration with other project’s entities such as the Project Management Team, the Scientific and the Technical Manager etc., as depicted in the Figure 1. The establishment of this structure not only ensures a high-level management for the project lifespan but also mitigates the risks of potential failures concerning the systems capacities and their functionalities.

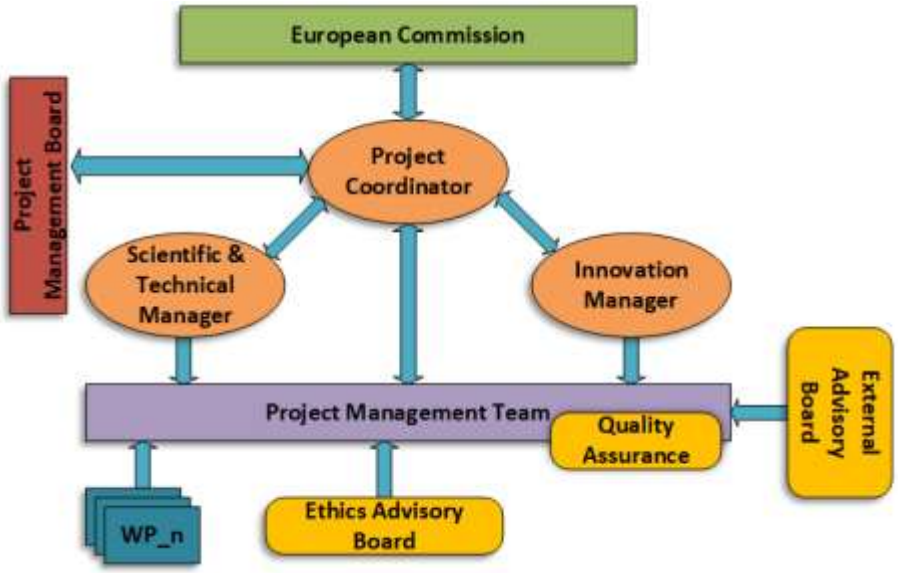

Figure 1. Management structure.

2.2 Tools and categories

Withing the context of the quality assessment of the project's procedures and in order to guarantee a high-quality assessment, the appropriate tools and the corresponding categories must be identified.

Assessment tools

The following assessment tools are applied in the project depending on the nature of each task that requires an evaluation:

⇒ Desk studies
⇒ Peer review
⇒ Qualitative evaluation using a catalogue of test scenarios
⇒ Quantitative evaluation using baselines and standards as references
⇒ User surveys/questionnaires

Desk studies are performed by a member of the project management team or an another individual of the user group or from a beneficiary with similar background and working experience from related projects. The assigned person assesses the quality of the results relying on his/her personal expertise, the state-of-the-art in the field and the objectives formulated in the work plan for the given task. The individual provides his/her opinion in writing on the relative and absolute quality along with recommendations for improving the required quality. The desk assessment will be concluded in case a risk is identified during the period of the project's implementation. The main objective is to mitigate and minimize any risk and reduce potential delays. Such desk studies will be included in the corresponding end-user reports.

Peer reviewing includes the internal evaluation of the project's documentation (e.g. deliverables) in terms of novelty, presentation clarity, adequacy of previous work, technical correctness and relevance to the initial description. In most cases, the review process is performed by two individuals within the consortium, one technical expert and one end-user. All the comments/suggestions indicated by the deliverables' reviewers will be considered the documents responsible for improvements and updates. Towards a more complete procedure, each reviewer should complete one review form following a specific template (Appendix A – Deliverable Review Form). These reviews performed for each deliverable will enhance also the quality of future deliverables while the same process will be applied for all deliverables of the upcoming period until the end of the project.

A qualitative evaluation by external and /or internal assessors requires the compilation of a catalogue of testing scenarios. Every evaluation scenario will represent a setting that will demonstrate the performance of the under-evaluation component in specific context. This implies that for all system's modules and all major tasks, all the potentially relevant contexts must be covered during the evaluation scenarios. In addition, for each scenario the performance of the system's capacity will be specified. In the context of the ROBORDER project, the task/component developers in charge will be responsible for the compilation of the corresponding scenarios which will be validated properly by the project's management team for assuring the required quality. Once the appropriate testing scenarios have been compiled, the qualitative evaluation is applied by benchmarking the component under evaluation and comparing the outcomes with the relevant baseline(s).

In addition, quantitative evaluation in terms of traditional IR metrics such as precision, recall, F-Score etc. comprise the most objective and reliable means of assessing the quality of the performance for many modules of the ROBORDER platform although in some cases, such approach is irrelevant (e.g. the visual interaction between the operator and the system). It assumes the acquisition of standards (e.g. ideal outputs utilized as ground truth data) and external baselines against which the actual performance is compared.

Quantitative and qualitative assessments are utilized to achieve the desired results at macroeconomic and microeconomic level. In a macro level, these instruments will be used to evaluate the overall solution during the field trials and pilots. The outcomes will be used by

the entire consortium towards improving and updating the implemented solutions and strategies. In the micro level, these assessment tools will be used in task or even component level. Every responsible partner for a particular component will conduct the relevant assessments and the outcomes will validate the efficiency and the overall status of the component. Moreover, the micro evaluations will determine the status of the overall ROBORDER solution.
Finally, user surveys and questionnaires allow the assessment of the quality of a component from the perspective of users. For each category, a different questionnaire is required to be developed. The questionnaires are also a means to evaluate the satisfaction of the user in relevance with the delivered service. The satisfaction of the user is measured along different dimensions with the aid of the Likert[1] scale. The latter comprises the most widely used scale in quantitative research and was designed to determine the opinion or attitude of a subject by using mostly a scale of five response categories, e.g. “very good”, “good”, “barely acceptable, “poor” and “very poor”.

Assessment categories
The followed assessment within the project will cover three major categories:
1. The extent to which the results of each task or module fulfils the objectives defined in the Work Plan.
2. Contributions to the state-of-the-art
3. End-user satisfaction

For the assessment of the capacity of the evaluated subject matter to meet the objectives of the work plan, all aforementioned assessment tools will be used although the user-targeting questionnaires will be less significant than the other four. For the assessment of the contribution to the state-of-the-art by the work performed in the project, expert desk studies and quantitative evaluations with state-of-the-art approaches utilized as baselines will be primarily used. Finally, to evaluate the satisfaction of the end-user, questionnaires will be used as the evaluation meas. Self-report methods such as questionnaires rely on the assumption that individuals are able and willing to interpret and report their subjective experience. While they might be subject to participant’s bias, self-report methods are efficient and simple approaches for obtaining personalised data.

2.3 Self-assessment plan per work package

The following section includes all the relevant information for the assessment of individual tasks within the WPs from the perspective of the objectives that are foreseen to be fulfilled. Each WP is analysed in a separate table which **(i)** enumerates the main objectives of the WP, **(ii)** the foreseen tasks towards accomplishing the aforementioned objectives and **(iii)** the MS(s) to which an objective or task contributes. In the second part of each table, the evaluation tools that will be utilized in order to assess the progress and the quality of the performance on the included tasks. As analysed in the previous sections, an assessment tool can be comprised of user interviews or questionnaires completed by users, qualitative evaluation in the context of test scenarios or quantitative evaluation formulas (e.g. precision, recall, F-score) depending on the corresponding task. Finally, every table includes the indicators and the baseline used for each tool individually as well as the corresponding TRL per service (check Section 2.4 for the assessment of the corresponding values).
From the perspective of the assessment category “contribution to the state-of-the-art” (check Section 2.2), the minimal expectation for all envisioned R&D activities is that the achieved performance of the relevant algorithms surpasses the reported outcomes of similar works in the corresponding literature. On the contrary, the maximal expectation includes significant improvement of the reported performance. The precise definition of such terms (“slightly” and

[1] Likert, R. (1932). A technique for the measurement of attitudes. Archives of psychology, Vol. 140, pp. 1-55.

"significantly") are to be clarified in the course of the evaluation of each technique in consensus with experts in the corresponding research field.

2.3.1 WP1: User requirements and pilot use cases

WP	1		
WP Leader	HMOD		
WP Objectives			
A/A	**Objective**	**Task**	**Milestone**
1	**Analysis of user requirements and operational aspects** This task will focus on the extraction of user requirements from the use case scenarios.	T1.1.	MS1-MS4 (End month:M36)
2	**Analysis of security requirements** This task will focus on the security requirements in relation to the technology systems in use and the integration of the solution.	T1.2	MS1- MS4 (End month:M36)
3	**Analysis of ethical and legal requirements** This task will consider the ethical and legal requirements both for the developed system and for the ongoing compliance of the project.	T1.3	MS1- MS4 (End month:M36)
4	**Design of the pilot use cases** In the context of this task, the requirements collected from the users at T1.1 will be the basis for the development of the required set of real use case scenarios.	T1.4	MS1- MS4 (End month:M36)
5	**Design of concept of operations** In this task, general ROBORDER concept of operations for surveillance missions with a swarm of or standalone heterogenous robots will be defined.	T1.5	MS1- MS4 (End month:M36)
WP Evaluation Strategy			
A/A	**Evaluation strategy description**		
1	The evaluation strategy of the user requirements has been defined to include a qualitative evaluation step in the process: ⇒ Building upon the first results evaluation, the requirement specifications will be adjusted both according the evaluation findings and also on recent market developments. All project participants will assess the definitions which will be also adjusted based on the qualitative evaluation.		
2	The evaluation strategy of the security requirements involves: ⇒ Collaboration between end-user and technical partners in order to identify hardware/software security issues and to protect the generated information within the ROBORDER solution ⇒ Monitor every information through the project's SAB in order to be compliant with the security regulations.		
3	The evaluation strategy of the ethical and legal requirements will involve: ⇒ Compliance with the project's DMP and the established Data Protection Rules. ⇒ Alignment with the outcomes of the Ethics Requirements Work Package. ⇒ Collaboration between technology and end-users on legal and ethical frameworks		
4	The evaluation strategy of the pilot use case design involves: ⇒ Detailing the scenarios ⇒ Collaboration between the end-users and the technical partners on deployment of ICT solutions ⇒ Finalizing use cases for inclusion in the testing strategy ⇒ Final review of testing strategy and use cases with technical and research partners ahead of operational testing. All the consortium will collaborate to assess the developed testing strategy before the operational testing phase.		
5	The evaluation strategy of CONOPS involves: ⇒ Define the role of human operator and co-operators with other stakeholders.		

