



**An Enhanced Common Information Sharing Environment for Border
Command, Control and Coordination Systems**

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D.1.4 Project Final Report

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Executive Summary

The Deliverable D1.4 “Project Final Report” is the final progress report of ANDROMEDA project which belongs to WP1 activities and covers the reporting obligations for the period M13-M24 (September 2020 – August 2021), considering the 6 months extension that the project has granted due to the COVID-19 outbreak. Overall, during this final period of the project the activities have been focused on the finalization of the development and integration of the ANDROMEDA system which has been launched in 4 successive releases tested and validated during project’s long-lasting trials. The context and all the logistics for the operational trials were defined and ANDROMEDA successfully demonstrated its results to the User Community, stakeholders and policy makers for a long period (around 12 months). In parallel, the project organized its Final Workshop & Demonstration event and concluded its dissemination, communication and exploitation activities paving the way for the large market uptake of the ANDROMEDA components. From a managerial perspective the document provides a thorough list of actions that have been undertaken to fulfill EC’s recommendations received during the mid-term review meeting.

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1. Introduction

1.1 Purpose of the document

The purpose of D1.4 Project Final Report is to present the main outputs of the work performed during the third and last period of the project (M13-M24). Similarly, to D1.2 and D1.3, it summarises the progress towards the objectives, provides information for the status of the Work Packages (WP), Tasks, Deliverables and Milestones, identifies and highlights the most significant results, and presents the progress with respect the Person-Months (PM) spent per WP and per Partner.

1.2 Reference documents

[1] ANDROMEDA Grant Agreement No 833881 – Annex 1 Description of the action

[2] ANDROMEDA D1.1 Project Management, Quality and Risk Plan

1.3 Definitions

List of Definitions	
CISE	CISE is the Common Information Sharing Environment for the Maritime Domain. It will integrate existing surveillance systems and networks and give to all the relevant authorities (EU and national authorities responsible for different aspects of surveillance) concerned access to the information they need for their missions at sea. The CISE will make different systems interoperable so that data and other information can be exchanged easily through the use of modern technologies.

1.4 Structure of the document

The document is structured as follows:

Chapter 1 – Introduction, purpose of the document, reference documents, definitions, structure and list of acronyms.

Chapter 2 – Project’s objectives and work progress: A summary of the project objectives during the third period of the project and the progress achieved including a comparison between the activities planned in DoA. Detailed work progress achievement during this last period is presented in the consolidated results for each Work Package. This section is ordered according to the Work Packages as defined in the DoA.

Chapter 3 – Project management and coordination: A summary of the progress at managerial level for each Task under WP1, including the status of the deliverables due between M13 (September 2020) and M24 (August 2021), the milestones that have been achieved, the reference to the problems encountered and the corrective actions undertaken, the status of each KPI defined in the DoA, the summary of the meetings and teleconferences arranged, the risks that have been identified and the measures to mitigate them and last the resources that have been spent per partner and per WP.

Chapter 4 – Conclusions: A summary with the conclusions of the Deliverable and reference to the final reporting obligations on the participant portal.

1.5 List of Acronyms

List of Acronyms	
AB	Advisory Board
AI	Artificial Intelligence
AIS	Automatic Identification System
CDM	Common Information Sharing Environment Service and Data Model
CISE	Common Information Sharing Environment
CSG	CISE Stakeholder Group
C2	Command and Control
DF	Data Fusion
DFS	Data Fusion Services
DoA	Description of Action
DPM	Data Management Plan
DPO	Data Protection Officer
DST	Decision Support Tools
EB	Executive Board
EMSA	European Maritime Safety Agency
ETSI	European Telecommunications Standards Institute
E/O	Electro Optical
JRC	Joint Research Centre
IM	Innovation Meeting
IPR	Intellectual Property Right
ISG	Industry Specification Group
KoM	Kick off Meeting
KPI	Key Performance Indicator
MST	Management Support Team
OSINT	Open-Source Intelligence
P2PKOS	Project to Policy Kick Off Seminar
PM	Person Month
POPD	Protection of Personal Data
RASCI	Responsible, Accountable, Support, Consulted, and Informed
RV	Review
R&D	Research & Development
SIA	Societal Impact Assessment
TM	Technical Meeting
UC	User Community
WP	Work Package

2. Project's objectives and work progress

2.1 Project's objectives for the period

The main objectives of the project covered during the last period of the project (M13-M24) are the following:

- Address the recommendations received from the mid-term review report
- Engagement with the User Community and extend it to include land border authorities and FRONTEX
- Conclusion of the adaptations of the involved C2s (ENGAGE, SMART, SOCRATES and GEOC2) in order to be 100% compatible with the e-CISE Data Model
- Development of the Data Fusion Services and Decision Support Tools
- Development of the ANDROMEDA Hub, e-CISE to CISE adaptor and all e-CISE adaptors with the aim of Adaptor-to-Adaptor direct interconnection and provision of future interface with an enhanced CISE Gateway or Node
- Development of the intelligent UxV Surveillance platform for object detection, identification and tracking via UAV and terrestrial image processing
- Integration of the C2 systems, data fusion and analytics services with the legacy systems
- Implementation of the integration platform over secure VPN for testing the ANDROMEDA components taking into account interoperability, rules and standards.
- Test different configurations that will be used to validate the ANDROMEDA system during the trials.
- Factory and acceptance testing following the integration of the different configurations using simulated data whenever needed.
- Finalization and implementation of the validation test plan by deploying the 2nd, 3rd and 4th (final) release of the ANDROMEDA system per Trial.
- Perform training and long-lasting validation testing per system release by collecting feedback from the User Community.
- Preparation, logistic work and configuration of the actors, assets, components and data sources/sensors involved per Trial.
- Installation and configuration of the new surveillance equipment in Evros region (cameras on the fence, radars and cameras on the 18-meters mast and river patrol boat, AIS antenna, meteorological sensors etc.) including the deployment of the necessary telecommunication infrastructure in order to grant data access at C2 level.
- Trials execution under close to real operational conditions, validation and evaluation of the trials results following the preparatory work in WP2.
- Analysis of the trials results and lessons learnt.
- Conclude the dissemination and communication activities by participating in various remote events, releasing research publications and organizing the ANDROMEDA's final workshop & demonstration event with the active involvement of the User Community, EU Agencies (FRONTEX, EMSA, JRC) and external stakeholders and policy makers (DG-HOME, REA etc.)
- Contribution to the ETSI ISG-CDM by using ANDROMEDA as a starting point to extend the CISE standardization to the land domain.
- Manage legal, ethical and societal issues.

2.2 Achievements during the period

This section reports, for each work package active in the reference period (M13-M24; except for project management which will be addressed in chapter 3), the following information:

- the status of the work package at task level
- the achieved results
- the current status
- any deviations from DoA

2.3 Work Package 2: Operational Analysis, User Requirements and Technical Specifications

Task 2.1: User Community Interactions

Task Progress: T2.1 started in M1 (September 2019) and lasts until the end of the project. T2.1 formed the ANDROMEDA User Community of practitioners focused on the goal of “innovation”, delivering the benefits of the Information Sharing Environment through the enhanced CISE model for Land and Maritime Border Surveillance and Monitoring. The T2.1 work was divided into four phases.

During the first phase (M1-M6), LAUREA, in collaboration with T2.2, formulated the initial set of the User Community composed of the participating consortium partners and the external end-users who have been involved in the definition of the user requirements and have expressed their initial interest to link with the project activities. During this phase, each participant in T2.1 created a list of external end-users outside the Consortium from past or on-going initiatives in the domain (e.g. EUCISE2020, EWISA, MARISA, RANGER, CLOSEYE, PERSEUS, CoopP etc.) and invited them to be part of the User Community and participate in the process of the user requirements definition.

During the second phase (M6-M7), the T2.1 strategy for extending the User Community with additional organisations, both users and providers of data and services, not directly involved in the project, was created. The project continued the activities for searching the new potential external partners from relevant projects to be part of the User Community and support ANDROMEDA project to achieve its ambition by providing their expertise and knowledge during the projects Workshops and Trials.

During the third phase (M8-M12), the activities for User Community enlargement continued. The D2.1 was submitted in M12. The phase 4 (M13 – M24) contained activities for utilizing the external partners’ expertise for ANDROMEDA. The external partners were invited to projects Workshops and to projects Trials. The D2.5 User Community Final Report was published in M23.

Achieved results: As the results of three recruit campaign and partners active recruiting throughout the projects duration 3 EU Agencies, 12 external End-Users, 7 external Academies and Research organisation and 4 Industrial partners joint in ANDROMEDA User Community and 5 EU funded projects provided their support to ANDROMEDA project. The external partners represent 12 countries, 6 from the European Union 6 outside of the European Union.

The External Partners were activated and allowed to participate and provide their expertise and experience in several manners. Workshops, including User Community session and Trials, were the main events where the External partners were invited to have updated information about the project’s achievements and providing them the possibility to provide their knowledge and support to the Project. For the informal and open discussion and for collecting opinions the ANDROMEDA Forum was established. Notwithstanding of the partners good initiatives the discussions remained limited. ANDROMEDA User Community is presented in the following Figure.



Figure 1: ANDROMEDA User Community

The User Community, including the external partners, were involved to the work analysing the existing gaps in cross-border cross-sectoral information sharing and in User Community perspective. The outcome of this analysis was identified twenty gaps: the gaps varied from soft gaps, human and policy related gaps to hardware gaps in technical possibilities. The gaps are presented in D2.5 User Community Final report.

Task 2.1 arranged three User Community surveys during the Trials and one after the Final Workshop and Demonstration Event. Surveys' purpose was to collect end-users and external partners opinions of the gaps in information sharing, to find out the Potential of ANDROMEDA and ANDROMEDA's implications regarding the Command and Control, Economy and Authorities co-operation. Until the day when Deliverable 2.5 was submitted, 36 answers were received. Eight answers were from the external partners and 28 from the consortium End-User partners spanning from a variety of Operational Departments & Communities. In the results of the Surveys, ANDROMEDA solution received excellent feedback from the User Community. The key results are presented in D2.5 User Community Final Report.

The role of Land Border authorities was increased in current and towards reflection of ANDROMEDA's User Community, especially the actors outside the Mediterranean area. One difficulty for all authorities in ANDROMEDA project was that the User Community formulation and the actual possibilities effected to the project's goals and ANDROMEDA's requirements had quite narrow timescales and relative short project duration.

ANDROMEDA User Community and the interactions during the project and especially during the long-lasting Trials improved on its own way the mutual trust among the partners and create the way ahead for cross-border cross-sectoral information sharing among the partners. The information, experience and practices shared between the competent authorities will lead to a safer and more secure maritime area, ease of risks, a better response to SARs, environmental protection, etc.

Current status: The task 2.1 is completed.

Deviations: No deviations from the DoA.

Task 2.2: User Requirements and Technical Specifications

T2.2 is completed.

Task 2.3: Legal and Ethical Context Analysis

T2.3 is completed.

Task 2.4: Operational Scenarios & Trials Definition

T2.4 is completed.

2.4 Work Package 3: Overall Design, Architecture & Interoperability Framework

Task 3.1: Enhanced CISE (e-CISE) Data Model for Border Monitoring & Control

T3.1 is completed.

Task 3.2: Physical and Logical System Architecture

T3.2 is completed.

Task 3.3: Land Borders C2 Design

T3.3 is completed.

Task 3.4: Maritime Borders C2 Design

T3.4 is completed.

Task 3.5: Data Fusion, Situation Awareness and Decision Support Services Design

T3.5 is completed.

2.5 Work Package 4: ANDROMEDA System Developments

Task 4.1: Development of Land C2 Systems Adaptations

Task Progress: The task involved the developments of the C2s in the project which operate in the land border domain according to the user-requirements gathered in T2.2. These C2s are compatible with the e-CISE Data and Service Model as developed in T3.1. Each C2 was modified or additional new modules were developed. Understanding the information that can be provided by the e-CISE Data Model allows for any operator conversant in the data types to switch between C2s and create the information and share. The development process followed a staged release cycle (four releases) to match the training and validation required by WP6. In each release additional functionality was added until the completed C2 systems were available at M15.

Achieved results: Command and Control systems of ANDROMEDA were developed for the Land Domain (compatible with eCISE) and reported inside D4.1 which was submitted.

Current status: Completed.

Deviations: None.

Task 4.2: Development of Maritime C2 Systems Adaptations

Task Progress: T4.2 started in M5 (January 2020) and ended in M15 (November 2020). In the first phase, as described in the previous report, a set of tasks were established by each C2 System to comply with the requirements. All this progress was being monitored by the WP4 Leader in order to check closely the advance of the developments. The tasks were divided into four different releases, leading to an incremental development adding new capabilities with each release. All development activities associated to each release were successfully completed.

Additionally, D4.2 “Interoperable C2 for Maritime Border Operations” deliverable was created and submitted to the EC. This deliverable presented all the C2 systems used in the maritime domain, detailing their components, communications and user interfaces. It also included the schedule for the release management of the planned work.

Achieved results:

- The four planned releases for the C2 systems were successfully planned and achieved.
- The releases led to the final version of the C2 systems used in the demonstrations in time.
- D4.2 “Interoperable C2 for Maritime Border Operations” was submitted to the EC.

Current status: Completed.

Deviations: Due to Christmas and some unexpected extreme weather conditions (a snowstorm in Madrid), the submission of the deliverable suffered some delay and was finally submitted at M17, end of January 2021. This delay did not affect other tasks and project activities.