	⇒ Identify the needs for training the operators.	
WP Indicators		
A/A	**Highest expectation**	**Lowest expectation**
1	Project goals and scope fully achieved	80% of the project goals and scope satisfactorily achieved
2	Project goals and scope fully achieved	80% of the project goals and scope satisfactorily achieved
3	Project goals and scope fully achieved	80% of the project goals and scope satisfactorily achieved
4	Accuracy, reliability and concise descriptions of the developed use cases. Project goals and scope fully achieved.	80% of the project goals and scope satisfactorily achieved
5	Effective and efficient inspection progress and situation awareness. Project goals and scope fully achieved (increase mission effectiveness by 5% and reduce to 0% the reported errors).	80% of the project goals and scope satisfactorily achieved

Objective 1: The requirement analysis study has been almost fully completed as the corresponding deliverable (D1.1) is currently assessed for the second prototype. Through the collaboration between the end-users and the technical partners, the initial end-user requirements are refined and is scheduled to be reported in D1.2 (April 2020). In details, the final definition of the requirements is processed through an iterative process that, utilizing as the basis the reported requirements, led to a qualitative evaluation to adjust and optimize them accordingly. This process has actively involved all the responsible participants in each phase. Thus, the objective is expected to realize the highest expectation.

Objective 2: From the very beginning of CERTH's assignment as a coordinator, a formal procedure for security guidelines was established upon agreement with the SAB. The procedure foresees the alignment of all reporting activities within a reasonable timeframe so that the SAB could evaluate the security requirements for each information. The final decision about the content to be disseminated will affect the way that the documentation will be treated. In addition, regarding the hardware/software security and the protection of the produced data, the consortium in collaboration with the responsible partner has identified all the aspects that must be considered during all the development circles following specific guidelines. Therefore, the objective is expected to reach the highest possible expectation.

Objective 3: Towards addressing all the ethical issues resulted from the ethical review report (Ref. Ares (2019)4518279-12/07/2019), CERTH as the project's coordinator has established a new DMP as well as DPRs that address all the ethical and legal issues in the context of the project. The objective is aligned with the main objectives of the "Ethics Requirement" work package, namely WP9, which is monitored and updated continuously. Therefore, the objective is expected to realize the highest expectation.

Objective 4: Currently, the WP1 leader, HMOD, have compiled all the descriptions for each pilot use case provided by every responsible end-user. The outcome included the successful submission of D1.1 "Draft of Concept of Operation, Use Cases and Requirements" which analyses the real operational scenarios. In addition, the collaboration between the end-users and the technical partners resulted on the assessment of the identified requirements in order to extract the final requirements to be included in D1.2. Moreover, proper KPIs were identified in the context of WP6 to quantify the evaluation process and proceed with the proper technical modifications. At the date of submission of this deliverable, the objective is still on-going nonetheless, it is expected to attain the highest expectation.

Objective 5: Similarly, to Objective 4, the concept of operations has already been identified and included in D1.1. The objective involves the definition of the operator's role as well as their need for proper training. For the latter, in the context of WP6, an appropriate course will be developed which is updated according to the acquired knowledge between the first evaluated pilot use cases. As the final CONOPS will be submitted, the main objective is still on-going.

2.3.2 WP2: Sensing, robotics and communication technologies

WP	2
WP Leader	Elettronica

WP Objectives

A/A	Objective	Task	Milestone
1	**Cloudlet based communications** This task aims at identifying the communication link that is required to interconnect all the deployed UxVs. (TRL6-TRL8)	T2.1	MS2-MS4 (End month:12)
2	**Passive radar on board UAVs and USVs** This task defines the passive radar operation mode as well as the hardware optimization according to the ground radar network (TRL3).	T2.2	MS2-MS4 (End month:33)
3	**RF signal sensor on board UxVs** The task aims at developing a Radio-Frequency Communications sensor for monitoring mission-specific communications (TRL14).	T2.3	MS2-MS4 (End month:33)
4	**Sensor adaptability** This task will design and develop the SIMROB simulation environment (TRL1).	T2.4	MS2-MS4 (End month:33)
5	**Re-configuration of agents and carrier solution** The task includes activities that will modify the sensors and the assets in order to operate in adverse weather conditions. In addition, a carrier solution is developed to operate the UGVs as re-charging stations for small UAVs (TRL2).	T2.5	MS2-MS4 (End month:33)
6	**Photonics based radars** In this task, the development and characterization of the photonics-based radar system and optical clock will be carried out (TRL4, TRL5).	T2.6	MS2-MS4 (End month:33)

WP Evaluation Strategy

A/A	Evaluation strategy description
1	⇒ Data transmission rate ⇒ Delays between data acquisition and availability at the highest development level ⇒ Connection stability
2	For the passive radar evaluation strategy, the following strategy is established: ⇒ Compact construction ⇒ Quantitative evaluation of the detection accuracy ⇒ Quantitative evaluation compared to the ground-based radar
3	The evaluation strategy for the developments of this sensors will focus on: ⇒ Physical dimensions & Weight of the sensor ⇒ Number of channels for the direction finding ⇒ Detection range
4	The evaluation strategy of the sensor adaptability involves: ⇒ Use case and assets coverage ⇒ Computation time
5	The evaluation strategy of this task involves: ⇒ Proper KPIs according to specific IEC standards ⇒ KPIs for the carrier solution
6	⇒ Number of RF carriers ⇒ Noise suppression ⇒ Maximum range ⇒ Range resolution

WP Indicators

A/A	Highest expectation	Lowest expectation
1	⇒ Adequate data rate according to the end-user requirements ⇒ Instantly information of the operator	⇒ Insufficient data rate leading to low levels of situational awareness ⇒ Delays between the actual event and

	when the event is performed ⇒ Data package loss is kept at minimum levels.	the information nonetheless; within an acceptable timeframe ⇒ Good assessment of the module's performance by the evaluators.
2	⇒ Receiver size: Each dimension below 1m, Weight: <20 kg ⇒ Max detection range compared to the coastal radar: improvement >20% ⇒ Covered area: improvement >50%	⇒ Increased receiver size: Inappropriate for integration on UxV ⇒ Max detection range compared to the coastal radar: improvement 5% ⇒ Covered area: improvement >10%
3	⇒ Volume: 300x40mm, Weight: ≤1 kg ⇒ Number of channels: 6 ⇒ Detection range ≥1km (sea installation), ≥2km (air installation)	⇒ Volume: >300x40mm, Weight: ≥1 kg ⇒ Number of channels: 2 ⇒ Detection range: <1km
4	⇒ Use case and assets coverage: 100% ⇒ Computation time: 1/20 of the mission time	⇒ Use case and assets coverage: 60% ⇒ Computation time: Over 1/20 of the mission time
5	⇒ Resistance reaching the standards of IP67 for UGVs and IP68 for small UAVs ⇒ KPIs for the carrier solution: (i) Fully re-charge the UAV, (ii) TOL operations (iii) Autonomy of 3 hours flight and/or 2 re-charge cycles.	⇒ Applied standards compliant with IP65 ⇒ KPIs for the carrier solution: (i) Not fully recharge, (ii) non TOL operations, and (iii) 1 re-charging cycles.
6	⇒ RF carriers: Extension to 3 (S, C and X band) ⇒ Signal-to-Noise: at the state-of-the-art > 80db/1MHz ⇒ Maximum range: 30km ⇒ Range resolution: Improved < 1m	⇒ RF carriers: Single band operations ⇒ Signal-to-Noise: at the state-of-the-art > 60db ⇒ Maximum range: 7.5km ⇒ Range resolution: 1.5 m

Objective 1: The initial plan regarding the communications links was to deploy a secure VPN over a cloud network. The latter would be utilized as an intermediate node of a unified network where all UxVs would transmit the received data through their GCSs to the cloud infrastructure and finally to the ROBORDER framework. After the first assessment of the end-user requirements, this architecture was abandoned as in distant border areas, the signal coverage would not be sufficient to meet the requirements. Thus, the objective for the cloudlet communications is not valid as this approach was not followed.

Objective 2: The main objective is to extend the radar coverage of a coastal photonic radar network by implementing a Passive Radar to be mounted on UAVs and USVs. The corresponding hardware of the passive radar includes only a receiver for multifunctional operations. The development of the required hardware configurations resulted to a compact receiver capable of being installed on UAVs and USVs depending on the required scenario of operation. As the last implementation activities are on-going, a proper evaluation could not be valid regarding the radar's final performance. It is expected though to increase the required coverage area and the maximum detection range.

Objective 3: The objective of minimizing the physical dimensions of the RF sensor was not met leading to the minimum of expectation. Thus, the sensor could not be integrated directly on a UAV and thus, the responsible partner, ELTM, in collaboration with the UGV provider, Robotnik, selected to integrate the sensor onto the UGVs in order to meet the criteria. In addition, following the project's needs, the number of channels used was limited to 2 which was considered sufficient reaching the lowest expectation. Finally, multiple evaluation tests were conducted where RF signals could be identified and classified as "drone-related" within a range over 1km attaining the highest expectation.