Task 4.3: Development of enhanced CISE Adaptors

Task Progress: T4.3 started in M6 (February 2020) and ended in M13 (September 2020). In the first phase, as described in the previous report, a set of tasks were established by each C2 System to comply with the requirements. All this progress was being monitored by the WP4 Leader in order to check closely the advance of the developments. The tasks were divided into four different releases, leading to an incremental development adding new capabilities with each release. All development activities associated to each release were successfully completed.

Additionally, D4.3 “Development of enhanced CISE Adaptors” deliverable was created and submitted to the EC. This document established the design of the various enhanced CISE Adaptors and showcased them to be compatible with the enhanced and extended CISE Data Model. It also provided implementation details for each Adaptor in the ANDROMEDA’s landscape: C2’s adaptors, Global Data Fusion Adaptor and eCISE/CISE adaptor.

Achieved results:

- Adaptors for all C2’s were planned, implemented and deployed.
- Such adaptors allowed C2 to exchange the data in the trials.
- D4.3 “Development of enhanced CISE Adaptors” was submitted to the EC.

Current status: Completed

Deviations: No relevant deviations.

Task 4.4: Development of Data Fusion, Situation Awareness and Decision Support Services

Task Progress: T4.4 started in M5 (January 2020) and ended in M15 (November 2020). A thorough analysis of the needed actions have been initiated and a detailed plan formed for all the relevant actors in the task from the very beginning following also the work that have been done in T3.5. Therefore, the implementation of the Data Fusion Gateway, the Data Fusion services, the Early Warning Engine for Threat Assessment and the decision support systems concluded successfully, following the four-release approach and in parallel a set of integration and verification actions took place. For example, some actions that have been done, are the below:

- Verification of e-CISE message exchange via Data Fusion Middleware
- All components have been adapted the e-CISE data model
- Verification of Data Fusion Gateway monitoring tools during integration tests
- Added capability for scaling communication middleware with Apache Kafka cluster
- All components have been integrated with ANDROMEDA C2s according to trials needs

At this point it should be mentioned also, that data fusion services, decision support services and the data fusion gateway components have been packaged and delivered using Docker containers, in order to be able to facilitate any configuration and deployment complexities due to the different environments between the three trials. These components have been deployed and tested on ANDROMEDA's integration platform offered by GMV.

Last but not least, Deliverable 4.4 “**Data Fusion, Situational Awareness and Decision Support Services**” has been created in order to present/describe the work that has been done in this task.

Achieved results:

- All the components concluded & integrated on time, according to the plan (four release approach) and demonstrated in the relevant trials
- Deliverable 4.4 submitted on EC portal
- All the advancements of Data Fusion, situational Awareness and Decision Support Services are depicted in detail in the D4.4, together with an explanatory TRL table per component.
- All components have been successfully adapted to e-CISE data model

Current status: Completed

Deviations: There was a delay on the submission of the deliverable towards a qualitative and fully completed document. The deliverable was submitted on M18, early February. It should be mentioned that his delay did not affect any other task and/or project activity.

2.6 Work Package 5: System Integration and Testing

Task 5.1: Test Architecture, Sensor and Data Integration

T5.1 is completed.

Task 5.2: Definition and Implementation of Integration Platforms

T5.2 is completed.

Task 5.3: Definition of System Configurations for Each Trial

T5.3 is completed.

Task 5.4: Factory Integration and Testing of Trial Configurations

Task Progress: The task involved the execution of the various test cases described inside D5.4 for the four releases of the ANDROMEDA system. This involved coordination and cooperation between partners to ensure that various test cases can execute successfully thus green-lighting their deployment to the end-users' premises for training and validation for each release.

Achieved results: D5.5 which was submitted contains test reports for all the releases of the systems, services and components developed in the project.

Current status: Completed

Deviations: The task required an extension found in the amendment of 2 months to ensure all tests can be carried out caused by the pandemic conditions.

2.7 Work Package 6: Pilot Demonstrations, Validation & Evaluation

Task 6.1: Operational Trials Context

Task Progress: T6.1 has started on M6 (February 2020) and its duration has been extended till M17 (January 2021). The main objective of this Task is to define the approach and plans for the execution of the operational trials considering the preparatory work performed in WP2. During the period from M13 to M23, T6.1 was reporting its progress and activities in the WP6 biweekly Coordination teleconferences. The activities undertaken within T6.1 for this period were regarding the drafting of D6.2 "Operational Trials Results Report and Lessons Learnt", the work allocation among partners etc. Within this period, the validation framework of the trials, defined in D6.1, was implemented in 4 different releases, including the trials' time-plans, the execution of the operational steps as well as the completion and statistical analysis of the validation & evaluation metrics.

Achieved results: The scenarios which were broken into operational steps was the basis for executing the trials' validation in 4 successive releases. In order to analyze the results per Trial, the following means have been used:

- Feedback forms completed after each release
- Validation survey with reference to the appropriate KPIs/MoEs completed after the final release of the ANDROMEDA system
- Evaluation survey completed after each release and the final demonstration event
- Ethics requirements' compliance survey.

All this information was included in D6.2, apart from the evaluation surveys which are reported in D2.5.

Current status: Completed

Deviations: Deviations in the timing when the validation of the final release took place per Trial due to COVID-19 implications following the amended Gantt chart of the GA.

Task 6.2: Iberian Maritime Border Trial)

Task Progress: The Iberian trial was performed on the 7th May 2021. The area monitored for the trial was the South Coast of Portugal (Algarve), and the Italian Waters on the Mediterranean. The trial was an inter-country, inter-sector Maritime Border trial involving two EU agencies (the Italian Navy and the Portuguese Navy), with two scenarios demonstrating joint activities on Maritime Traffic Control, Illegal Activities, Smuggling and Drugs. PTN was the main end user in this trial and ITN the producer and consumer of information through CISE.

Achieved results: Releases 2-4 were validated prior to the Trial in the End User's infrastructure. During the trial, the two stories presented provided ample information exchange through Andromeda Hub, between PTN and ITN, using CISE common language. Additionally, mission execution with resource dispatch involving the end user's mobile assets from PTN was also demonstrated.

Current status: Completed

Deviations: Due to Covid-19 limitations, the trial was performed remotely and with mostly simulated data.

Task 6.3: Greece-Bulgaria Land Border – Maritime Trial

Task Progress: The task involved the deploying of systems to end-user premises (Hellenic Coast Guard, EAMA, Hellenic Police, Hellenic Navy), training and supporting the end-users during their usage of the system for four releases beginning from July 2020 and ending June 2021. Moreover, several assets and sensors have been deployed in the borders that will remain functional and operational after project closure, e.g.:

- Evros Delta river 18m. mast with the following equipment: X-band surface IP radar, Long-range IR – Thermal IP PTZ camera, IP radio communication with LCC of Alexandroupoli and river patrol boat, AIS receiver.
- Evros Delta river patrol boat which has been renovated installing the following equipment: X-band surface IP radar, Radar screen, depth gauge, Long-range IR – Thermal IP PTZ camera, Joystick and panel of thermal camera, General switch of electronic systems, Network and sensor node NMEA2000, Microwave antenna, Deck lights, Cockpit roof lights, Roll bar headlights, Navigation lights, Patrol lights, Police siren etc.
- Evros Fence pole equipment: Long-range IR – Thermal IP PTZ camera, X-band surface IP radar, Optical network connection with LCC of Nea Vyssa etc. A mobile Command and Control center has been deployed in the land borders with a long-Range IR – Thermal camera in order to cover the surveillance of a totally remote and inaccessible area.

There was ongoing support while they used the system between releases. For more details see D6.2.

The task also involved the planning and logistics for holding the official trial where physical presence was required.

Achieved results: A successful trial period between 7th to 15th June (five scenarios) that demonstrated land border and maritime border scenarios within Greece and with Bulgaria. The results are reported inside D6.2

Current status: Completed.

Deviations: The trial was postponed a number of times due the inability to travel because of the pandemic conditions. The trial's date was fixed, once a specific time period opened in June 2021.

Task 6.4: Ionian-Adriatic Maritime Border Trial

Task Progress: The Task started in M11 (July 2020) and lasted in M20 (April 2021). It included activities for the organization, setting-up, and execution of the Adriatic – Ionian Trial. The Trial deals with illegal immigration, search & rescue, illegal fishing, and smuggling in maritime areas. The goal of the task was to prove in a long-time trial session the capability to exchange maritime eCISE entities including targets, anomalies, alerts, reports of missions between C2s, and underlying DF and DS services.

Achieved results: The first and the second releases of the software have been validated on the 22nd of October; the third one has been validated on the 2nd of December 2020. On the 16th of March 2021, a rehearsal has been performed to finalize the status of all the involved systems (C2s, DFs, DSS). The official execution

of the trial has been done on the 17th and 18th of March 2021. All the stories described in document D6.1 have been executed. The necessary eCISE maritime entities have been successfully exchanged between involved C2s via the Andromeda Hub. The results of the trial have been presented during the 2nd Workshop that was held online in June 2021, with a dedicated demonstration session consisting of the execution of some of the steps from all the stories.

Current status: The task has been completed.

Deviations: Due to the COVID-19 outbreak the physical participation of potential external auditors has been avoided. A virtual conference has been established to grant access to the interested external users.

Task 6.5: Trials Validation and Evaluation

Task Progress: During this Task, the validation of four releases were performed. After each release, the feedback and comments regarding the predefined KPIs/MoEs from the end-users were collected in order to extract the results and improve the system for the next release. After the releases, three final trials were performed in different areas involving different end-users. The end-users completed a validation survey evaluating the MoEs and compliance with the ethics requirements. These results also were collected and analysed in a statistical way.

Achieved results: The main result of this Task was D6.2 “Operational Trials Results Report and Lessons learnt” which reports on the performed actions in the releases and the trials, the results of the feedback forms and surveys collected, the analysis for the final outcomes of the project and the ethical evaluation.

Current status: Completed

Deviations: Similar deviations as reported in T6.1.

2.8 Work Package 7: Impact Creation, Exploitation and Standardization Activities

Task 7.1: Dissemination and Communication

Task Progress: T7.1 started in M1 (September 2019) and lasts till the end of the project. The main progress of this Task is described below:

T7.1 Deliverables

- Deliverable D7.1 “Communication and Dissemination Strategy and Plan” has been completed and submitted on time
- An ‘Update of the Andromeda Project Dissemination and Communication Plan due to the COVID-19 situation’ was prepared and submitted as Annex B to D1.3., Project Intermediate Report
- D7.2 Initial Dissemination Material was submitted
- D7.3 Final Dissemination Material was submitted
- D7.4 Andromeda Initial Web Service was submitted
- D7.5 Andromeda Final Web Presence has been completed

T7.1 Communication material, Brand Identity and Communication channels

- Communication material has been developed, both for the project and for the two Andromeda Workshops and updated were needed. Communication material includes:
 - Project Leaflet (updated in July 2021)
 - Official Project Presentation (updated in July 2021)

- Project Roll up banner
- Leaflets for the 2 project Workshops
- The project Fiche for the ‘project to policy kick off seminar’
- The Brand Identity has been developed, and the branding guidelines include directions about the use of ANDROMEDA Branding Elements (Logo, Typography, Colours, Imagery).
- The ANDROMEDA social media pages (Twitter and LinkedIn pages) have been developed and are active. They are continuously used to communicate the main Andromeda news and achievements.
- The ANDROMEDA web site has been published and several updates and upgrades have been completed, including the design of a Forum and a series of updates of the news and events section, the downloads section, the user community and the advisory board section.
- A Table listing all completed and planned Dissemination and Communication Activities has been prepared and uploaded in the SharePoint. The layout follows the one of the participants’ portal, including listings for activities types, audiences, impact recorded, etc. This is presented in the ‘achieved results’ section below.
- Moreover, means of verification for Milestone MS2, MS3, MS8 have been met accordingly.

The Dissemination and Communication Strategy has been designed and implemented. The individual steps are given below:

- SMART Communication Objectives have been defined.
- The Stakeholder analysis & mapping has been completed and illustrated using the Interest vs Influence grid. Also, the needs of each stakeholder in terms of geographical dimension have been visually presented.
- Key messages have been drafted for each identified target group. The brand identity has been designed, presented and agreed with the Consortium during the Kick-off meeting. Guidelines about the use of ANDROMEDA Branding Elements have been prepared.
- A list of Communication Routes has been selected. Reasoning for their selection has been provided together with the validation measures for Results’ acceptance.
- A list of Dissemination Routes has been selected. Reasoning for their selection has been provided together with the validation measures for Results’ acceptance.
- Networking Groups have been identified along with the methods used for networking.
- Additional resources for the implementation of the communication plan have been determined and include scientific communities and Industry Groups.
- The Internal Process for Dissemination and Communication has been agreed and is being followed by the consortium. It is in line with the relevant rules of the Grant Agreement and the Consortium Agreement, the Security Advisory Board Role and budget constraints.
- The Innovation Management Roadmap has been prepared for the main ANDROMEDA Results, thus clarifying the exact purpose for the selection of each dissemination and communication activity.
- A re-evaluation of the deadlines, the dissemination and communication routes has taken place and an ‘Update of the Andromeda Project Dissemination and Communication Plan due to the COVID-19 situation’ was prepared and submitted as Annex B to D1.3. Project Intermediate Report. The updated plan listed 1) the Dissemination and Communication activities already implemented until the end of November 2020 and their recorded Impact with respect to audience size and type 2) The consortium plans for future Dissemination and Communication Activities 3) The Scientific Articles under

preparation for publication in peer reviewed journals or conference proceedings 4) The plans for utilizing the social media to communicate the project results.