Objective 4: Work on the overall analysis for the simulation of the required operational scenarios and the required sensors/UxVs focus on identifying the most significant parameters to be simulated. The utilized tools for the simulation were reported in D2.2 where the evaluation of one operational scenario was also analysed. Nonetheless, no evaluation

has been carried out yet on the final scenarios (as their description will be included in D1.2-to be submitted on April 2020) so it is not feasible at the moment to evaluate the progress in terms of the indicators listed in the above table.

Objective 5: The final design of the carrier solution is almost completed and reporting the outcomes in D2.4. Due to specific hardware restrictions, the lowest expectations have been accomplished regarding the sensors' standards to be met. Thus, the IP65 has been identified. Finally, regarding the re-charging process, as the initial evaluation tests are currently pending (which will be performed the upcoming period in the context of the demonstrations) considering also that the quantification requires the equipment of two partners (Robotnik and Copting) tested in parallel, no proper evaluation is currently feasible in terms of the aforementioned indicators.

Objective 6: As the used technologies were at a very mature level, proper evaluation tests were performed during this period including the hardware enhancements that were performed. The outcomes were reported in D2.3. The radar network achieved the 3 bands operational mode which comprises the highest expectation. On the contrary, the levels of noise, the maximum range and resolution attain the lowest expectation nonetheless, a more detailed picture of the final performance will be accomplished after the execution of the relevant pilot use cases.

2.3.3 **WP3:** Detection and identification of border-related threats

WP	3		
WP Leader	CNIT		
WP Objectives			
A/A	**Objective**	**Task**	**Milestone**
1	**Detection of pollution incidents** An oil spill detector based on either visual or SAR images will be delivered in the context of this task (TRL9).	T3.1	MS2, MS5 (End month:35)
2	**Identification and tracking of illegal activities** This task will develop the appropriate radar-based detection schemes for identifying metallic objects of interests in the open sea. In addition, the task involves the development of visual detection algorithms as well as activity recognition scheme for specific objects (TRL9-TRL11).	T3.2	MS2, MS5 (End month:35)
3	**Low level of fusion data** This task involves the development of a multi-sensor fusion approach aiming at increasing the detection capacities (TRL12).	T3.3	MS2, MS5 (End month:35)
4	**Detection and classification of cyber and cyber-physical attacks** This task will deliver an intrusion detection and classification module to identify potential cyber-attacks (TRL13).	T3.4	MS2, MS5 (End month:38)
5	**Identification of unauthorised communications using RF sensor** This task will deliver a set of algorithms for the identification of unauthorised communications based on the RF readings (TRL14).	T3.5	MS2, MS5 (End month:38)
WP Evaluation Strategy			
A/A	**Evaluation strategy description**		
1	⇒ Quantitative evaluation of the performance (accuracy, false positive events etc.) ⇒ Computational cost ⇒ Detection latency		
2	The evaluation strategy for the identification of illegal activities involves will focus on: ⇒ Detection accuracy (precision, false positive rate, true positive rate, area under curve) ⇒ Processing time: Resulted FPS, latency		
3	⇒ Improvement of the detection accuracy		

	⇒ Time efficiency
4	The module for the classification of cyber-physical attacks will be evaluated through the following strategy: ⇒ Classification metrics ⇒ Time efficiency
5	The evaluation of the RF-based detection schemes will focus on: ⇒ Detection performance (precision and detection latency) ⇒ Physical dimensions and technical specifications (for on-board integration)

WP Indicators		
A/A	**Highest expectation**	**Lowest expectation**
1	⇒ Recognition accuracy: ~5% improvement ⇒ False positive events: ~10^{-6} ⇒ Resulted frame rate: ~ 8 fps	⇒ Accuracy: SoA performance ⇒ False positive events: ~10^{-3} ⇒ Resulted frame rate: ~2 fps
2	⇒ Detection accuracy: ~5% improvement ⇒ Detection probability: ≥ 80% ⇒ Frame rate: ~7 fps	⇒ Detection accuracy: SoA performance ⇒ Detection probability: < 80% ⇒ Frame rate: ~ 2 fps
3	⇒ Performance: Near real-time ⇒ Detection improvement: ~5%	⇒ Performance: High latency ⇒ Detection improvement: ~0%
4	⇒ Accuracy: ~5% improvement over the baseline ⇒ Latency: Real time	⇒ Accuracy: SoA performance ⇒ Latency: 1 sec
	⇒ Accuracy: ≥ 90% ⇒ Dimensions: Proper for onboard integration	⇒ Accuracy: <80% ⇒ Dimensions: Increased weight and size.

Objective 1: The main objective of the task is the deployment of a novel detection algorithm which could identify accurately oil dispersions over the sea surface. The development focused on processing SAR data which eventually results to integrate a SAR sensor onboard of a fixed-wing UAV. Nonetheless, depending on the configurations and the availability of a SAR sensor, the detector will be capable of processing visual data as alternative, nonetheless, applying different approach. SAR was selected due to its ability in operating in extremely diverse weather conditions and thus, operating in any environment (e.g. cloudy etc.). A deep learning architecture, namely DeepLabv3+[2] was properly trained and evaluated. Overall, the deployed model can identify the desired objects (sea, oil- spill, look-alike, ship) with an accuracy 65.06 in terms of mIoU (Figure 2). Due to lack of proper evaluation dataset, no valid comparison with other similar works can be performed in order to identify the scale of improvement. The research focused on semantic segmentation schemes in order to follow the end-user requirements leading to a novel algorithm. Nonetheless, towards increasing the situation awareness level, a high frame rate (thus, decreased computational cost) was accomplished reaching the reported fps for this model even with high resolution images (1250x650 pixels). Thus, the model reached the highest expected fps.

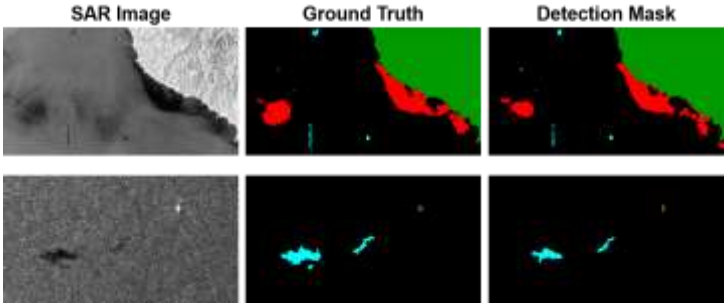

Figure 2. Oil spill detection with SAR images.

[2] Chen, L. C., Zhu, Y., Papandreou, G., Schroff, F., & Adam, H. (2018). Encoder-decoder with atrous separable convolution for semantic image segmentation. In Proceedings of the European conference on computer vision (ECCV) (pp. 801-818).

Objective 2: Similar to the oil spill detector, the outcomes of the object identification and the activity recognitions schemes will be reported at M36 in D3.1. The task includes three separate modules: radar detection, visual object identification and activity recognition. The first two modules can identify specific objects of interests while the latter can identify their performed activities. The radar processing tool considers the geometry of the antennas of the network and extracts a range/cross-range map. In addition, architecture Faster R-CNN[3] was utilized in order to recognize specific objects from visual data (Figure 3a). Figure 3b represents some results of the activity recognition module which extracts spatio-temporal features for the detected objects and classify them as illegal or not.

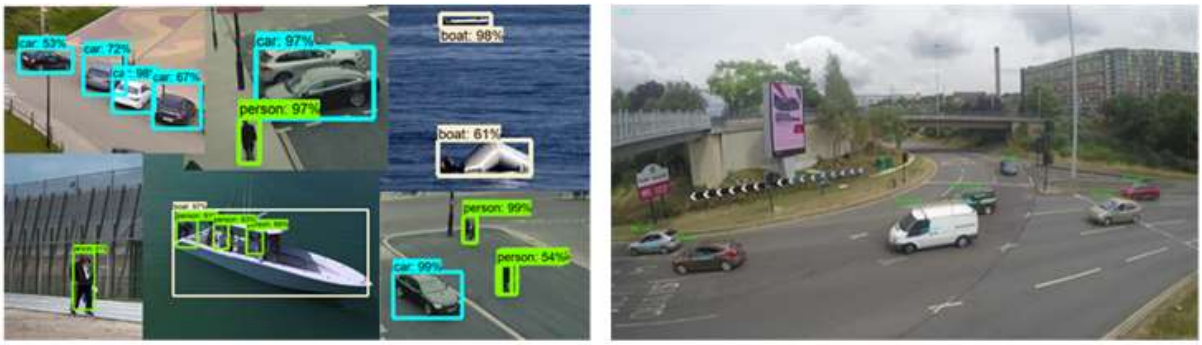

Figure 3. (a) Object identification and **(b)** Speed and direction of the detected objects.

Overall, all three modules depict adequate performance according to the evaluation reports. For example, the object detection module can identify the object of interests with a ~83% in terms of mAP with a resulted frame rate equal to ~ 5 fps depending on the configuration of the image acquisition system. Therefore, the highest expectation has been attained for the detection accuracy while the resulted frame rate is sufficient. Nonetheless, since the development process has not been completed, the final performance might be slightly improved.

Objective 3: At the date of submission of this deliverable, the objective is still on-going. The objective will focus on fusing heterogenous data providing the system one out of two options depending on the system's configuration. The first approach involves an algorithm for combining visual and thermal data into one signal representation while the second solution relies on data fusion acquired from heterogeneous sources. As the last implementation activities are on-going and strictly rely on the final configuration of the assets, a proper evaluation could not be valid. It is expected though to increase the detection accuracy by one small factor.

Objective 4: Within this objective, the developments will focus on deploying an intrusion detection and classification module to classify both cyber and cyber-physical attacks. The module uses statistical-based reasoning and deep learning-based reasoning techniques. According the evaluation tests that were performed, the module can identify such intrusion attempts with an accuracy ~93% while in the evaluation phase, it can produce the detection result in 0.52ms. Despite the fact that more exhaustive evaluation process is currently on-going with more evaluation data, the initial results depict that the objective reaches the highest expectation.

Objective 5: The corresponding task includes the development of the detection and identification algorithms to be integrated along with the RF sensor. As the final development activities of the RF sensor are still pending due to the termination of the responsible beneficiary, namely TEK-AS, the evaluation process is still pending.

[3] Ren, S., He, K., Girshick, R., & Sun, J. (2015). Faster r-cnn: Towards real-time object detection with region proposal networks. In Advances in neural information processing systems (pp. 91-99).

2.3.4 WP4: Command and control unit functionalities

WP	4
WP Leader	CERTH

WP Objectives

A/A	Objective	Task	Milestone
1	**Advanced human-robot interface** The main objective of the task is to develop a novel interface enabling the operator to monitor mission of the swarm and have natural interaction with the control system (TRL15).	T4.1	MS3, MS5(End month:35)
2	**DSL-based mission specification** This task aims at designing a domain specific language for the mission specification of the robotic devices (TRL17).	T4.2	MS3, MS5(End month:35)
3	**Autonomous resource task coordination** Within this task, a swarm platform will be developed aiming at handling situations where a complex and dynamic interplay is involved (TRL16).	T4.3	MS3, MS5(End month:35)
4	**CISE-compliant common representation model and semantic reasoning** The task aims to define a set of modelling requirements, ontologies and schemes for the semantic representation of the multi-modal data collected by different sources (TRL18, TRL19).	T4.4	MS3, MS5(End month:38)
5	**Risk models** This task aims at establishing a framework for the integration of risk models within the ROBORDER platform (TRL20).	T4.5	MS3, MS5(End month:38)
6	**Visual analytics and decision support** This task will develop the visual analytics methods that will enable the operator to have a visual overview of the situation as well as the mechanisms to provide high-level decision support (TRL21, TRL22).	T4.6	MS3, MS5(End month:38)

WP Evaluation Strategy

A/A	Evaluation strategy description
1	The advanced operator's interface will be evaluated following the below strategy: ⇒ Situation awareness ⇒ Error rate in mission control
2	The DSL-based mission specification will be evaluated as follows: ⇒ Expressiveness ⇒ Powerful
3	The resource controller will be evaluated as follows: ⇒ Use case coverage ⇒ Accurate path extraction
4	The CISE-based model and semantic reasoning will be evaluated the following strategy: ⇒ Consistency and structure ⇒ Relevant to project scope ⇒ Scalable reasoning
5	⇒ Consistency and structure ⇒ Relevant to project scope ⇒ Decision complexity and Prediction accuracy
6	⇒ Visual analytics: Speed rendering and end-user requirements coverage ⇒ Decision support: user satisfaction, response time

WP Indicators

A/A	Highest expectation	Lowest expectation
1	⇒ 5% improvement on SoA human-robot interfaces ⇒ 5% decrease of the mission error rate	⇒ SoA values for situation awareness ⇒ SoA error rates
2	⇒ Accurate description of the mission	⇒ Partial satisfaction of the operators

3	⇒ 100% scenario coverage ⇒ 90% path accuracy	⇒ 50% scenario coverage ⇒ 60% path accuracy
4	The developed ontology should be consistent and aligned with the CISE model while quality checks should conclude with only minor (the pitfall does not represent a problem) or no pitfalls. Ontology should be able to respond to all competency queries in a set of sample questions, which will be representative of all queries. For the evaluation of the semantic reasoning, the expected maximal value for the F-score is 90%.	Ontology should be **consistent**. Encountered pitfalls could be **minor or important,** but not critical. Ontology should be able **to answer the important competency questions**. The expected minimal value for the evaluation of the semantic reasoning is 70% in terms of F-score values.
5	Similar highest expectation as for the Objective 4	Similar Lowest expectation as for the Objective 4
6	⇒ Visual analytics: Real-time execution and end-user requirement fulfilment by 90% ⇒ Decision support: 90% in terms of f-score	⇒ Visual analytics: Low rendering time and end-user requirement fulfilment by 60% ⇒ Decision support: Minimal f-score value equal to 70%

Objective 1: As the developments have not been finalized, the evaluation of the enhanced human-robot interaction framework is pending. Considering also that the final end-user requirements are to be identified, a concrete evaluation using the final KPIs has not been performed for this objective. The evaluation must be relied on the final KPIs as these will include the operator's satisfaction with the operation of the system.

Objective 2: The term "Expressiveness" refers to ability of the module to clearly identify the language constructs that can express the operator's intentions. In addition, term "Powerful" describes how complete are the produced missions in terms of features to express the abstraction clearly. Therefore, the latter indicates the ability of the module to mitigate the operator's interference in providing low-level commands to the UxVs. As the module is part of the UxV commanding pipeline, the end-user satisfaction expressed as KPIs will be only valid when all the involved modules will be completely operable and tested. Currently, the evaluation of this objective could not be evaluated.

Objective 3: The autonomous resource controller comprises one of the modules of the main pipeline for commanding the UxVs. Similar to Objective 2, the main evaluation strategy of the module involves the end-user satisfaction expressed in KPIs. Therefore, the first evaluation metric of the objective could not be properly identified. Regarding the accuracy of the generated paths, initial tests indicate a mean precision of accuracy approximately 80% nonetheless, the performed tests are significantly few at the current phase. It should also be highlighted that the actual paths (followed by the UxVs) depend on unstable and unforeseen factors such as wind speed and intensity which eventually affects the final outcome of the evaluation.

Objective 4: The project's ontology was developed to describe the detected events at higher-level towards an improved situation awareness. CISE data model comprised the basis of the ontology and therefore, was initially developed. Nonetheless, in the context of the project was expanded in order to describe more events of in sea operations as well as land operations (as the CISE model was developed for maritime cases). The described illegal events were identified after the collaboration of the corresponding technical partner, namely CERTH, and the responsible end-user for each PUC. As also presented during the first review meeting, the ontology is consistent with no pitfalls detected.

Consistency/Structure: For evaluating the structure, appropriate validation frameworks were used along with the metrics involved. Metrics such as classes, axioms and objects quantify the ontology elements. For the design of the ontology, schema metrics such as richness, depth and inheritance were applied. The total count of classes and properties

indicates the proposed ontology is a lightweight model, easily adopted by various applications.
Relevance to project scope: As aforementioned, the ontology was a result of the collaboration of one technical partner and all the end-users. This means that the implementations were strictly relied on the immediate feedback of the end-users thus, filling the highest expectation.
Scalable reasoning: The respective part of all the implementations are still on-going. Semantic reasoning is based on a set of SPARQ-based queries submitted to the knowledge base. This approach currently handles scalability issues satisfactorily.
Objective 5: In general, the developments of the risk models are aligned with the developments of the CISE-based data model as well as the used technologies in both modules. The risk models will rely on the CIRAM model proposed and applied by Frontex to establish a conceptual framework to assist the relevant personnel in the preparation of risk analyses.
Consistency/Structure: Similar to the CISE model and the adopted evaluation methods, it was proven that the developed framework comprises a lightweight model.
Relevance to project scope: As the original CIRAM model was established for operations at border territories and the project's main operational scenarios involves such locations, the relevance is obvious.
Scalable reasoning: Similar to the objective and expectations for the CISE-based data model.
Objective 6: The two modules that have been developed under the scope of this task refer to Visual analytics where the model focuses on providing the operator with a visual overview of the situation and the decision support module operating as an extension of the semantic reasoning module. The visual analytics module relies on mock-ups of exemplar visualization that will be provided during the testing exercises. The integration process of the module is currently on-going and therefore, the evaluation of the objective is still pending. Similar to the visual analytics component, the decision support module is currently under the integration process and therefore, the evaluation of the objective could not be validated.

2.3.5 **WP5:** Integration of ROBORDER platform for the remote assessment of border threats

WP	5
WP Leader	CERTH

WP Objectives

A/A	Objective	Task	Milestone
1	**Technical system requirements and architecture** The task involves the design of the technological roadmap for the development of the ROBORDER platform (TRL23).	T5.1	MS1-MS5 (End month:12)
2	**Software integration** The task aims at deploying all the software components and exposing them as web services (TRL23).	T5.2	MS1-MS5 (End month:42)
3	**Hardware integration** The task aims at collecting all the hardware components designed in other work packages and unifying their operations towards upgrading the capabilities of the used UxVs (TRL23).	T5.3	MS1-MS5 (End month:42)
4	**ROBORDER system integration** In this task, technical requirements and architecture will be realized while hardware and software modalities will be delivered as an integrated system (TRL23).	T5.4	MS1-MS5 (End month:43)
5	**System deployment and maintenance in testing environment** The task deals with the deployment of the final framework in border authorities and LEAs environment following the integration plan.	T5.5	MS1-MS5 (End month:43)

WP Evaluation Strategy	
A/A	**Evaluation strategy description**
1	The evaluation strategy of the technical requirements and resulting architecture is mainly qualitative, by reviewing the percentage of high level requirements that are met by the design, and the degree in which use case scenarios can be carried out as desired by the individual pilots.
2	The evaluation strategy of the platform integration is mainly quantitative by testing the resulting capabilities based on the high-level technical requirements garnered by the partners. The performance of the back-end services selected and deployed should be in accordance with the platform needs.
3	The evaluation strategy of the final deployed system will rely on the end-users' satisfaction by enumerating the percentage of the use case coverage. For this qualitative evaluation, proper KPIs were identified within the context of WP1 and WP6.