Achieved results:

T7.1 Scientific Publications (8)

Table 1: Scientific Publications of Andromeda in peer reviewed Journals and Conference Proceedings

Title	Authors	ANDROMEDA partners	Proceedings/Journal	Relevant Links
Augmenting maritime Command and Control over a regional Common Information Sharing Environment implementation: Montenegro Case	Zdravko Paladin, Andrej Mihailović, Nexhat Kapidani, David Merino Delgado, Juan Manuel Grenner Nogueron, Giuseppe Vella, Marios Moutzouris, Roberto Leuzzi	Administration for Maritime Safety and Port Management, GMV, Engineering, Satways, CODIN	Accepted by NMIOTC Semi-Annual Journal (Greece), for July 2021 edition.	https://nmiotc.nato.int/news/journals-2/Journal_Issue_22_edition_available_online
Analysing the Prospect of CISE Implementation and Feasibility in Montenegro	Andrej Mihailović, Nexhat Kapidani, Enis Kočan, David Merino Delgado, Jari Räsänen	Administration for Maritime Safety and Port Management, GMV, Laurea	Submitted to periodical Journal of Maritime Research (Pomorstvo Journal) (Croatia). Expected to be published during 2021.	https://www.pfri.uniri.hr/web/en/scientific_journal_pomorstvo.php
A Framework for Incorporating a National Maritime Surveillance System into the European Common Information Sharing Environment	Andrej Mihailović, Nexhat Kapidani, Enis Kočan, Žarko Lukšić, David Merino Delgado, Marios Moutzouris	Administration for Maritime Safety and Port Management, GMV, Satways	Published and presented at 25th International Conference on Information Technology (IT), Montenegro Žabljak, February 2021. (after the Conference, the paper is included in IEEE Xplore database)	https://ieeexplore.ieee.org/document/9390138
Information Sharing Networks for European Land and Maritime Border Authorities	Räsänen Jari, Tikanmäki Ilkka, & Ruoslahti Harri	Laurea	5th International Conference on Applied Physics, Simulation and Computing (APSAC 2021). Conference will be held in Salerno, Italy on 3-5 September 2021	To be published at the Conference Proceedings by IOP (https://iopscience.iop.org/journal/1742-6596)
Identification of vessel class with LSTM using kinematic features in maritime traffic control	Fusca Davide, Rahimli Kanan, and Leuzzi Roberto	CODIN	Submitted to the ICMEMA 2022: 16. International Conference on Maritime Environment Monitoring Applications (notification of acceptance is expected on September 15 th)	https://waset.org/maritime-environment-monitoring-applications-conference-in-january-2022-in-paris

Title	Authors	ANDROMEDA partners	Proceedings/Journal	Relevant Links
The INUS Platform: A Modular Solution for Object Detection and Tracking from UAVs and Terrestrial Surveillance Assets	Evangelos Maltezos, Athanasios Douklias, Aris Dadoukis, Fay Misichroni, Lazaros Karagiannidis, Markos Antonopoulos, Katerina Voulgary, Eleftherios Ouzounoglou and Angelos Amditis	ICCS	Published in Computation as part of the Special Issue Recent Advances in Computation Engineering	https://www.mdpi.com/2079-3197/9/2/12/pdf
Preliminary design of a multipurpose UAV situational awareness platform based on novel computer vision and machine learning techniques	Evangelos Maltezos, Lazaros Karagiannidis, Thanasis Douklias, Aristeidis Dadoukis, Angelos Amditis, Evangelos Sdongos	ICCS	Proceedings of 2020 5th South-East Europe Design Automation, Computer Engineering, Computer Networks and Social Media Conference (SEEDA-CECNSM)	Proceedings Available in IEEE Explore
The Andromeda Galaxy: Legal and Ethical Aspects of Technology-Aided Maritime Border Surveillance Operations	Dimitra Papadaki, Marina Markellou	KEMEA	Presented at the Mediterranean Security Event 2019 Chapter in a Book Technology Development for Security Practitioners. Security Informatics and Law Enforcement. Springer, Cham.	Link Proceedings not available yet https://link.springer.com/chapter/10.1007%2F978-3-030-69460-9_18

Table 2: Status of the Dissemination and Communication targets

	Metrics	Target	Current Status (M24)
Dissemination	Publications in scientific Journals	3	3
	Presentation in scientific conferences/ conference proceedings	n n<6	4 Articles in Peer Reviewed Conference Proceedings completed 1 book chapter 5 presentations in Conferences completed
Communication	Number of views of website	5,000	149,145 [29,976 visits from 17/12/2019 until 31/12/2020] 119,169 visits from 01/1/2021 to 31/08/2021 Website made accessible to the public on 17/12/2019]
	Published articles in papers, magazines, newspapers	3	23

			7 Press Release/Articles published in 5 partners' websites, 1 article in the 'ingenium' magazine, 1 in the 'European Security and Defence' magazine, 1 article in the 'Metzuda' magazine 1 article in the 'Notiziario della Marina' 1 article in the 'Rivista Marittima' 1 interview in online national media (BG), 10 presentations of Andromeda /interviews in national radio & national TV (ME)
Information material, Creation of leaflets, brochures, posters	3	5	[1 leaflet and 2 roll up banners created and used, 2 more leaflets completed for the 2 workshops]
Newsletter	6	Six	Issues of the Newsletter completed & released.
Video material introducing ANDROMEDA's findings & results	1	1	
Number of video views	1,000		The short version was shown during the second workshop, and was viewed by 129 attendees. The Video file link will be published soon.
Number of professionals to whom the project leaflet will be distributed	500		400 hard copies of the project leaflet distributed [200 were given at the Mediterranean Security Event 2019 and 200 were given at the DEFEA International Conference 2021)] The electronic file was viewed by 234 participants 107 attendees of the 1 st workshop+129 attendees of the 2 nd workshop had accessed the online version of the workshop leaflet 397 leaflet downloads from the website
Presentation in trade fairs, exhibitions	6-n		1 participation in DEFEA International exhibition
Project website leaflet and/or poster downloads	200		Total Downloads: 2,934 [From 17/12/2019 until 30/07/2021 <u>2019 downloads statistics:</u> Presentation:6 Banner:2 Leaflet:63 <u>2020 downloads statistics:</u> Newsletters: 546 Presentation: 295

			Banner: 172 Leaflet: 252 Workshops' Agendas and materials:208 Deliverables: 79 e-CISE Model:9 <u>2021 Downloads Statistics</u> Newletters: 365 Presentation: 140 Banner: 94 Leaflet: 82 Workshops' Agendas and materials: 338 Deliverables: 254 e-CISE Model: 29
	Twitter account followers	200	327 followers
	LinkedIn Group members	200	342 followers, 333 connections
	Social media posts	150	89 independent posts from Andromeda account 47 from partners' accounts

The Dissemination and Communication Activities implemented until M24 are presented in Table 3. The layout follows the one of the participants' portal. Special attention is given to the impact recorded for *each* activity, in terms of audience size and type.

Overall, the consortium has:

- Published **3** scientific papers in peer reviewed journal and **5** in conference proceedings (one is also a chapter in a book)
- Organised **1** Conference and **4** workshops
- Published **15** Press Releases/Articles
- Prepared **3** Non-scientific and non-peer-reviewed publication (popularized publication)
- Designed **5** flyers
- Participated to **3** Trainings
- Designed and maintains **2** social media accounts and **1** website
- Implemented **11** Communication activities in TV and radio
- Participated to **7** Conferences and **5** workshops
- Participated to **15** Events other than a Conference or a Workshop
- Participated to **1** activity organized jointly with other H2020 projects

Table 3: List of Dissemination and Communication activities performed until M23 and audience size and type

Type	Total Nu	Title	Date and Place	Partner Responsible	Audience size/type
Organisation of a Conference	1				
	1	Mediterranean Security Event 2019 Supported by DG-HOME, EARTO, ENLETS and SECURITY COU ()	Date: 29-31 October 2019 Location: Crete, Greece	KEMEA	Security Sector/ 200

Organisation of a Workshop	4				
	1	Joint Workshop on maritime border security , co-organized among H2020 RANGER, MEDEA and ANDROMEDA projects in the context of the Mediterranean Security Event 2019 (p. 12 out of 20)	Date: 30 October 2019 Location: Crete, Greece (14:00 – 17:00)	KEMEA, EXUS	projects RANGER, MEDEA, ANDROMEDA and MSE participants/ 50
	1	1st online workshop Andromeda	Date: 28-29 September 2020 Location: online	GMV supported by KEMEA, STWS, ICCS	JRC, EMSA, Frontex, stakeholders projects/ 107
	1	ANDROMEDA User Community Session	Date: 14.5.2020	Laurea, supported by KEMEA, GMV, STWS, INW, CODIN	Projects ARESIBO, ANDROMEDA, End-Users, external partners, potential external partners/65
	1	Final Workshop and Demonstration Event	Date: 23-24 June 2021	EXUS supported by STWS, KEMEA, ICCS	JRC, EMSA, Frontex, stakeholders, projects OCEAN2020, COMPAS2020, EFFECTOR / 129
Press release - Article	15				
	1	A new research initiative for the control and safety of European borders (EN, EL versions)	Date: 07 October 2019 Location: KEMEA's website (News)	STWS-MMAIP-KEMEA	website visitors, researchers/571
	1	Μία νέα ερευνητική πρωτοβουλία για την εποπτεία και την ασφάλεια των ευρωπαϊκών συνόρων (EL version)	Date: 03 October 2019 Location: MMAIP' website	STWS-MMAIP-KEMEA	website visitors, researchers, media
	1	Con ANDROMEDA la sicurezza dei confini è nella condivisione delle informazioni (IT version)	Date: 07 October 2019 Location: ENG's website	ENG	website visitors, researchers/ 145
	1	GMV helps to extent the capabilities of the Common Information Sharing Environment (CISE)	Date: December 2019 GMV News magazine page 42	GMV	website visitors, subscribers customers/ 5,000
	1	ANDROMEDA Newsletter #1 September-December 2019	Date: January 2020 Location: ANDROMEDA website	STWS	website visitors, general public/ total downloads for all

					newsletters: 911
1	ANDROMEDA Newsletter #2 January-March 2020	Date: May 2020 Location: ANDROMEDA website	STWS	website visitors, general public total downloads for all newsletters: 911	
1	Big Data and AI for the protection of territories and seas: the Andromeda case. How can data analysis and the use of Artificial Intelligence contribute to the defense of borders?	Date: July 2020 Location: online version, ingenium-magazine	ENG	Ingenium magazine readers/ 30,500 views for the Italian version and 1,100 for the English version	
1	FRONTEX Executive Director and Greek Minister of Citizen Protection inspect ANDROMEDA's C3 System at Evros	Date: July 2020 Location: KEMEA website	KEMEA	General public/ 115	
1	Delivery and installation of equipment to the Police Directorate (DA) of Alexandroupolis, in the framework of the implementation of the European program "ANDROMEDA"	Date: July 2020 Location: KEMEA website	KEMEA	General public/ 526	
1	Press Article under the title "By information sharing to the enhancement of border and external security" - MSD realization of ANDROMEDA project in Montenegro	Date: published on 22nd September 2020 Location: Daily Newspaper Montenegro, pp 18-19	MSD	General public/ 2,000	
1	Article on presenting ANDROMEDA project in the online version, European Security & Defence magazine	Date: expected to be published up to the end of 2020 Location: online	MSD	various professional public related to security subjects	
1	Andromeda Newsletter 3 April-July 2020	Date: November 2020 Location: ANDROMEDA website	STWS	General public/ total downloads for all newsletters: 911	
1	Andromeda Newsletter 4 August -December 2020	Date: May 2021 Location: ANDROMEDA website	STWS	General public/ total downloads for all newsletters: 911	
1	Andromeda Newsletter 5 January – May 2021	Date: July 2021	STWS	General public/ total downloads for all	

			Location: ANDROMEDA website		newsletters: 911
	1	Andromeda Newsletter 6 June- July 2021	Date: July 2021 Location: ANDROMEDA website	STWS	General public/ total downloads for all newsletters: 911
	1	Short Presentation of Andromeda in the MARINA MILITARE website		MARINA MILITARE	
Non-scientific and non- peer- reviewed publication (popularised publication)	3				
	1	Interview in "METZUDA" magazine. In this article, The Head of INP R&D unit mentions the common work with the EU (and the H2020) in general and the ANDROMEDA project.	Date: End of December 2019 Location: "METZUDA" magazine	MOPS-INP	security leaders of Israeli agencies and public organizations/> 200
	1	"SMEs drive Innovation and Real Time Analytics - A revolution in Cyber and Homeland Security. "	Date: Location: Notiziario della Marina magazines	CODIN	General public (>1000)
	1	‘CODIN-le PMI alla guida dell’Innovazione e del Real Time Analytics. Una rivoluzione in ambito Cyber and Home Land Security’ "SMEs drive Innovation and Real Time Analytics - A revolution in Cyber and Homeland Security. "	Date: November 2020 Location: Rivista Marittima	CODIN- Italian Navy	Italian agencies (4000)
Exhibition	1				
	1	DEFEA – Defence Exhibition Athens (Satways booth)	Date: 13-15 July, 2021 Location: Athens - Greece	STWS, HPL	1. Security sector 2. Industry representati ves 3. Academia 4. Media (315 industries from 22 countries, visited by 45 military delegations from 35 countries)
Flyer	5				

	1	ANDROMEDA leaflet	Date: 29-31 October 2019 Location: Crete, Greece,	STWS/ ICCS	MSE 2019 attendees, researchers, policy makers (>200) (downloads from the website: 273)
	1	ANDROMEDA roll up banner for general use	Date: 19-20 November 2019 Location: Crete, Greece	STWS	2nd Greek pilot and RANGER workshop, researchers end users (50) (downloads: 134)
	1	ANDROMEDA roll up banner for MSE 2019	Date: 29-31 October, 2019 Location: Crete, Greece	STWS	MSE 2019 attendees, researchers, policy makers (>200)
		Updated Andromeda Leaflet	Date: 13-15 July 2021 Location: Athens, Greece	STWS	DEFEA 2021 attendees, industry policy makers (200)
	1	Andromeda 1st workshop flyer	Date: July 2020 Location: online	STWS	Attendees: 107 Linked In Views: 347 downloads from the website: 302 154 (2020) + 148 (2021)
	1	Andromeda 2nd Workshop Flyer	Date: 23-24 June 2021	STWS	Attendees: 129 Linked In Views: 872 downloads from the website: 183
Training	3				
	1	Training in JOINT RESCUE COORDINATION CENTER (J.R.C.C.)	Date: 27-29 November 2019 Location: Larnaka, Cyprus	MSD	Participants from various EU maritime authorities (20)
	1	Training seminar on Smart Port Technologies organised by APEC Antwerp with the presentation of ANDROMEDA Project under the title "Introduction of COMPASS2020 and ANDROMEDA – Horizon 2020 projects"	Date: 27 August 2020 Location: Online course	MSD	Port managers, researchers IT ind. representatives, logistics companies, port safety community maritime authorities (35)

	1	Training Sessions organised by the Trial Leaders before the organisation of the 3 trials	Dates: March, April and May 2021	INOV, STWS, CODIN	End-users of the Consortium and external partners from the User Community
Social Media	2				
	1	Twitter Account: @ANDROMEDA_H2020	Date: October 2019	STWS	Researchers academics, policy makers, general public, Companies (210 followers)
	1	LinkedIn Account: https://www.linkedin.com/in/ANDROMEDA-horizon2020-project	Date: October 2019	STWS	researchers academics, policy makers, general public, Companies (250 followers, 239 connections)
Website	1				
	1	ANDROMEDA Project website	Date: November 2019	STWS	Researchers, stakeholders, general public, companies 108,456 visits from 01/1/2021 to 30/07/2021 29,976 visits from 17/12/2019 until 31/12/2020 Website made accessible to the public on 17/12/2019]
Communication Campaign (e.g. Radio, TV)	11				
	1	Participation of consultants on the project ANDROMEDA in the national radio “Broadcasting for mariners”, emitted on local radio station. In the interview the structure and importance of ANDROMEDA project for Montenegro has been presented.	Date: 29 January 2020	MSD	Wide radio public/ (80)
	1	Participation of Project Manager for MSD ANDROMEDA Team, on	Date: 07 February 2020	MSD	Wide TV audience / (200)

		national TV and presentation of project activities and goals.			
1	Interview in national Bulgarian media	Date: 19 May 2020	EAMA	national stakeholders / (1056)	
1	Presentation of the ANDROMEDA and other H2020 project implemented in MSD on Montenegrin National Radio and Television Programme (Public service - Morning broadcast) - TV reportage	Date: 2 July 2020	MSD	Wide TV audience (100)	
1	Presentation of the ANDROMEDA and other projects in MSD on Montenegrin National Radio and Television focusing on maritime safety	Date: 12 July 2020	MSD	Wide TV audience (100)	
1	Brief presentation of ANDROMEDA and COMPASS2020 projects on TV Vijesti interview, pointing out SAR components of the projects	Date: 12 July 2020	MSD	Wide TV audience (100)	
1	Interview at local TV Budva with presentation of ANDROMEDA as innovative project realized in MSD	Date: 15 July 2020	MSD	Wide TV audience (80)	
1	Participation on local Radio Bar (BarInfo) broadcasting interview with presentation of main features of ANDROMEDA project	Date: 17 July 2020	MSD	Wide TV audience (50)	
1	Radio of Montenegro/Scientific-educational Programme - Interview on Achievements, C2 systems and implementation of ANDROMEDA project in Administration for Maritime Safety and Port Management of Montenegro (MSD)	Date: 19 October 2020	MSD	Wide Radio Public (200)	
1	Interview on local TV and Radio Corona regarding the MSD implementation progress of ANDROMEDA project and Adriatic-Ionian Trial	Date: 19 October 2020	MSD	Wide Radio Public (200)	
1	Broadcasting appearance on national Radio Tivat, presentation of ANDROMEDA features related to environment impacts and sea protection	Date: 20 October 2020	MSD	Wide Radio Public (200)	

Participation to a Conference	7				
	1	Mediterranean Security Event 2019 Supported by DG-HOME, EARTO, ENLETS and SECURITY COU	Date: 29-31 October 2019 Location: Crete, Greece	KEMEA, STWS, ICCS, EXUS	researchers academics, policy makers (>200)
	1	Conference Information Technology (IT 2020) in Žabljak – Montenegro supported by IEEE and some papers will be in IEEE Xplore	Date: 18-22 February 2020 Location: Žabljak, Montenegro	MSD	Academia and industry representatives (>40)
	1	1st Maritime Situational Awareness Workshop, MSAW 2019, Villa Marigola, Lerici (La Spezia), Italy	Date: 8-10 October 2019 Location: Lerici, Italy	LAUREA	researchers and academics, policy makers (25)
	1	SEEDA CECNSM 2020: 5th South-East Europe Design Automation, Computer Engineering, Computer Networks and Social Media Conference	Date: September 25-27, 2020 Location:	ICCS	Engineering Industry and Academia
	1	Conference Information Technology (IT 2021) in Žabljak – Montenegro supported by IEEE and some papers will be in IEEE Xplore	Date: February 2021	MSD	Academia and industry representatives (50)
	1	27th Telecommunications Forum TELFOR 2020	Date: October, 2020, Location: Belgrade, Serbia	MSD	Academia and industry representatives
	1	Presentation of paper “A Framework for Incorporating a National Maritime Surveillance System into the European Common Information Sharing Environment”, 25th International Conference on Information Technology (IT), Montenegro Žabljak, February 2021.	Date: February 2021 Location: Žabljak, Montenegro	MSD	researchers and academics, policy makers (50)
Participation to a Workshop	5				
	1	Joint Workshop on maritime border security , co-organized among H2020 RANGER, MEDEA and ANDROMEDA projects in the context of the Mediterranean Security Event 2019 (p. 12 out of 20)	Date: 29-31 October 2019 Location: Crete, Greece	KEMEA, SATWAYS EXUS, ICCS	participants from the projects RANGER, MEDEA, ANDROMEDA and MSE participants (>50)
	1	H2020 First Secure Societies “project to policy kick off seminar” (P2PKOS)	Date: 31 January 2020 Location: Brussels, Belgium	MMAIP, KEMEA	REA B4 unit, DG CNECT, DG HOME,

					EC-funded projects of Secure Societies (2018) (30)
	1	Intellectual property and innovative solutions in maritime sector through the cooperation between SME, academic and public institutions	Date: 29 July 2020 Location:	MSD	SME managers, academics, university professors, ship agents (12)
	1	Workshop on Horizon Border Security projects organized by FRONTEX	Date: 20-21 May 2021 Location: online	KEMEA	experts from 17 Member States and Schengen Associated Countries and Frontex staff, experts representing industry, academia, NGOs, research centres and end users (e.g. ministries of interior, police directorates, etc.). DG Home, the Joint Research Centre and the Research Executive Agency . (>100)
	1	ECGFF – EMSA Workshop “Information sharing and data security in the maritime safety and security domains”	Date: 11-12 February 2020, Place: EMSA premises – Lisbon, Portugal	KEMEA	ECGFF, EMSA, (>50)
Participation to an Event other than a Conference or a Workshop	15				
	1	Round Table on Maritime Transport Connectivity, South Adriatic Connectivity Governance	Date: 30 October 2019 Location: Tirana, Albania	MSD	Representatives of Ministries Transport, maritime authorities, experts in transport / maritime connectivity, academic - maritime faculties (12)

1	INP internal forums for operational and technological representatives	Occasionally performed, no specific dates	MOPS-INP	operational technological representatives (50-100)
1	INP external forums with Industrial and Academic representatives	Occasionally performed, no specific dates	MOPS-INP	Industrial and Academic representatives (30-40)
1	SAGOV project – Interreg IPA CBC Albania, Italy and Montenegro, conference on VTMISS	Date: June 2020 Location: online	MSD, KEMEA	SAGOV project partners (20)
1	Maritime Safety Department participation on National Joint-Inter-ministerial Exercise and meeting	Date: 04 October 2019 Location: Bar, Montenegro	MSD	Internal activity (100-120)
1	'Maritime Surveillance: Engaging Manned and Unmanned Assets – #COMPASS2020 Project', Durban University of Technology – Lectures and project presentations as keynote speaker at the dissemination event of COMPASS project.	Date: 29 January 2020 Location: Durban University of Technology, South Africa	MSD	academics, COMPASS event participants (70)
1	European Organization for Security (EOS) directors meeting	Date: February 2020 Location: Brussels	LAUREA	EOS Directors (30)
1	ECGFF – EMSA Workshop “Information sharing and data security in the maritime safety and security domains”, EMSA premises – Lisbon, Portugal	Date: 11-12 February 2020 Location: Lisbon, Portugal	MMAIP	EMSA, EFCA, ECGF, Member States (30)
1	5th CISE Stakeholder Group Meeting organized by EMSA	Date: 05 October 2020		maritime authorities from EU member states and EU agencies (30)
1	17th Mediterranean Expert Working Group for maritime surveillance and AIS data collection in Mediterranean sea (MARES meeting)	Date: December, 2020, Location: Rome, Italy	MSD	Experts in maritime surveillance, EMSA representatives, Italian Coast Guard (40)
1	Presentation of the innovation-research project ANDROMEDA achievements on the meeting with director of EU Transport Community, Mr. Matej Zakonjšek	Date: October 16th 2020 Location: MRCC Bar, Montenegro,	MSD	Representatives from EU Transport Community and Montenegro Ministry of Transport and

					Maritime Affairs (20)
	1	Implementation of research & innovation ANDROMEDA H2020 Project in Administration for Maritime Safety and Port Management	Date: 18th November 2020, Location: MRCC Bar, Montenegro	MSD	Representatives from EU agency - FRONTEX and Montenegro National Coordination Center (15)
	1	Overview of ANDROMEDA H2020 project on Science Festival 2020 within European Researchers' Night	27th November 2020, Podgorica, Montenegro	MSD	Wide technology researchers public, scientists, students, academics, IT companies (200)
	1	Guest lecture on ANDROMEDA project security and safety aspects related to CISE, given on invitation of International Police Organization in Montenegro	22nd December 2020, Bar, Montenegro	MSD	Teachers, high school pupils, police officers (30)
	1	Presentation of ANDROMEDA project overview at launching ceremony for Center of Excellence in Maritime Affairs (CEMA)	27th May, 2021, Durrës, Albania	MSD	Governmental institutions from Albania, technology companies, maritime professionals, researchers public (50)
Participation in activities organized jointly with other H2020 projects	1				
	1	2nd Greek pilot and final workshop of RANGER	Crete, Greece, November 19-20 2019	MMAIP/ KEMEA/ EXUS	academics, researchers end-users. H2020 projects: RANGER, MEDEA, REBORDER, Infore, Camelot (50)

Current status: The consortium is currently preparing the project video

Deviations: No Deviations from the DoA for the reporting period

Task 7.2: Workshops Coordination

Task Progress: T7.2 started in M1 (September 2019) and lasted throughout the project's lifecycle. The objective of this task was to organize two workshops in order to present and promote the ANDROMEDA results, through presentations and/or live system demonstrations. The aforementioned objective was successfully met in both workshops. The audience that this activity was addressed to included end-users, practitioners, consortium partners and other relevant stakeholders.

Achieved results: The current report that covers the period from M13 until M24 mainly describes the activities made towards the organization of the **2nd Workshop** that was held online in June 2021 (M22). Additionally, at the beginning of this reporting period (M13) the realization of the **1st Workshop** was achieved virtually in September 2020 (M13) as the ANDROMEDA consortium altered its initial plan due to the impact that the pandemic had on all physical activities. It should be noted that all activities around the organization of the 1st Workshop were made during Y1 and they have already been reported in D1.3.