WP Indicators		
A/A	**Highest expectation**	**Lowest expectation**
	100% of high importance technical requirements met by the architecture	75% of high importance technical requirements met by the architecture
	100% of high importance technical requirements met by the platform	75% of high importance technical requirements met by the platform
	100% of designed test cases completed and technical requirements fulfilled	75% of designed test cases completed and technical requirements fulfilled

Objective 1: Major system requirements were distilled from the initial use case requirements. These requirements comprised the basis for the first version of the architecture which was eventually modified (concerning the communication link) in order to be aligned with the end-user requirements. The corresponding deliverable was accepted (D5.1) and the task has been completed. As the final end-user requirements are scheduled to be delivered at M36, some minor adaptations of the architecture might be required nonetheless, without any foreseen risk. Currently, a safe estimation for the evaluation of the objective would be that the technical requirements have been completed by 75% reaching the lowest expectation nonetheless, it is expected to attain the 100% by the end of the project.
Objective 2: The integration among different HW and SW components is a challenging task for which a large set of parameters must be considered. Overall, the first prototype was developed and deployed based on the initial version of the architecture and was validated in internal tests. The second prototype is under development and so its evaluation is pending. Considering that the second prototype is under development, the evaluation of the objective could not be performed currently. Nonetheless, at the time of compiling this deliverable, a safe estimation based on the current outcomes would be that an estimated 75% of high-level requirements has been addressed.
Objective 3: System tests are performed frequently in an isolated manner meaning separate tests for each module. Some preliminary tests for one unified system were also performed where individual services exchanged information from low to higher levels of the architecture. End-to-end tests according to the real scenarios are on-going as the second prototype with the refined architecture is under development at the time being. As it concerns the deployment of the system at the identified end-user premises, the first demonstrated use case where the system will be installed for the first time is scheduled to be performed at M34 (March 2020) meaning two months after the submission of this deliverable. Therefore, the evaluation about the completeness of the use cases will be performed at a later stage.

2.3.6 **WP6:** Demonstrations and evaluation

WP	6		
WP Leader	CMRE		
WP Objectives			
A/A	**Objective**	**Task**	**Milestone**

1	**End-user evaluation plans and methodology** The aim of this task is the definition of a common evaluation methodology and a testing plan for all the defined PUCs.	T6.1	MS1, MS3-MS5 (End-Month: M38)
2	**Operator Training** In the context of this task, the appropriate training courses will be developed for the corresponding personnel to be familiarized with the framework.	T6.2	MS1, MS3-MS5 (End-Month: M45)
3	**Preparation and implementation of test-plans as simulated exercises** The main output of this task will consist on a test-bed capability based on M&S that will enable the testing of the ROBORDER developments in early phases before its deployment and the final operational testing.	T6.3	MS1, MS3-MS5 (End-Month: M44)
4	**Demonstration and evaluation for marine border threats detection** In this task, the scenarios related to marine border threats will be operationally tested based on the evaluation plan.	T6.4	MS1, MS3-MS5 (End-Month: M45)
5	**Demonstration and evaluation for land border threats detection** In this task, the scenarios related to the land border threats will be operationally tested and evaluated based on the evaluation plan.	T6.5	MS1, MS3-MS5 (End-Month: M45)

WP Evaluation Strategy	
A/A	**Evaluation strategy description**
1	The evaluation strategy that was followed included the definition of the proper KPIs which were identified by the end-users and the corresponding evaluation methodology.
2	The under-development training courses will be evaluated based on the end-users' satisfaction.
3	Simulated scenarios and demonstrations will be evaluated based on the accuracy and the use case coverage.

WP Indicators		
A/A	**Highest expectation**	**Lowest expectation**
1	100% coverage of the identified KPIs	75% coverage of the identified KPIs
2	100% competence and confidence of the trainees as operators of the system.	75% competence and confidence of the trainees as operators of the system.
3	100% alignment between the results of the real and the simulated scenarios.	75% alignment between the results of the real and the simulated scenarios.

Objective 1: The assessment of the initial end-user requirements (D1.1) resulted to the identification of the appropriate KPIs to provide a qualitative evaluation of the system. After some rounds of discussions between the responsible partner and the end-users, the KPI metrics were extracted and reported in D6.1, entitled as Evaluation methodology using benchmarking. The deliverable was re-submitted at M30 which version included all the reviewers' recommendations.

Objective 2: Currently, the training courses are under development. The evaluation will rely on the competence and the confidence of the trainees to operate the system after their participation in the operator training courses. First training courses will be executed before the project's first demonstration (scheduled to be performed M35-March 2020). Thus, the evaluation of the objective could not be performed at the time being.

Objective 3: The activities performed so far for this objective focused on designing and implementing the M&S capability since the technologies were mature and closer to the timeplan. As aforementioned, the use cases to be demonstrated will be evaluated under three demonstration events starting from M35 (March 2020). The outcomes of the first M&S test bed were reported in D6.3, entitled as "First M&S based Test Bed Demonstration" where a fraction of the entire PUC list was evaluated. Despite the fact that the complete evaluation of this objective would be valid after the last demonstration (M45), the current outcomes of

the first M&S attain the lowest expectation nonetheless, it is expected to reach 100% by the end of the project.

2.3.7 **WP7:** Dissemination and exploitation

WP	7
WP Leader	Everis

WP Objectives

A/A	Objective	Task	Milestone
1	**Dissemination and events organisation** This objective focuses on the elaboration and update of the ROBORDER dissemination plan.	T7.1	MS1, 3, 5 (End month: 46)
2	**Communication** This task focuses on developing and updating the dissemination material to all stakeholders.	T7.2	MS1, 3, 5 (End month: 46)
3	**Standardisation and collaboration with other projects** This objective aims at guaranteeing the interoperability of the different subsystems and focusing on the collaboration with other projects.	T7.3	MS1, 3, 5 (End month: 46)
4	**Market analysis** This task analyses the potential market opportunities for the different outcomes of the project.	T7.4	MS1, 3, 5 (End month: 14)
5	**Business model** This objective aims at defining the initial business plans that will support the commercial exploitation.	T7.5	MS1, 3, 5 (End month: 46)
6	**Exploitation and long-term sustainability plan** This task focuses on the development of an innovation and exploitation plan that will be launched as soon as ROBORDER's expected outcomes are fully documented.	T7.6	MS1, 3, 5 (End month: 46)

WP Evaluation Strategy

A/A	Evaluation strategy description
1	The evaluation strategy of this task will focus on: ⇒ Request internal, ongoing dissemination activities reports from each partner.
2	For the evaluation of the communication plan, ROBORDER will focus on: ⇒ Assess the time that all relative material has been created ⇒ Assess that all material will be updated regularly
3	For the evaluation of ROBORDER's standardisation and collaborations with other projects: ⇒ Assess the connections with possible members by using all the partners' connections with stakeholders ⇒ Asses the connections with possible members through other projects
4	For the evaluation of the market analysis, the responsible partners should focus on: ⇒ Show that the system will enter the market and provide benefits to the stakeholders
5	For the evaluation of the business model: ⇒ High level of user-friendliness ⇒ Relevance to multiple modules
6	For the exploitation and long-term sustainability plan, the responsible partner should: ⇒ Evaluate the pilots' outcomes and identify the strengths of the system ⇒ Use the NoI to evaluate the system and the needs it addresses ⇒ Specify the targets to be reached, define the actions required, specify which partners are to take these actions, and present them in a time plan extending at least 2 years after the completion of the project.

WP Indicators

A/A	Highest expectation	Lowest expectation
1	⇒ 100% completion of all tasks/activities by the foreseen deadline ⇒ Receiving input from 100% of the partners.	⇒ 75% completion of all tasks/activities by the foreseen deadline ⇒ Receiving input from 50% of the partners.

	⇒ Participate in 20 conferences/events ⇒ Publication of 25 scientific papers	⇒ Participate in 6 conferences/events ⇒ Publication of 10 scientific papers
2	⇒ 20% increase in website traffic per year ⇒ 20% increase per year and activity on at least 2 social media platforms. ⇒ A private section for safe access by project partners to be used for collaborating purposes ⇒ Create account in all major social media ⇒ Create a project presentation, leaflet and factsheet	⇒ 10% growth in website traffic per year ⇒ A private section with minimal material and minimal use ⇒ Create only one social media account ⇒ Create only one presentation
3	⇒ At least 5 synergies with other projects achieved.	⇒ At least 3 synergies with other projects achieved
4	Conducting a market analysis for all aspects of the potentially relevant markets that the system will address.	Conducting a market analysis only for the most significant markets that the system will address.
5	Create business models for all modules that are developed	Create business models only for the core modules
6	Create specific and measurable targets to be reached in 2 years period after the project's completion with specific target for each partner and for the consortium.	Create more generic and qualitative 2 years action plan for the whole consortium.

Objective 1: A dedicated dissemination plan has been created at the start of the project. The identification of the project's results has a high dissemination and exploitation potential. Until M32, the majority of the project's has been presented and disseminated through various means mostly as journal publications and presentations in conferences and workshops. The dissemination activities are frequently updated upon request in the project's wiki page. All members of the consortium have participated in various conferences and workshops and will continue to participate in the last year of the project. An updated list of all participation is presented in the project's website. Currently, there have been 25 participations in conferences and workshops and equal published papers, already surpassing both highest expectations of the project. Moreover, the overall participations in conferences is going to increase even further during the last year of the project.