Regarding the **2nd Workshop**, the project team organized it online during June 2021 (M22), and as per DoA description it was made by the responsible partner, EXUS, in close collaboration with the rest of the ANDROMEDA consortium. The activities that were carried out are summarized as follow:

- The coordination team for the organization of the 2nd workshop was appointed with members from EXUS, KEMEA, STWS and ICCS.
- Date selection was made by the coordination team in respect to the project's evolvement within the activities of other ANDROMEDA work packages.
- Decided to organize the event virtually as the vaccination programme was under deployment and the risk for spreading the COVID-19 virus to participants and project partners was still valid.
- Decided the 2nd Workshop to be organized in conjunction with the Demonstration Event (Trial sessions).
- Agreed the date for the organization of the online event, 23rd – 24th June 2021
- The leading partner for hosting this event, EXUS, decided after consulting the rest of the coordination team the web tool for hosting the online event and created the online registration form.
- Speakers for the event were proposed, the options were evaluated and selection was made.
- The selected speakers were contacted by EXUS and KEMEA
- The agenda was finalized by EXUS in close collaboration with the rest of the coordination team
- The leaflet dedicated to the event's promotion used as invitations were created by the communication and dissemination manager SATWAYS
- Promotion of the event was made via project's website and social media
- Enriched the available list from the 1st Workshop with the potential participants and invitations were sent.
- Invited the potential participants and communicated the event within the consortium's network and contacts.
- Specific round tables with the User Community and related EU Agencies have been organized with interesting results (e.g. that the end users and relevant authorities are very keen on large scale demonstrations)
- Slido tool has been used enhancing the interaction with the participants giving to the Consortium the possibility to quick and real-time collection of feedback.

The table below presents in numbers the result of the activities made by the consortium towards organizing the 1st Workshop and the 2nd Workshop.

Table 4: Workshop statistics and dates

	1 st Workshop	2 nd Workshop
Registered	129 (Day 1) , 133 (Day 2)	133 in total
1st Day	107 (28/09/2020)	129 (23/06/2021)
2nd Day	95 (29/09/2020)	118 (24/06/2021)

The outcomes of this Task derived from the 1st Workshop have been reported in D7.6 “Initial Workshops Organization and Results” and from the 2nd Workshop in D7.7 “Final Workshops Organization and Results” (M24).

Current status: The task has been completed.

Deviations: Due to COVID-19 outbreak the 1st Workshop and the 2nd Workshop were organized virtually and not physically as it was foreseen in the DoA.

Task 7.3: IPR Review and Patenting Process

Task Progress: T7.3 started on M8 (April 2020) and ended with the completion of the project. The aim of the specific task was to identify the IPRs created and/or used within the project and examine the possibility of filing applications for the registration of such IPRs, wherever possible.

Within the context of the specific Deliverable, periodic surveys (Questionnaires in form of tables to be completed by each partner) have been circulated among Partners to keep record of the Project’s IPRs status; surveys took place in two times: in the middle and at the end of the Project.

As explained in the intermediate report (reporting period M7-M12) partners were firstly requested to:

1. Identify what had been created within Andromeda Project until the moment the table was circulated (definitions of the concepts were provided at the end of the document).
2. Declare if Background has been used; in the affirmative, declare if the Background has been already stated in the CA and who is the rightholder on the IPRs of the specific Background.
3. Specify the type of the Results (software, database, etc.),
4. Define who is/are the owner(s) of each Result: if it is joint ownership or not, if the creation includes preexisting works and, if so, to whom this preexisting work belongs to.
5. Specify when and under which circumstances the Partners have access to certain Results incorporating a preexisting work.
6. Keep record of IPRs generated within Andromeda and identify cases for which clearances are needed.

Upon reception of all completed tables, we proceeded with the update of the IPR status and drafted a new table summarizing the information collected by the partners. This new table, containing all essential related information, was circulated anew to the Partners giving the opportunity to each one of them to confirm, correct and/or update their Results and IPRs, following the progress made the last months. In addition to this table, an additional questionnaire was shared with the partners, focusing on the legal issues affecting the exploitation of the results.

This information permitted to identify if and which IPRs have a commercial potential. In addition, this method permitted partners to declare if there is patentable material and, in the affirmative, identify the owner/rightholder of the patent and proceed with the filing of the patent.

Since no deliverable was foreseen for this Task, the outcomes were reported in D7.8 “Exploitation Plan” by M12 (August 2020) and D7.9 “Exploitation and Large Uptake Assessment” delivered at the end of the project.

Achieved results: A final report on IPRs of the project containing all information on the ownership of Results, use of Background or third parties IPRs, possibility to file an application for patent, was drafted and delivered. A general outcome of the research conducted within the frame of T7.3 is that the Results generated within the Project are owned at a percentage of 100% by the Partner generating it (when background was used for the production of the Result, such background pertained 100% to the Partner generating the Result); therefore, each partner may proceed with the exploitation of its contribution on its own, since there is no joint ownership. The intention of the partners to proceed to joint exploitation was not excluded. In addition, no patent application has been filed at the moment, while most of the partners do not seem to believe that such application would be successful, due to the nature of the Result.

Current status: Finalised. Report submitted within T7.9.

Deviations: No deviations from the DoA have been identified.

Task 7.4: Exploitation Plan and Market Large Uptake Assessment

Task Progress: T7.4 lasts from M1 (September 2019) till the end of the project. Information about Key exploitable results (KER) has been updated with the final contributions from the partners. The deliverable D7.9 has been submitted.

Table 5: List of Key Exploitable Results

KER title	Expected TRL declared (at project's start)	TRL (at project's end)	Time to exploit ¹	KER Details
Decision Support Tools	8	8	1-	The DST (Decision Support Tool) consists of: <ul style="list-style-type: none"> - WITOIL (Where is The Oil): is a service to deliver and disseminate the prediction of the transport and transformation of actual or hypothetical oil spills in the Mediterranean Sea; - VISIR®: is a service providing optimized nautical routes in the Mediterranean Sea; - OCEAN-SAR: is a service provided to support maritime authorities and operational centers during search-and-rescue operations.
Meteo-Oceanographic Forecasting Services	-	9	0	Production and operational delivery of Meteo-Oceanographic forecasting products
GeoC2 Command and Control Solution for eCISE	8	8	1-	Enhanced product Information Exchange capabilities and mission execution capabilities in a CISE-based ecosystem
Socrates C2	8	8	1-	Command and Control solution for local, regional or national command centers, totally compliant with CISE and eCISE standard. Covers the main capabilities in this kind of tools, monitoring, tasking, planning, exploitation etc.
Socrates Data Fusion	8	8	1-	Component is in charge of getting information from different track sources and fusing them, providing an improved track. It is applicable in the maritime and land domain.

¹Time to exploit: immediate: 0, Less than 1 year: 1-, 1 to 3 years: 3-, More than 3 years: Mark 3+, Cannot be specified: ?

<p>INUS Platform: Intelligent UxV Surveillance platform for object detection, identification and tracking via UAV and terrestrial image processing.</p>	<p>7</p>	<p>7</p>	<p>3-</p>	<p>The INUS Platform comprises of:</p> <ul style="list-style-type: none"> - An aerial unmanned platform (UAV) - An aerial unmanned platform (UAV) - A terrestrial surveillance system - The UAV pilot's workstation - The Intelligence Officer's workstation - object detection and tracking SW module - e-CISE interface of INUS - Object Detection and tracking (e.g. land vehicles, persons) using Machine Learning and image processing techniques from (i) UAV and (ii) terrestrial surveillance assets - Near real-time streaming of raw videos - Near real-time streaming of detected/tracked objects - Creation of object detection/tracking events (including localization of events and other attributes) - Provision of e-CISE interface for data sharing with C2s in ANDROMEDA
<p>Data Fusion Engine (Data Fusion Gateway & Data Fusion service)</p>	<p>7</p>	<p>7</p>	<p>3-</p>	<p>The ANDROMEDA Data Fusion Engine is a platform which performs Data Fusion operations on data, originating from different sources and combines them to produce accurate and meaningful high-level information.</p>
<p>TRITON</p>	<p>7</p>	<p>9</p>	<p>0</p>	<p>The TRITON Abnormal Vessel Behaviour Engine is an abnormal vessel behaviour service that uses a geospatial complex event processing to identify and analyse motion patterns which was enhanced with additional monitoring patterns for maritime and includes also the detection of additional anomalies in the land domain.</p>
<p>ENGAGE BME</p>	<p>8</p>	<p>9</p>	<p>0</p>	<p>The ENGAGE BME platform is fully-fledged Command and Control solution catering for first responders in the field and personnel in a local or regional or national command centers which was upgraded to handle all the e-CISE entity information and to be able to communicate via e-CISE to other e-CISE C2s.</p>

IANUS, specialization of ESSG - Enterprise Service Security Grid - Framework	8	8	0	IANUS functionalities are: <ul style="list-style-type: none"> - Classification of targets based on their behaviour. - Behaviour analysis, comparison with learned models, identification of common and divergent behaviours. - Automatic generation of alerts associated with targets that present underlying threats or offenses.
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Achieved results: For the preparation of the deliverable D7.9 a set of templates were shared among the partners to collect information about the Key Exploitable Results in order to analyze the individual exploitation plans. Besides that information about joint exploitable options has been collected.

The main outcome of this period is the deliverable D7.9, generated with the information collected from partners and with the analysis of the current market of the different technologies.

Current status: Completed.

Deviations: No deviations from the DoA.

Task 7.5: Standardization

Task Progress: T7.5 started in M1 (September 2019) and spans until the end of the project. The objective of this task is to identify opportunities for ANDROMEDA solutions and services for pre-standardization, mainly targeting the e-CISE Data Model for land and maritime surveillance border control, for data fusion and analytics services and C2. Deliverable D7.10 Standardization Report which was planned initially for M18, and has been submitted on M23 after the amendment. Within the reporting period (M13-M24), the pre-standardization activities took place, that led to an official invitation of ANDROMEDA to present the eCISE data model to the ETSI ISG Group, in order to investigate potential extension of current CISE data model.

Achieved results: The achievements during the final reporting period can be summarized as follows:

- i) The collection of existing standards used by Andromeda's partner tools of C2 legacy systems, data fusion systems, and decision support systems has been collected and analyzed
- ii) The CISE framework, its potential extension and the e-CISE data model has been analyzed
- iii) All pre-standardization channels that were identified for promoting the eCISE data model have been activated 1) EMSA CISE stakeholder group, 2) ETSI ISG Group, 3) JRC.
- iv) Several dissemination activities for promoting and showcasing the e-CISE data model and its applicability in land border and maritime border operations have been carried out: 1) First Andromeda Workshop (September 2020) and 2nd Andromeda workshops (June 2021), 2) Successful demonstration of the use of eCISE at the three real operational Andromeda's trials, 3) Liaison activity between Andromeda project and the EFFECTOR project, where e-CISE has been adopted to be used as the interoperability standard
- v) Finally, an official invitation for participation to the ETSI ISG CDM meeting has been accepted to present ANDROMEDA's e-CISE data model, for potential extension of the current CISE standard.

The following figure illustrates the methodology and the entities involved in the successful pre-standardization activities.

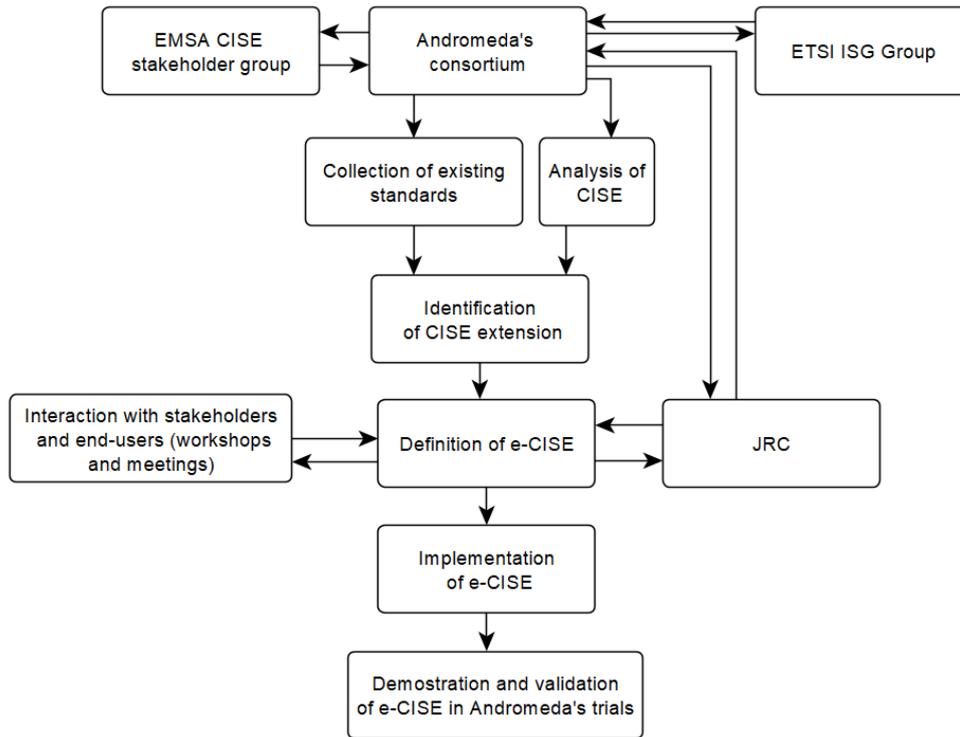


Figure 2: ANDROMEDA's consortium methodology that incorporates pre-standardization activities for the exploitation potential of e-CISE.

The aforementioned activities are strongly support the Andromeda's consortium aim, i.e., to promote e-CISE as a possible new standardization item.

All these activities and results have been reported in Deliverable D7.10.

Current status: The task has been completed.

Deviations: The initial submission of D7.10 was in M18. After the amendment the submission date was set to M21. The actual submission was in M23. It was deemed necessary to include in the report, the activities related to the final workshop as well as the results of the pre-standardization activities, which let to the invitation of ETSI ISG to present the eCISE data model, as potential extension of current CISE standard.

2.9 Work Package 8: Ethics requirements

Task Progress:

- Submission of all 13 deliverables until M12 (previous reporting period).
- Re-submission of D8.3 H-Requirement No.3 following the remarks of the reviewers made via the General Project Review Consolidated Report.

The deliverable was accepted during the review; however, additional information was requested as follows:

“The deliverable basically states that the different partners have no ethical committee but promise to adhere to the regulations. However, not having an ethical committee does not exempt the partners to seek authorization for the trials from the competent national data protection authority/privacy commission. The consortium partners should check whether this is not required in the countries where the trials take place

(check <https://www.dataprotectionauthority.be/privacy-commissions-european-union>). This deliverable could be public as apparently it doesn't cover any confidential element or a particular element of innovation".

The requested information was included in the new/revised version of D8.3 which has been resubmitted.

- Resubmission of D8.6 POPD-Requirement No.6 following the remarks of the reviewers made via the General Project Review Consolidated Report.

A request for revision has been made which has been justified as follows:

"The document describes the anonymization/pseudonymization techniques to be followed in ANDROMEDA project. However, some items seem to be missing in this deliverable:

- D1.1 discusses a dataset (#7) consisting of personnel tracks obtained through Electro-Optical data. The anonymization/pseudonymization techniques for this dataset do not seem to be discussed in D8.6, while they do seem relevant.

- Only for the SOCRATES and ENGAGE systems, the anonymization/pseudonymization functionalities are discussed. The status for the other two C2 and subsystems is unknown.

The deliverable could be public as apparently it doesn't cover any confidential element or a particular element of innovation".

The requested information was included in the new/revised version of D8.6 which has been resubmitted.

Achieved results:

- Ethical monitoring of the project, especially during the project's WP6 pilot demonstrations, including the informed consent procedure as described in the relevant deliverables D8.1 H-Requirement No.1 (for the participation of humans in research) and D8.5 POPD-Requirement No.5 (for the processing of personal data) Copies of informed consent forms have been collected by the lead researchers who conducted the relevant research activities and/or online when using the EU Survey tool.
- Increase of ethical awareness of the consortium and end-users alike.
- Disseminating ethical knowledge (e.g., through the participation in the final workshop)

Current status: Completed

Deviations: No deviations from the DoA

3. Project management and coordination

3.1 Management tasks and achievements

Task 1.1: Administrative & Financial Planning and Coordination

Task Progress: T1.1 span throughout the whole duration of the project. The project coordination and administration are carried out by MMAIP ensuring the smooth running and operation of the project. During the third reporting period, the following activities have been made:

- Organization of the 4th Project meeting and Final Workshop & Demonstration event remotely due to the COVID-19 situation.
- Continuous cooperation with the Management Support Team (Project Manager, Technical Manager, Innovation Manager) for ensuring smooth execution of the project from all perspectives.
- Continuous engagement with the Advisory Board and maintenance of collaboration for retrieving feedback and recommendations.
- Preparation of the Project Final Report
- Submission of project deliverables including the EUCI ones.

Achieved results: D1.4 “Project Final Report” has been submitted

Current status: Completed.

Deviations: No deviation from DoA.

Task 1.2: Project Management, Quality Control and Risk Management

Task Progress: T1.2 span throughout the whole duration of the project and is related to the day-to-day planning supporting the Project Coordinator during the project implementation. Due to the COVID-19 situation, the project has been extended for 6 months which subsequently extended the duration of the trials, shifting the demonstrations closer to the summer period. This helped to execute some of the scenarios physically in the borders integrating ANDROMEDA with legacy systems & new surveillance equipment and testing the interoperability capabilities of the project under real operational conditions in Evros region (fence and river). Overall, the extension gave the possibility to validate project results in longer duration and engage with additional external stakeholders & practitioners from the land and maritime domain. The Risk Management Plan has been kept up to date especially due to the situation with the pandemic and mitigation measures for the execution of the trials have been applied. All the recommendations received from the experts after the mid-term review meeting have been addressed and the actions done for implementing them are reported in Section 3.10.

Achieved results: D1.4 “Project Final Report”

Current status: Completed.

Deviations: Deviations from the DoA.

Task 1.3: Innovation Management

Task Progress: T1.3 span throughout the whole duration of the project. This task will focus on the innovation management of ANDROMEDA, reflecting the strategy to deliver technology aligned to market needs, European strategies and directives and operational contexts. From the innovation point of view some of the technical work packages have been closely followed. WP2 regarding user requirements analysis has been the starting point to innovation analysis. It is important to see if these requirements are already covered by

solutions already deployed in user facilities or available in the market. Another important work package that has been checked on this period is WP4 related to development.

Achieved results: Information about the innovation provided by each one of the results of the project has been collected and included in the deliverable D7.9. Moreover, a specific analysis of the innovative aspects of the overall project has been described in regards to the following areas:

- Border Surveillance Interoperability Frameworks
- Command and Control Systems.
- Data Fusion and Situational Awareness.
- Decision Support Tools.

The expected benefits of ANDROMEDA project have been analyzed from two different points of view. The first one, taking advantage of the practitioners involved in the project and using their perceptions about the ANDROMEDA project from the inside, shared during a round table in the second innovation meetings held during the project (May 14th, 2020). The second analysis is from the objectives of the project and main expected outcomes. All this information was included in the deliverable D7.9.

Current status: Completed.

Deviations: No deviations from the DoA

Task 1.4: Legal, Policy, Social and Ethical Management

Task Progress: This task continued during the whole lifetime of the project. It provided guidance and steering on legal, ethical and societal issues, including traditional research ethics, e.g. involvement of humans in the research work, but also various other aspects such as possible dual and misuse, privacy issues etc.

Achieved results: The results of this task are presented in D1.6 Legal, Societal, Ethical Final Report that summarised the ethical work done during the project. It presents the various ethical challenges that we have tackled, starting from research integrity to the legal and other commitments the partners of the project had, i.e. obligations to follow the H2020 ethical guidelines and others too, for example, on respecting people's privacy (GDPR), on possible misuse, dual use, and so on. Together with the challenges, also, the ethical work, i.e. the tangible work that has been done during the project are presented in this deliverable. Hence, the different guiding documents, for example, on human participation are presented together with descriptions how they were used in ANDROMEDA. Also, the ethics checks are presented, not forgetting some specific issues that somewhat surprised everyone and that had ethical aspects too, i.e. COVID-19.

Current status: Completed

Deviations: No deviation from DoA (part from the prolongement of the project due to COVID-19).

3.2 Deliverables

This section presents a summary of the status of the Deliverables for the last period of the project (M13-M24).

The complete list of Deliverables is given in Table 6.

Table 6: List of Deliverables submitted during the period M13-M24 (September 2020 - August 2021)

WP	Task	Deliverable Number	Deliverable Name	Lead	Type	Dissem. Level	Due Date	Calendar Due Date	Delivered (Yes/No)	Actual/Forecast Submission Date	Comments
WP4	T4.1	D4.1	Interoperable C2 for Land Border Operations	GMV	R	EU-RE	M15	30/11/2020	Yes	20/01/2021	Delayed (due additional time needed to collect contribution from partners in an encrypted way)
WP4	T4.2	D4.2	Interoperable C2 for Maritime Border Operations	SATWAYS	R	EU-RE	M15	30/11/2020	Yes	03/02/2021	Delayed (due additional time needed to collect contribution from partners in an encrypted way)
WP4	T4.3	D4.3	Nodes and Services for e-CISE Information Exchanges	INW	R	CO	M12	31/08/2020	Yes	15/02/2021	Delayed (due to the required change of the dissemination level of this deliverable from PU to CO as introduced in the Amendment)
WP4	T4.4	D4.4	Data Fusion, Situational Awareness and Decision Support Services	EXUS	R	CO	M15	30/11/2020	Yes	12/02/2021	Delayed (due to necessary adaptations that need to be made following its peer-review process)
WP5	T5.4	D5.5	Integration and Validation Test Report	SATWAYS	R	EU-RE	M17	31/01/2021	Yes	05/05/2021	Delayed (due to the national lockdown in

											Greece, the integration tests with the drone of ICCS flying (INUS platform) were postponed.
WP7	T7.1	D7.5	Andromeda Final Web Presence	SATWAYS	R	EU-RE	M21	31/05/2021	Yes	27/09/2021	Delayed (due to the necessary consolidation of partners' inputs and finalization of the project promotional video)
WP7	T7.4	D7.8	Exploitation Plan	GMV	R	CO	M12	31/08/2020	Yes	10/02/2021	Delayed (due to the required change of the dissemination level of this deliverable from PU to CO as introduced in the Amendment)
WP7	T7.4	D7.9	Exploitation and Large Uptake Assessment	GMV	R	CO	M21	31/05/2021	Yes	27/07/2021	Delayed (mainly due to the fact the deliverable's deadline coincided with important milestones of the project like the Trials and Final Workshop)
WP7	T7.5	D7.10	Standardization Report	ICCS	R	PU	M21	31/05/2021	Yes	26/07/2021	Delayed (mainly due to the fact the deliverable's deadline coincided with important milestones of the project like the Trials and Final Workshop)
WP1	T1.4	D1.6	Legal, Societal, Ethical Final Report	LAUREA	R	PU	M22	30/06/2021	Yes	14/07/2021	On time

WP2	T2.1	D2.5	User Community Final Report	LAUREA	R	PU	M23	31/07/2021	Yes	31/07/2021	On time
WP6	T6.5	D6.2	Operational Trials Results Report and Lessons learnt	GMV	R	EU-RE	M23	31/07/2021	Yes	10/08/2021	On time
WP7	T7.1	D7.3	Final Dissemination Material	ICCS	R	PU	M23	31/07/2021	Yes	31/07/2021	On time
WP1	T1.2	D1.4	Project Final Report	MMAIP	R	PU	M24	31/08/2021	Yes	21/09/2021	On time
WP7	T7.2	D7.7	Final Workshops Organization and Results	ICCS	R	PU	M24	31/08/2021	Yes	10/09/2021	On time

3.3 Milestones

All the project Milestones, due at the first half of the project, were reached on time and verified by the submission of the relevant deliverables, as presented in Table 7.

Table 7: Status of project's milestones

MS No.	MS Name	WP No.	Lead	Due Date	Achieved (Yes/No)	Actual/Forecast Achievement Date	Comments
MS1	Project Start	ALL	MMAIP	1	Yes	17-18/09/2020	Achieved and reported in D1.2
MS2	Initial Definition of User community needs, operational trial scenarios and strategy	WP2 WP3 WP5 WP6 WP7	MARINA MILITARE	5	Yes	07/02/2020	Achieved and reported in D1.2
MS3	ANDROMEDA Initial Design	WP3 WP5	GMV	7	Yes	21/04/2020	Achieved and reported in D1.3
MS4	Integration Completed for 1st and 2nd Trial	WP3 WP5	INW	11	Yes	02/09/2020	Achieved and reported in D1.3
MS5	Mid-Term Review	WP4 WP5 WP6	MMAIP	12	Yes	16/06/2020	Achieved and reported in D1.3
MS6	Integration Completed for 1 st , 2 nd and 3 rd Trial	WP5	INW	17	Yes	05/05/2021	Factory Integration and testing of the 1st, 2nd and 3rd trial configuration achieved (D5.5. submitted).
MS7	System Developments Completed	WP4	STWS	15	Yes	03/02/2021	All functions of Interoperable C2, Data Fusion and SA services implemented (Deliverables D4.1, D4.2 and D4.4 submitted)
MS8	Project Completion	WP1, WP2, WP3, WP4, WP5, WP6, WP7, WP8	MMAIP	24	Yes	31/08/2021	Operational Trials completed and results available (D6.2 submitted), Assessments of ANDROMEDA' User Community achievements available (D2.5 produced), Legal, Societal and Ethical issues defined (D1.6 submitted), final workshop achieved (D7.7 submitted), Final Web site with dissemination content (D7.5 submitted),

MS No.	MS Name	WP No.	Lead	Due Date	Achieved (Yes/No)	Actual/Forecast Achievement Date	Comments
							Exploitation and Market Uptake Assessment achieved (D7.9 submitted), Standardization actions achieved (D7.10 submitted), Final dissemination material produced (D7.3 submitted). Project Final Report produced (D1.4 submitted).

3.4 Encountered Problems and Corrective Actions

This section lists the most important problems encountered, and the corrective actions undertaken during this third period of the project.