Objective 2: Various communication material has been created and is continuously updated. All the communication activities were reported in D7.2. More specifically:

⇒ A dynamic project website has been created for the dissemination of project news and results among the scientific community, the stakeholders and the EC representatives. In reference to the specified indicator, the growth from the first to the second year has met the highest expectations by achieving a growth of more than 20% (Figure 4).

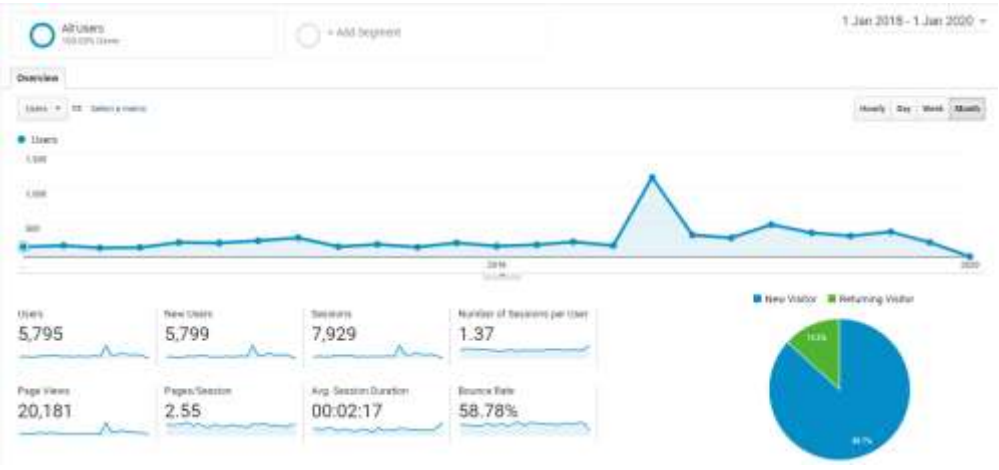

Figure 4. Year over year website traffic (Google analytics)

⇒ A dedicated wiki page was developed to be exploited as a private section for safe access by project partners for collaborating purposes. All relevant project information and materials are uploaded in the relative sections. In general, the wiki is used as an everyday tool to support the overall management of the project.
⇒ Dedicated social media accounts for the dissemination of the project and its activities have been created on Facebook, Twitter and LinkedIn.
⇒ Various dissemination materials have been produced for dissemination purposes. A general presentation, a leaflet and a factsheet have been designed and can be downloaded from the project's website.

Objective 3: Potential synergies have been identified. Cooperation activities with other EU projects have already been carried out, like the organization of common workshops. In the upcoming period, actions will be taken in order to strengthen the cooperation with those synergies. Until M32, 4 synergies with other projects have been achieved (Rawfie, Camelot, Aresibo and Ranger), meeting a good level for the objective's expectation. The project will continue to aim to meet the highest expectation, which is at least 5 synergies by the end of its lifecycle.
Objective 4: A market analysis of the core market (border surveillance market) that the system addresses has been carried out and reported in D7.3. Moreover, the core market covers all relative segments of the Roborder platform.
Objective 5: The project's business model is scheduled to be developed and submitted as D7.6 in M39 (July 2020).
Objective 6: Specific and measurable targets to be reached in 2 years' time after the project's completion with specific target for each partner and for the consortium as a whole will be created and reported in the upcoming period. The goal is for the project to reach its highest goal set.

2.3.8 **WP8:** Project management

WP	8		
WP Leader	CERTH		
WP Objectives			
A/A	**Objective**	**Task**	**Milestone**
1	**Project Management** This task focuses on carrying out all the coordination and planning activities needed to manage and coordinate the project.	T8.1	MS1, MS3-5 (End month: 46)
2	**Project administration, reporting and financial management** This task provides support to administration and financial management of the project.	T8.2	MS1, MS3-5 (End month: 46)
3	**Quality assurance and risk management** The aim of this task is to develop the quality assurance guidelines, monitor the quality of the scientific output, and detect risks and take corrective actions where necessary.	T8.3	MS1, MS3-5 (End month: 46)
4	**Management of confidential information** This task will create a Data Management Plan (DMP) as a document outlining how research data will be handled during a research project and after it is completed.	T8.4	MS1, MS3-5 (End month: 46)
WP Evaluation Strategy			
A/A	**Evaluation strategy description**		
1	The evaluation strategy for this task includes: ⇒ Request internal, 3-month periodic activity and expenditure reports from each partner ⇒ Assessment of the completion (%) of each task/activity by the time foreseen based on the information obtained from the 3-monthly internal activity reports and the interviews with the responsible partners.		

	⇒ Assessment of the budget figures as reported by the partners in the 3-month internal expenditure reports in light of the overall budget figures and their extrapolation to the total duration of the project.
2	The evaluation strategy for this objective involves: ⇒ Assessment of the successful and timely completion of the requests by the partners of Consortium and the Commission ⇒ Assessment of the timely submission of the deliverables. ⇒ Assessment of the successful management of the meetings
3	The evaluation strategy of the task includes: ⇒ Assessment of the research progress within a WP as documented in the internal periodic reports, deliverables ⇒ Assessment of the all the components progress within each WP as documented in the internal periodic reports, deliverables
4	The evaluation strategy involves the development of high quality DMPs and reported in the relevant deliverables (D8.2 and D8.4).

WP Indicators		
A/A	**Highest expectation**	**Lowest expectation**
1	⇒ 100% completion of all tasks/activities by the foreseen deadlines ⇒ Expenditure of funds proportionally to the lifetime of the project	⇒ 75% completion of all tasks/activities by the foreseen deadlines ⇒ Justified expenditure of funds, in accordance with the EC regulations.
2	⇒ Completion of all requests by the partners of the consortium and the Commission within 7 working days to the satisfaction of the inquirer ⇒ Submission of the deliverables by the deadline established in the work plan ⇒ Exhaustive treatment of all topics foreseen in the agenda of a meeting	⇒ Completion of all requests by the partners of the consortium and the Commission within 14 working days to the satisfaction of the inquirer ⇒ Submission of the deliverables within the contractually fixed 45 days after the deadline established in the work plan ⇒ Treatment of all topics foreseen in the agenda of a meeting to an extent that allows for the continuation and successful completion of the topics over distance
3	100% fulfilment of the criteria/highest metric figures established for a given task/activity.	Meeting the minimal requirements/performance figures established for a given task/activity
4	100% fulfilment of the established criteria	Meeting the minimal requirements for the quality of the corresponding deliverables.

Objective 1: All three evaluation strategies for Objective 1 are taking place as expected. More than 75% of all tasks / activities have been completed by the foreseen deadline (lowest expectation for the first performance indicator). Most of the deliverables submitted on time. In case of delays, these were always after discussion and confirmation by the PO.
Objective 2: The proper administration and communication with the Commission is being ensured, as all three types of assessment with respect to the corresponding evaluation strategies are being made. Objective 2 is being fully achieved according to all three of its performance indicators.
Objective 3: Regarding the research and the development progress within each WP of the project, for the majority of the tasks / activities there is a 100% fulfilment of the established criteria/highest metric figures. Thus, Objectives 2 and 3 are being fulfilled to the highest expectations as defined in the corresponding performance indicator.
Objective 4: The highest expectation was attained as the corresponding deliverables which includes the versions of the project's DMP has been successfully submitted on-time according to the consortium's obligations.

2.3.9 **WP9:** Ethics requirements

WP	9

WP Leader	CERTH		
WP Objectives			
A/A	**Objective**	**Task**	**Milestone**
1	This objective ensures compliance with the "Ethics Requirements" set out in this work package.	-	-
WP Evaluation Strategy			
A/A	**Evaluation strategy description**		
1	The evaluation strategy of this WP focuses on acquiring all the necessary documentation in order to be compliant with the suggested European Guidelines on Ethics and Data Protection: ⇒ UxV authorizations for operation ⇒ DPO ethics approvals regarding data protection ⇒ Signed informed consent for involving humans in demonstrating real scenarios and on forming certain ethical and data protection rules that should be abide by the partners that are involved in the demonstrations/operational tests: ⇒ Ethical Code ⇒ Data Protection Rules		
WP Indicators			
A/A	**Highest expectation**	**Lowest expectation**	
1	Acquire all needed documentation before commencement of any relevant work and submit codes and rules in the respective deliverable.	Acquire all needed documentation before commencement of any relevant work and submit drafts on codes and rules.	

Objective 1: All ethic issues were addressed and reported in the corresponding deliverables (D9.1-D9.6). The recommendations proposed as outcomes of the project's ethics review meeting (26-28/06/2019) were addressed in a newly inserted deliverable, namely D8.6.

2.4 TRL Mapping

Following the reviewers' recommendations, the SAP was updated accordingly in order to include the mapping of the TRL values and mostly to report the current status of each system's feature. The below table presents the initial, current and the targeted TRL level for each Key Result as well as the corresponding WP and objective of Sections 2.3.

A/A	Key Results	TRL			WP/ Obj	Details
		Init	Cur	Tar		
TRL1	Simulation environment (SIMROB)	5	6+	7	WP2/ Obj_4	The technologies used are quite mature and the increment of the value is due to the applications in some of the PUCs. The completion of all PUCs will increase the value to the foreseen TRL.
TRL2	Extreme condition adaptability functionality	3	5	7	WP2/ Obj_5	The required sensors were ruggedized properly in order to be physically integrated on the platforms and bear extreme weather conditions. As the project's demonstrations are organized for the upcoming period, the demonstration in relevant environments (TRL=7) is to be attained by the end of the project.
TRL3	Passive radar receiver	4	5	7	WP2/ Obj_2	The corresponding partner, FHR, has completed all the upgrades of the passive radar receiver. Technology has already validated in relevant environments nonetheless; in the upcoming period it is expected to demonstrate the prototype as the test prerequisites the existence of a

						ground coastal network.
TRL4	Photonics-based radar	5	6	7	WP2/ Obj_6	The level of maturity of the relevant technologies is already high nonetheless; it is expected to be increased as the ability to process massive data in real time and demonstrate the capability of the system to communicate with legacy systems is to be performed.
TRL5	Optical clock for photonics-based radar network	4	6	7	WP2/ Obj_6	The optical clock will comprise an upgrade of the photonics-based radar network and so, the TRL values are related. It is expected to reach the foreseen value after the demonstration of the prototype.
TRL6	Passive microwave sensors for mission-specific emission monitoring	5	-	7	WP2/ Obj_1	The respective key result refers to the initial approach of the architecture where a cloud-based architecture would have been applied. Nonetheless, after the assessment of the end-user requirements and the decision of a local deployed system, these Key Results are invalid. Considering also the termination of TEK-AS as the main contributor, these TRLs are obsolete.
TRL7	Hierarchical cloudlet-based communication architecture	3	-	7	WP2/ Obj_1	
TRL8	Context-aware link selection algorithm	3	-	6	WP2/ Obj_1	
TRL9	Moving Target Detection	5	6	7	WP3/ Obj_1, Obj_2	Currently, the service has been evaluated using real video streams from relevant environments. The TRL value is expected to reach the value 7 as the system prototype will be demonstrated the upcoming period during the demonstrations of specific PUCs.
TRL10	Event Detection and Recognition	5	6	7	WP3/ Obj_2	The module has been extended and demonstrated in relevant environments. The corresponding value will be increased as the prototype will be demonstrated in the upcoming period.
TRL11	Activity Detection and recognition	4	5	6	WP3/ Obj_2	As the service refers to the identification of activities for specific objects (e.g. humans, cars etc.), the developed technology has already been evaluated in relevant environments. It is expected to reach the value of 6 after the first demonstration as real footages of such environments will be available and so, it will be evaluated and demonstrated during the second demonstration.
TRL12	Low-level fusion engine	3	4	5	WP3/ Obj_3	In order to perform proper validation tests, the service requires real data from real operation tests from relevant environments. Thus, the service could be validated in relevant environments reaching the TRL value of 5 after the first demonstration (M35).
TRL13	Intrusion detection and classification module	4	5	6	WP3/ Obj_4	The service has been validated in relevant environments using data offline. The service will be demonstrated in relevant environments (TRL=6) during the demonstration events.

TRL14	SDR-based sensor of unauthorized RF communications for use on board unmanned vehicles	4	4+	6	WP3/ Obj_5	The service was under the responsibility of the terminated partner, TEK-AS, while all the relevant developments were frozen. Some tests were performed in lab environment, but these technologies were not validated in such environments. The technology will be demonstrated by another partner in order to attain the foreseen value.
TRL15	Novel Human-UxV interface	3	5	6	WP4/ Obj_1	The progress of the developments for this service have resulted to the validation in relevant environments while the technologies will be demonstrated in such environments in the context of the project's demonstrations.
TRL16	"Plug-n-play" Resource Controller	5	6	7	WP4/ Obj_3	The under-development service is currently demonstrated in relevant environments using similar technologies. It is expected to increase the TRL value as the module will be evaluated during the demonstration of the system's prototype.
TRL17	Mission authoring tool	4	5	7	WP4/ Obj_2	The Mission editor currently has been validated in relevant environments. As a significant service in commanding the UxVs, the technology will be demonstrated during the first demonstration and reach the foreseen value afterwards.
TRL18	CISE-compliant common representation framework	3	5+	6	WP4/ Obj_4	The developed ontologies for event categorization have been validated using data collected offline and processed at a second phase. TRL will reach the foreseen value after executing real scenarios and during the demonstrations.
TRL19	High-level integration, reasoning and interoperation framework	5	6	7	WP4/ Obj_4	Towards providing an increased situation awareness framework, the developments focused on demonstrating the framework in relevant environments where offline data were used. The final TRL value will be achieved after the demonstration of the prototype.
TRL20	Dynamic data-driven assimilation toolkit	6	6+	7	WP4/ Obj_5	Some validation tests have been performed. The final TRL value will be achieved after the demonstrations.
TRL21	Decision support module	5	6	7	WP4/ Obj_6	Similar to TRL19 as the two services are complementary.
TRL22	Visual analytics module	3	5	6	WP4/ Obj_6	The developments of the Visual analytics module focused on improving the rendering speed of visualizations which was accomplished according the end-user requirements. The service has been validated in relevant environments with offline data while it will be demonstrated during the demonstrations.
TRL23	Integrated and functional system	3	5	7	WP5/ Obj_5	The final TRL value of the system will be achieved upon the completion of the project where all services will be demonstrated as a whole.

3 Data management plan

3.1 Introduction

In order to make sure that all collected and processed data are being processed with efficient and secure procedures, ROBORDER has established a concrete Data Management Plan (DMP), which will assist the consortium in their effort to ensure that they are taking into consideration the multiple aspects of data management and protection throughout the project's lifetime and in the future. The following sections present the methodology that was followed for the DMP's creation and how it will be implemented by the involved partners.

3.2 Methodology

In the new deliverable D8.6, certain rules have been established regarding data protection, which have been based on the General Data Protection Directive (2019/679). More specifically, the consortium ensures to collect data:

⇒ **In a lawful, fair and transparent manner**: ROBORDER's lawful basis for data collection and processing is the acquisition of a signed informed consent from the participants that are going to take part in its studies. This is completed only after the data subject is fully informed about the procedure that is going to take place and what exactly is asked from him/her, not misleading them in any way. Additionally, the consortium will make sure to be as transparent as possible by giving the potential participants the opportunity to ask for any further clarifications regarding their involvement in the project, even though they are all employed by the partners, therefore they are already familiar with the project's scope and objectives.

⇒ **Focusing on the purpose they are after**: the purposes of the conducted research are clearly stated in the information sheet provided to the participants and are limited to re-adjusting the user requirements and designing the technologies that are going to be used throughout the project for object/individual detection. If, in any case, there is a change in these purposes, the updated purposes will be reported in the respective deliverables and mentioned in the information sheet before commencement of any work.

⇒ **Considering that these data are indeed required**: ROBORDER will make sure that it collects data that are adequate, relevant and limited to what is necessary for its purposes. The personal data (such as name, age, job title) that are going to be asked from the participant during their information of the research and their sign of the consent form are mostly because the people involved are already employed by the project or other relevant contacts (therefore, the minimum personal details are already known to the partners). Additionally, the data that are going to be collected during the demonstrations/operational tests by the UxVs, cameras and sensors will be images and footages that will be used for the detection of objects located within the demonstration area.

⇒ **Ensuring that they are accurate**: by using the consortium's employees and own contacts, it is easier to confirm that the collected data from the consent form (name, age, etc.) are indeed true and that the participants appoint the expertise to operate the appropriate UxV in order to collect the data required by the system to identify an object.

⇒ **No storage (with no apparent reason)**: the data that are going to be stored (only until the project's lifetime) in the responsible partner's premises are going to be signed informed consents. In reference to the data collected by the UxVs, they are going to be processed online by the system without the requirement of being stored on a vehicle or in the ROBORDER system. In other cases, and only for specific occasions with limitations, the responsible partner will ensure the secure storage of these data only until the project's completion and in a secure server within their premises.

⇒ **With integrity and confidentiality**: ROBORDER will collect data that are going to be treated as fully confidential and will not be circulated outside the consortium (unless required otherwise by the European Commission/National Authorities as a part of its obligation). Moreover, in case of sharing a piece of information that is considered personal or sensitive with another partner, all beneficiaries will make sure to anonymize the data. Additionally, all technical related data that are considered essential to the project's success will be shared with the involved partners in an encrypted version, in order to make sure that they will not be jeopardised by a breach.

Following the same rationale of focusing its research on European guidelines and in combination with the pre-mentioned rules, the consortium has created a table according to EC's guidelines on "FAIR Data Management" in Horizon 2020 which collects and summarizes its procedures regarding the processing of the collected data. More specifically, ROBORDER's DMP focuses on:

⇒ The handling of research data,
⇒ The types of the collected and processed data,
⇒ The methodology followed,
⇒ The accessibility of the data and their securely treatment.