- With regards to **WP1**, the most challenging issue continued to be the situation with the COVID-19 outbreak and the unstable conditions in the East Mediterranean Basin which affected the project during its third period, as estimated in D1.3. In order to tackle these problems and ensure a successful execution of the Trials, the Consortium officially requested an amendment of the GA which has been accepted by EC. The request for the amendment included the following changes:
 - Request to extend the duration of the project for 6 months due to the COVID-19 outbreak and its implications towards the inability of physically visiting the GR-BG borders, deploying the upgrades of the ANDROMEDA system hardware components and executing the trials.
 - Request a change of dissemination level from “Public” to “Confidential, only for members of the consortium (including the Commission Services)” for the following Deliverables:
 - D4.3 - Nodes and Services for e-CISE Information Exchanges – INW (M12). Since D4.3 uses information provided in D3.2 and exposes the implementation of the architecture, this information should be set to Confidential consortium partners only.
 - D7.8 - Exploitation Plan – GMV (M12). The deliverable includes individual exploitation plans and a market study that should be more appropriate to be set at Confidential consortium partners only level.
 - Request to change beneficiary 19 (MSD) due to partial takeover from beneficiary 20 (AMSPM). The legal documents proving the transfer of rights and obligations have been uploaded in the Participant Register of beneficiary MSD (via My Organisation page) on 08th January 2021.
- With regards to **WP2**, the main issue (indicated in D1.3) was related to a certain imbalance noted between Maritime and Land sector. The main challenge was to engage as many land border authorities during the validation phase and analysis of the achieved results. Due to the short duration of the project and the health crisis, this attempt was by default a challenging action. Given the established network with practitioners from related projects, this risk was minimized as much as possible achieving to enroll in the validation and evaluation process EU Agencies like FRONTEX, EMSA, JRC and land border authorities with strong interest in the ANDROMEDA results. Another problem encountered during M13-M24 was still related to the COVID-19 follow-on waves. Although subject to overall related safety and mitigation actions, precise re-planning, continuous review of the activities and adaptations, together with regular VTC/Telco cycles

allowed the achievement of the objectives in line with the project timeline (extended till 31 August 2021).

- As far as it concerns **WP3** (completed)
- Referring to **WP4** and the overall System Development, although the ongoing health crisis existed, partners were able to work remotely and thus minimized the impact of this crisis towards the development process.
- As **WP5**, and while the COVID-19 pandemic was a limiting factor in the realization of meetings and workshops, the Work Package team had the advantage of starting a bit later in the project, and thus being able to plan taking into account a pandemic-stricken reality. Hence, the WP5 team was working remotely from early on in the work package activities, and leverage from its initial ideas of supporting component tests on an Integration Platform to support most of the integration work as a complete set of remote, automated activities. Still, unfortunately and against what was originally planned, the majority of the tests are based on simulated data instead of user-fed real data streams. As such, consortium members were to incorporate more real (stored and live) data in the test packages in order to guarantee the quality of the input data and meteorological condition variety and managed to include some later in the Work Package lifecycle.
- As for **WP6**, the restricting measures which have been applied at national level due to the COVID-19 outbreak affected further the inability of technical partners to visit the test sites, deploy the necessary equipment, perform preliminary tests and on-site integration with legacy systems. Given that the project has been eventually extended for 6 months and the restrictive measures have been withdrawn approaching the summer period, this helped WP6 to reschedule the necessary preparatory actions during a period with less tense and execute the validation of the ANDROMEDA final release per Trial as scheduled in the DoA without significant deviations.
- Regarding **WP7**, the main issues encountered are again related to COVID-19 outbreak which resulted in organizing our two Workshops remotely instead of physically as originally scheduled. However, the remote option has been given the opportunity to many stakeholders and interested audience from EU and non-EU countries to participate in our events and be informed about ANDROMEDA project and its generated results. Moreover, more research papers have been submitted to Peer Reviewed Journals and Conference Proceedings to tackle the limitations for the dissemination of the project due to the cancellation of most of the conferences and exhibitions that the project has initially planned to attend.
- As far as it concerns **WP8**, all corrective actions have been taken based on the remarks and comments of the reviewers. In particular, D8.3 H-Requirement No.3 and D8.6 POPD-Requirement No.6 have been re-submitted including the requested information.

3.5 Key Performance Indicators

Table 8 depicts the current values of the project's key performance indicators as monitored during this third period of the project.

Table 8: Status of project's key performance indicators

KPI ID	Name	Description	Target Value	Current Value	Responsible Partner	Comments
O1. Demonstrate Innovative solutions validated and qualified in the real, operational environment of civilian missions, defined in detail according to specifications set by the practitioners (authorities in charge of border surveillance and coast guard functions) and tailored to effectively meet their requirements within civilian missions						
KPI1.1	Innovative Land and Maritime C2s	Number of Innovative and CISE Interoperable Land and Maritime Command and Control Systems	3 (three)	4	STWS, ENG, GMV, INW	SMART C2 of ENG has been added in the System Architecture.
KPI1.2	Data Fusion, Analytics and Decision Support Services	Number of Innovative and Technology Mature Data Fusion, Analytics and Decision Support Services	At least 9 (nine)	9	CDN, STWS, INW, GMV, FCMCC, ICCS	As scheduled in DoA.
KPI1.3	Collaborative Trials	Number of trials expected to be executed in different scenarios among different land of maritime border agencies	3 (three)	3	KEMEA/WP6 partners	As scheduled in DoA.
O2. Extend the Common Information Sharing Environment concept for Land Border Operations						
KPI2.1	Additional CISE CORE Entities	Define additional CISE model entities to support Land Border Surveillance Operations	At least 6 (six)	10	STWS/Technical partners	10 New e-CISE Core Entities are created, each of them in its dedicated namespace with numerous subclasses and enumerations. <ol style="list-style-type: none"> 1. Sensor 2. Mission 3. Task 4. Operation 5. Report 6. Rule 7. Simulation 8. Subject 9. RequestForInformation 10. CollectionPlan

KPI ID	Name	Description	Target Value	Current Value	Responsible Partner	Comments
O3. Strengthen the cross sector and cross border collaboration between authorities operating in the Land and Maritime environments (Coast Guards, Police Border Guards, Navies, Customs) in order to utilise resources towards the same goal, leading to cost efficient usage of existing resources						
KPI3.1	Cross-Sector and Cross Border Agencies Collaborating	Number of cross-sector and cross border agencies operating in the land and maritime surveillance trials (e.g. Border Guards, Coast Guards, Navies etc.)	At least 2 (two) per trial	2 or more than 2 per trial	KEMEA/WP6 partners	1. Iberian Maritime Border Trial: ITN and PTN. 2. Greece-Bulgaria Land Border – Maritime Trial: MMAIP, HMOD, HPL, EAMA 3. Ionian-Adriatic Maritime Border Trial: ITN, MMAIP, HMOD, AMSPM
KPI3.2	Number of users	Number of users (Civil and Military agencies) exploiting ANDROMEDA C2s and Services	At least 7 (seven)	7	KEMEA/WP6 partners	7 end-users from the Consortium: MMAIP, ITN, PTN, HMOD, HPL, EAMA, MSD
KPI3.3	Collaborative Assets	Number of interfaced assets from several Member States Land & Maritime border surveillance, security and search-and-rescue organizations	At least 7 (seven)	37	STWS/Technical partners	The assets have been identified from the D2.3 and D2.6. The current value will be updated when the trials logistics and planning are defined in WP6.
KPI3.4	Workshops	Organization of end user workshops to demonstrate the project achievements	2 (two)	2	ICCS	1 st Workshop 28-29 September 2020, 2 nd Workshop 23-24 June 2021 (remotely)
O4. Demonstrate and validate advanced, CISE compliant Command & Control Systems and kick-start the future demand for CISE information services						
KPI4.1	CISE CORE Entities supported	Number of CISE CORE Entities in Compliance	At least 15 Core Entities (fifteen)	18	STWS/Technical partners	Maintained as is or with modifications in attributes-subclasses level. <ul style="list-style-type: none"> • Agent • Anomaly • Cargo • Document • Event • Incident • Location • Metadata • Movement • Object • OperationalAsset

KPI ID	Name	Description	Target Value	Current Value	Responsible Partner	Comments
						<ul style="list-style-type: none"> • Organization • Period • Person • Risk • UniqueIdentifier • Vessel • MeteoOceanographicCondition
KPI4.2	CISE Message Patterns	Supported Message patterns according to the CISE Service Model	All message patterns	All	STWS/Technical partners	All CISE Message Patterns according to the CISE Service Model are maintained.
O5. Support the practitioners along the complete lifecycle of border situations, from the observation of elements in the environment up to detection of anomalies and aids to planning by creating and validating improved Situational Awareness						
KPI5.1	Targeted LSA	Capability of generating a complete Land Situation Awareness mixing several source feeds (offline and real-time data)	At least 2: Smuggling/Illegal Border Crossing	4	STWS/Technical partners	<p>The following are regarded at the moment offline and real-time source feeds:</p> <ul style="list-style-type: none"> • Video Feed • Detected objects • Location and Nature of Infrastructural Data (e.g. Land borders, border posts, border-crossings) • Earthquake feeds
KPI5.2	Targeted MSA	Capability of generating a complete Maritime Situation Awareness mixing several source feeds (offline and real-time data)	At least 3: Smuggling/Illegal Border Crossing/Drugs	3	STWS/Technical partners	<p>The following are regarded at the moment offline and real-time source feeds:</p> <ul style="list-style-type: none"> • Video • Radar • AIS
KPI5.3	Level 1 data fusion services	Number of JDL Level-1 DF services related to the “Observation of elements in the environment”	At least 2 (two)	3	Technical partners	GMV (Socrates DF Services) ICCS (INUS Platform) EXUS (EXUS Analytics Framework)
KPI5.4	Level 2 data fusion services	Number of JDL Level-2 DF services related to the	At least 3 (three)	3	Technical partners	STWS (TRITON) INW (GeoC2 Real Time analytics)

KPI ID	Name	Description	Target Value	Current Value	Responsible Partner	Comments
		“Comprehension of the current situation”				CDN (ESSG Real Time Maritime Analytics)
KPI5.5	Level 3 data fusion Services	Number of JDL Level-3 DF services related to the “Projection of Future States”	At least 2 (two)	4	Technical partners	FMCC (VISIR, OCEAN-SAR, WITOIL) EXUS (GeoC2 Predictive Analytics)
O6. Complement with actions undertaken in the Preparatory Action on Defence Research under topic PADR-US-01-2017: Technological demonstrator for enhanced situational awareness in a naval environment						
KPI6.1	Enhanced CISE Data Model	Contribute the enhance CISE Data Model to the OCEAN2020 project	1 (one)	1	STWS (Responsible for T3.1) GMV (partner in OCEAN2020)	Contact have been made with OCEAN2020 and the project has been invited to both Workshops organized by ANDROMEDA in order to be informed about the added value of e-CISE.
KPI6.2	Invitation to ANDROMEDA Workshops	Invite the OCEAN2020 consortium to ANDROMEDA workshops	2 (two)	2	ICCS	This has been done and reported in the corresponding WP7 deliverables.
O7. Enforce compliance with European societal values, fundamental rights and applicable legislation, including in the area of free movement of persons, privacy and protection of personal data						
KPI7.1	SIA on ANDROMEDA solution	Deliver Societal Impact Assessment (SIA) on ANDROMEDA solution’s compliance with European societal values, fundamental rights and applicable legislation	1 (one)	1	LAUREA	The initial SIA was conducted during the Kick-off Meeting, and the results are presented in the D2.4, paragraph 7. (met from the first reporting period)

3.6 Project Meetings and Teleconferences

Table 9 presents the project meetings that have been organized at Consortium level during the third period of the project. It includes the description of each meeting, the WPs that are involved, the organizer, the type, the date and the location.

Table 9: Project Meetings organized M13-M24 (September 2020 - August 2021)

No	Meeting	WP(s) involved	Organizer	Type	Date	Location
1.	1 st ANDROMEDA Workshop	WP7	GMV	Technical, User Community, Dissemination	28-29 September 2020	Remotely
2.	4 th Project Meeting	WP1	MMAIP/K EMEA	Executive Board, Technical	30 September 2020	Remotely
3.	Final Workshop & Demonstration Event	WP7	EXUS	Technical, User Community, Demonstration, Dissemination	23-24 June 2021	Remotely

Apart from the physical meetings, a number of teleconferences have been arranged to discuss constantly tasks and issues arisen at WP level. Table 10 lists the main teleconferences organized during this last period.