3.3 Data management plan

DMP Component	Issues to be addressed
Data summary	**Purpose**: The data that are going to be collected before the commencement of any research work aim at ensuring that the involved people have the experience and expertise to provide the consortium with some insightful feedback regarding the system and its successful operation. Additionally, the participant's signature and basic personal information (name, age, etc.) are going to be used for filling in of the informed consent that all human research participants should sign before their involvement in the study. Additionally, the data collected from the demonstration site by the UxVs that are going to be operated will contribute to the evaluation of the sensors and cameras performance and the assessment of its capabilities in order to ensure the detection of object of interests on site as well as the system's interoperability. **Relation to objectives**: ⇒ 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, ⇒ IO4: ROBORDER platform development and integration, ⇒ UO1: User requirements definition, end-user evaluation and validation, ⇒ IMO1 Dissemination and collaboration, ⇒ IMO2 Exploitation and sustainability model **Types and formats**: Regarding the data that are going to be collected before and during the demonstrations/operational tests, the informed consent with the participants basic personal data are going to be in a hard copy form. The data collected from the UxVs will be mainly images and footages from thermal and RGB cameras, sensory values from an RF sensor and a passive radar. Additionally, telemetry data and system diagnosis data (such as altitude, airspeed, position etc.) are going to be collected in an format identified from each UxV

	system. **Re-use of existing data**: During the first implementation of the detection algorithms, multiple open access databases have been used (e.g. Pascal-VOC). These databases mostly referred to visual data and deployed algorithms and helped with the training and testing of the detection models that are going to be used by ROBORDER. **Origin**: All involved partners with the necessary expertise are going to generate ROBORDER's dataset during the demonstrations/operational tests that are going to take place from M35 onwards. **Size**: The size of the processed data could not be identified as it depends on various system parameters (e.g. resolution of the images, mission time etc.) **Utility**: The prementioned dataset is going to be of crucial importance to the entire consortium in regard to achieving ROBORDER's objective. In addition, this information could also be proven beneficial for future researchers who wish to delve into border security state-of-the-art, as well as potential stakeholders that are interested in ROBORDER's technologies.
FAIR Data - Findable	**Discoverability**: The ROBORDER dataset is going to be made discoverable through its association of the metadata related to the dataset, mainly focusing on date of measurement, target classification, time of measurement and location of measurement. **Identifiability**: All data collected during the project's lifetime will be assigned to a unique and persistent identifier which is linked to the EU cordis portal (https://cordis.europa.eu/project/id/740593/en) and will be enriched with metadata that will be able to give detailed information regarding the context and the quality of the data. **Naming conventions**: The general scheme that was agreed by the consortium for naming the data is as follows: ROBORDER_PUCx_Location_Sensor_No_Version_file.exension, where "PUCx" is the number of the executed Pilot Use Case, "Location" corresponds to the location that the demonstration/operational test is performed, "Sensor" indicates the type of sensor, "No" presents the number of streaming data and "Version" is for the version of the file. **Search keywords**: The main approach regarding the search keywords aims at high specification and relevance. For example, in the first PUC that will be performed in Portugal, the appropriate keywords for searching relevant information would be "Portugal demonstration" and not "demonstration" in general. **Clear versioning**: A manual version is going to take place for the finding of ROBORDER's data. The initial version will be "1.0" and after the commencement of any update or change, the involved partner will make sure to update the version of the file with the number to follow (e.g. 2.0). **Metadata creation standards**: No metadata are foreseen to be developed, thus to follow specific standards, as relevant information will be available from appropriate sensors.
FAIR Data – Accessible	**Openly available**: The data that could contribute in enhancing ROBORDER's detection technologies and capabilities will be openly available to the consortium through secure channels such the

	established wiki page. The only data that will not be distributed to the partners will be the participants' personal data (such as name) in order to protect their privacy. The outcomes of the demonstration or the participant's feedback can become available to the rest of the partners, only after it has become anonymized. **Tools and means of availability**: The main tool for exchanging data will be the ROBORDER's wiki page (Link) that has been created by CERTH for collaborating purposes. All involved partners have a unique set of username and password in order to log in and find the data they need in the respective sections. For EU_RESTRICTED data, a ZED! encryption software is required in order to successfully encrypt sensitive information. **Deposition**: The consortium ensures that all the measures will be considered to secure all the acquired data as well as all the products of developments (e.g. code). For example, the acquired data to be processed during the execution of the pilot use cases will be stored on a secure server. **Provision of access** (in case of restriction): As mentioned above, all partners have access to the project's wiki page that has been created by CERTH; a personalized username and password was created for each individual to secure the means of collaboration.
FAIR Data – Interoperable	**Assessment of interoperability**: The collected and generated data are going to be provided to the partners in standard formats in order to ensure their interoperability in multiple systems. For example, for images a JPG or BMP formats will be opted for. **Vocabulary and ontologies**: Towards providing increased situation awareness to the operators, a CISE-based ontology was developed to describe efficiently the detected events. In addition, CIRAM data model was exploited as a risk model integrated to the framework.
FAIR Data – reusable	**License**: All collected/generated data will be open to the consortium for re-use until the project's end date. After that, ROBORDER will attempt to ensure its dataset's widest reusability with the anonymized research findings that have been included in the publicly available reports and scientific publications. **Third parties**: Third parties will be able to reuse the data produced by ROBORDER, which could be found anonymized in publicly available deliverables, reports and scientific publications. **Quality assurance**: Before providing the acquired/generated data available to the rest of the involved partners via wiki, the responsible partner should make sure that they are accurate and complete. They should always follow the naming and versioning that has been indicated and upload the data in their respective section in wiki, so they can be easily found by the rest of the involved partners. In addition, they should ensure that they are providing the data in a correct format and in the correct form (as a plain file or encrypted) depending on the type of information. **Re-use duration**: Currently, the original datasets that will be created after the demonstrations/operational tests will be available for re-use among the consortium until the project's end date. After its completion, anonymized data will remain available for reuse through the publicly available reports and publications.
Allocation of resources	**Estimation of costs**: The consortium internal (data) management tool, wiki, requires no resources; however, the encryption software ZED!Pro that is needed for exchanging sensitive data should be

	purchased by all partners. This cost is already foreseen in the original budget allocation. **Responsibilities**: All partners should make sure to abide by the updated DMP set out in this deliverable and purchase the needed tools and means in order to properly handle the produced data. CERTH is the main responsible for overseeing the DMP's implementation as the project's coordinator. **Long-term preservation**: No long-term preservation can be foreseen at this point as the collected/generated data will be available for re-use until the project's end.
Data security	ROBORDER's dataset will not include any sensitive or restricted data and all personal data and identifiers will be anonymized before being incorporated. Being stored in wiki, access is granted only to the individuals that have been given their unique pair of username and password by the coordinator; therefore, an intrusion or a breach is mitigated. Additionally, a specific versioning of the data will be followed which will allow access to the item's history to restore any kind of information, in case of an incidental deletion. This is also applied to wiki's functionalities, which allows the restoration of deleted information. Finally, the exchange of sensitive data among the partners and between the consortium and the EC will be conducted with the use of an encryption software (ZED!Pro) that is officially approved by the European Commission.
Ethical aspects	ROBORDER's ethical aspects are described in the submitted WP9 deliverables, as well as in the updated ethics related deliverable D8.6, which addresses all issues indicated by the ethics committee. Updated information regarding their data collection and processing have been requested by the partners involved in the PUCs and copies of ethics approvals will be granted by CERTH's Data Protection Officer. All the required authorizations for operating UxVs in the demonstration/operational test areas have been initiated and signed informed consents are going to be collected before commencement of any relevant work when humans are going to be involved. Moreover, an additional report from an external ethics advisor is also going to be submitted to the EC.

3.4 Other Data

To this point, no other relevant data were identified.

4 Conclusions

The SAP presented in this deliverable is an updated version of the Initial Assessment Plan - v1, D8.2. The experience gained in the process of the project work during the first 33 months of the project enabled us to revise the initial evaluation instruments and indicators for several tasks and objectives in order to ensure the optimal assessment of the quality of the work carried out. The updated instruments proved to be well-designed and efficient since when newly inserted, they allowed for a precise identification of the bottlenecks, delays and problems.

The results of the evaluation show that most of the objectives have been achieved to sufficient satisfaction. The preliminary results of the work on some of the objectives have met the lowest expectation envisaged, and only a few results are still below the expectations. In addition, the work on a number of objectives has not yet been evaluated since it is still in

progress. Finally, it should be noted that all aspects of work that do not fulfil yet the highest expectations are in the focus of the effort of the consortium.

Appendix A – Deliverable Review Form

ROBORDER Review Form	
Deliverable Number	
Deliverable Title	
Reviewer Name	
Date	

General decision		
The deliverable can be submitted:	as is	
	after minor revisions	
	after major revisions	
	the deliverable has significant flaws	

Scientific Objectives	**1**	**2**	**3**	**4**	**5**	**n/a**	**Comments**
	(1 totally disagree - 5 totally agree)						
States its objectives, specific technical areas, related (sub)task(s) and dependencies, as specified in the Description of Work							
Meets the objectives as specified in the DoW							
Closely addresses the specific technical areas that the DoW describes for this deliverable							
Represents a suitable outcome for the resources applied to the (sub)task(s) originating the deliverable							
Can be used by dependent deliverables as stated in the DoW							
Will lead to further outputs (papers, standards contributions etc.)							
Significantly advances the state-of-the-art at the beginning of the project							
Includes checks against the related quality metrics							

Metrics concerning document	**1**	**2**	**3**	**4**	**5**	**n/a**	**Comments**
	(1 totally disagree - 5 totally agree)						
Is clearly written							
Is concise							
Is complete (there are no significant omissions)							
All acronyms and abbreviations are listed							
Is technically correct							
Is easy to read by different types of public (broader communities)							

Is timely (it met its due date)							
Contains a good executive summary such that the reader can understand what is contained in the document without necessarily having to read it in its entirety							
Contains a clear and concise abstract							
Contains graphics depicting the overall architecture and the position of the modules/services addressed by the deliverable							
Presents the updated status of tools/components from the same Work Package, for which no more deliverables are planned							
Contains suitable conclusions							
Contains appropriate references							

Other metrics	**1**	**2**	**3**	**4**	**5**	**n/a**	**Comments**
	(1 totally disagree - 5 totally agree)						
The reviewer could read and adequately review the document within a reasonable time period							
The deliverable has been written to adequately target the right audience according to the security regulations							
The document describes what it is expected to be reported according to the DoW description of the (sub)task(s)							

Other general Comments	