Table 10: Main teleconferences organized until M13-M24 (September 2020 - August 2021)

No	Teleconference	WP(s) involved	Organizer	Date
1.	GR-BG Trial Conference #2	WP6	STWS	01/09/2020
2.	WP5 Follow-up telco#9	WP5	INW	09/09/2020
	WP4 Teleconference #7	WP4	STWS	18/09/2020
3.	GR-BG Trial Conference #2	WP6	STWS	24/09/2020
4.	WP6 Coordination Telco #13	WP6	KEMEA	15/10/2020
5.	WP5 Follow-up telco#10	WP5	INW	15/10/2020
6.	WP2 User Community Coordination meeting	WP2	LAUREA	16/10/2020
7.	WP4 Teleconference #8	WP4	STWS	21/10/2020
8.	WP5 Follow-up telco#11	WP5	INW	11/11/2020
9.	WP2 User Community Coordination meeting	WP2	LAUREA	30/11/2020
10.	WP6 Coordination Telco #14	WP6	KEMEA	29/10/2020
11.	WP6 Coordination Telco #15	WP6	KEMEA	12/11/2020
12.	WP6 Coordination Telco #16	WP6	KEMEA	26/11/2020
13.	WP4 Teleconference #9	WP4	STWS	27/11/2020
14.	WP6 Coordination Telco #17	WP6	KEMEA	10/12/2020

No	Teleconference	WP(s) involved	Organizer	Date
15.	Training Session	WP6	STWS	11/12/2020
16.	WP5 Follow-up telco#12	WP5	INW	17/12/2020
17.	WP6 Coordination Telco #18	WP6	KEMEA	23/12/2020
18.	WP6 Coordination Telco #19	WP6	KEMEA	07/01/2021
19.	WP6 Coordination Telco #20	WP6	KEMEA	21/01/2021
20.	Trials Planning	WP6	KEMEA	29/01/2021
21.	WP6 Coordination Telco #21	WP6	KEMEA	04/02/2021
22.	Ionian Trial Rehearsal	WP6	CODIN	16/02/2021
23.	WP5 Follow-up telco#13	WP5	INW	23/02/2021
24.	WP6 Coordination Telco #22	WP6	KEMEA	25/02/2021
25.	WP6 Coordination Telco #23	WP6	KEMEA	11/03/2021
26.	Ionian Trial Execution	WP6	KEMEA	18/03/2021
27.	WP6 Coordination Telco #24	WP6	KEMEA	30/03/2021
28.	GR-BG Trial preparations	WP6	KEMEA	31/03/2021
29.	WP6 Coordination Telco #25	WP6	KEMEA	15/04/2021
30.	GR-BG Trial preparations	WP6	STWS	26/04/2021
31.	GR-BG Trial preparations	WP6	STWS	28/04/2021
32.	Iberian Trial preparations	WP6	INW	05/05/2021
33.	Iberian Trial Execution	WP6	INW	07/05/2021
34.	WP7 Coordination telco	WP7	ICCS	10/05/2021
35.	GR-BG Trial preparations	WP6	STWS	10/05/2021
36.	Training Session	WP6	STWS	24/05/2021
37.	WP6 Coordination Telco #26	WP6	KEMEA	31/05/2021
38.	Gr-BG Trial Execution	WP6	STWS	08-15/06/2021

3.7 Project Planning

According to the Amendment - AMD-833881-7 and the justifications provided related mainly to COVID-19 situation, the ANDROMEDA project has been extended for 6 months. The updated schedule is reported in the below figure.

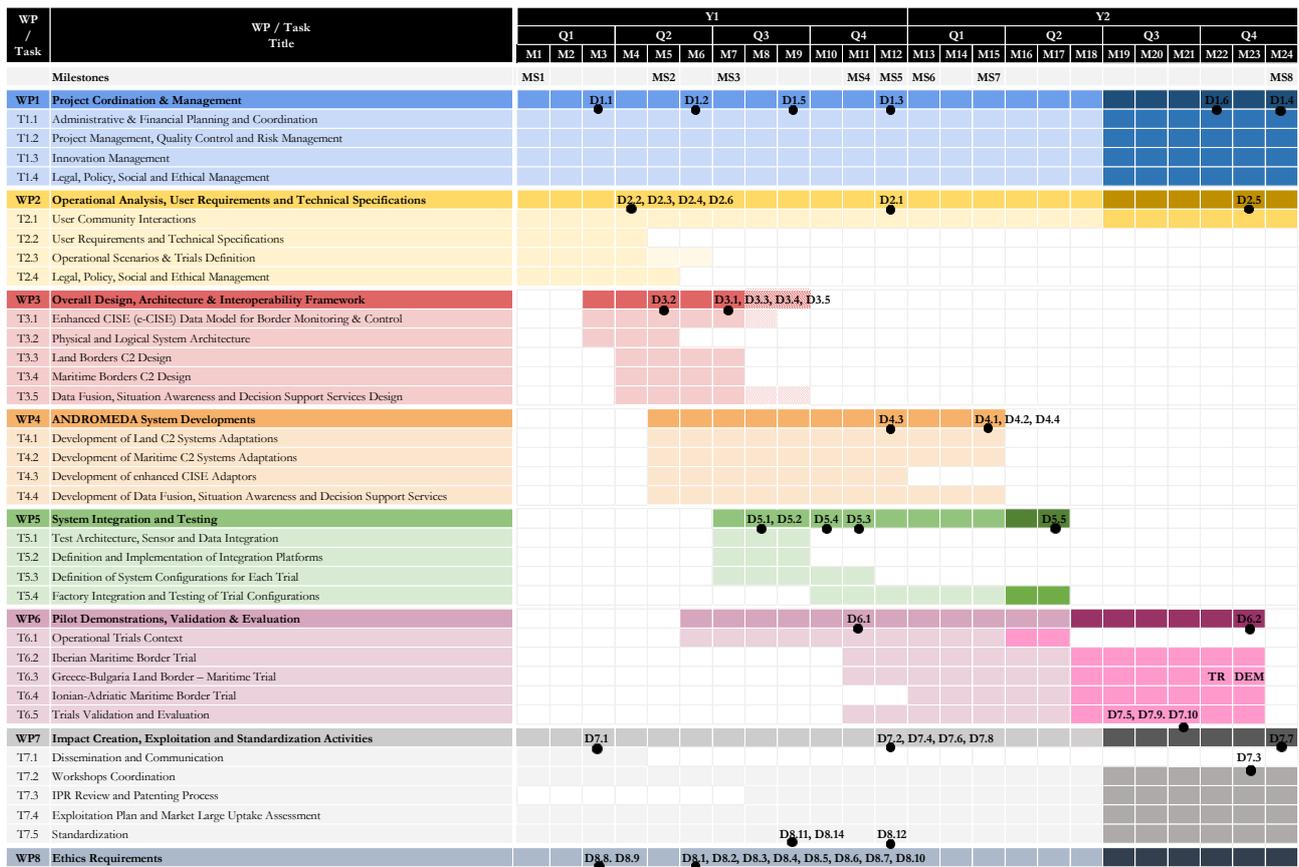


Figure 3: Gantt Chart

3.8 Advisory Board Interactions

During the third phase of the project, the Advisory Board continued to be engaged under various occasions (e.g. project meetings, trials, workshops and demonstrations). The feedback from the Advisory Board has been received through the conventional means created by the project in the definition of the validation framework and considered valuable for assessing project results from experts outside the Consortium.

3.9 Risk Management

According to the Quality Assurance, a Risk Register is maintained and reported below for the risks identified at the proposal stage, but also for the unforeseen risks arisen during this last period (M13-M24) of the project.

Table 11: Risks identified at proposal stage and mitigation actions

Risk number	Risk opening date	Risk creator	WP(s) involved	Risk type	Risk description	Risk status	Probability of occurrence	Expected impact	Possible solution/way to prevent
R1	Proposal stage	Consortium	WP1	Management	Insufficient resources and personnel committed to the project: Partner being in difficulties (company reorganization) or partner withdrawal	Identified	L	H	Raise the issue urgently with higher level management in partner organisation, ask EB to proposed solutions, in case of withdrawal replace partner
R2	Proposal stage	Consortium	WP1	Management	Partners cost expenses under/over budget.	Identified	L	M	Control mechanisms at each partner and internal periodic reports to control spending and activities
R3	Proposal stage	Consortium	WP2	Technical	Identifying legal and institutional constraints that will influence the design and operational use of ANDROMEDA solution.	Identified	L	H	One of the tasks within WP2 (T2.3) is devoted to identifying these possible constraints and provide the legal guideline in order to ensure the project complies with the current normative.
R4	Proposal stage	Consortium	WP2, WP3	Technical	If the requirements are not precise, there is risk that the implementation of the components does not meet the users' needs.	Identified	M	M	This risk is mitigated by the Model Based Systems Engineering approach adopted for design and the Agile development. At the same time the practitioners are involved as full partners and have close cooperation with the technical partners
R5	Proposal stage	Consortium	WP3	Technical	Interaction with legacy operational border surveillance systems could pose the following risks: • security restrictions can prevent a seamless	Identified	H	M	Early engagement of End users (full partners) responsible of the current border surveillance operational systems to assess the security restrictions. In addition, the three trials will span over several months each thus enabling

					integration with the network envisaged • daily operations (planned or unplanned) of existing civil and military systems could delay the trials envisaged				several alternative times slots for legacy systems availability
R6	Proposal stage	Consortium	WP3, WP4, WP5	Technical	Technical risk in the design phase of ANDROMEDA solution that shall be only detected at verification/validation time.	Identified	M	M	ANDROMEDA consists of High TRL components and during the development phase the Model Based Systems Engineering approach will help to identify any design inefficiencies early. In addition, the three trials span over several months and allow feedback to the development and integration tasks.
R7	Proposal stage	Consortium	WP5	Technical	Delay in testing and validation of the software	Identified	L	H	ANDROMEDA relies on software components that are already existing and largely tested, integrated with new software development. Then, the complexity of the software to be developed is reduced. Delays will affect individual components and not the system as a whole.
R8	Proposal stage	Consortium	WP6	Technical	The major risk at the integration phase is clearly that a number of components do not match the agreed specification, functionalities or simply interfaces.	Identified	M	L	The software engineering methods adopted allows to keep the complexity of the development at reasonable level. In addition, the possibility to test in advance the ANDROMEDA solution in synthetic environment reduces the risk to have troubles during the physical trials.
R9	Proposal stage	Consortium	WP5	Technical	Components not stabilised or not mature for integration	Identified	M	M	WP5 will deliver tested and qualified components prior to delivery to WP6
R10	Proposal stage	Consortium	WP2, WP6	Technical	Unavailability of sensible data to sustain the trials impact	Identified	M	M	The End-users will jointly define the trials in WP2 with technical partners, which reduces any mismatch between trial objectives and end-users data availability.

R11	Proposal stage	Consortium	WP2, WP6	Technical	Demonstrated solution not fully in line with end user constraints	Identified	L	H	ANDROMEDA involves practitioners in all project phases and ensures proper consultation. In addition, the trials execution span over several months enabling to analyse failures and provide feedback to WP5 and WP6.
R12	Proposal stage	Consortium	WP7	Technical	Difficulty in finding stakeholders willing to express their interests or interested in the final solution	Identified	M	M	A comprehensive market uptake assessment will be carried out in WP7; two workshops will be conducted during the project lifecycle. ANDROMEDA end users have already expressed during the proposal phase their need for CISE Interoperable C2s and associated Data Fusion and Analytics services.

Table 12: Unforeseen risks and mitigation actions

Risk number	Risk opening date	Risk creator	WP(s) involved	Risk type	Risk description	Risk status	Probability of occurrence	Expected impact	Possible solution/way to prevent
R13	06/10/2019	MMAIP KEMEA	WP1	Financial	Due to the fact that MMAIP does not officially hold a special account for the deposit of the contribution by the R&D activities of the EC-funded projects, it is examined the possibility of using both the Public Investments Program (ΠΙΔΕ) and the General Accounting Office (ΓΑΚ) for transferring the pre-financing payments to the partners.	Approved	H	H	In order to tackle this risk a Technical Factsheet had to be prepared by MMAIP and then assessed/approved by the Directorate General for Financial Services of the Ministry of Maritime Affairs and Insular Policy. Several meetings have been arranged between the Hellenic Ministry of Finance and MMAIP in order to find the optimum and quickest solution for transferring the pre-financing payments to partners. The transfer has been done by the end of December 2019 to all partners.
R14	05/11/2019	MMAIP KEMEA	WP1	Management	Delays in the distribution of the Filkrypto encryption application (including software, serial	Approved	M	L	For the first period of the project and until having the Filkrypto encryption application installed by all partners and as an alternative, partners could choose

Risk number	Risk opening date	Risk creator	WP(s) involved	Risk type	Risk description	Risk status	Probability of occurrence	Expected impact	Possible solution/way to prevent
					numbers and crypto key) to all partners following according to the procedures for handing EUCI information.				to exchange classified deliverables in hard copy or on external media/USB and placing the deliverable sealed in a double opaque envelope.
R15	05/11/2019	ICCS	WP7	Dissemination	Inconsistency that occurs in the DoA about the lead beneficiaries who will host the two project workshops and their timing during the project. Specific inconsistency between Table 10 (tentative list of project meetings) and T7.2 description.	Approved	M	M	According to the responsibilities of partners in T7.2, the first workshop will be organized by GMV and the second by EXUS. To this end, the first workshop will be organized in September 2020 remotely due to the COVID-19 outbreak and in parallel with the project meeting. The second workshop will be organized at the end of the project as scheduled. This will affect the deliverable D7.6 “Initial Workshops Organization and Results” which is proposed to be submitted to EC instead of M12 (August 2020) in M14 (October 2020) in order to report all the results from the execution of the first workshop.
R16	05/11/2019	KEMEA	WP2	User Community	Difficulty to reach the interested stakeholders and invite them to participate in the User Community of the project.	Approved	M	M	The user community will be set-up involving user partners as well as external end users invited to join the initiative. Links of consortium partners of the ANDROMEDA to past and on-going initiatives in the domain (EUCISE2020, EWISA, MARISA, RANGER, CLOSEYE, PERSEUS, CoopP etc.) will speed up the process. The first set of the User Community is formulated and efforts to be extended are continuously made.
D17	05/11/2019	STWS KEMEA	WP3	Technical	Development of the e-CISE Data Model without the validity of JRC.	Approved	M	H	The CISE Data Model is an essential enabler of interoperability and operational cooperation. It has been achieved to formalize a collaboration

Risk number	Risk opening date	Risk creator	WP(s) involved	Risk type	Risk description	Risk status	Probability of occurrence	Expected impact	Possible solution/way to prevent
									with JRC and specifically with the JRC.E.5 Unit in order to participate in the project's Advisory Board and review the deliverable D3.1 "e-CISE Data Model description" before its submission to EC. JRC as the center of expertise for the CISE Data Model will provide valuable feedback in order to validate project's work on the subject.
R18	17/01/2020	STWS	WP4	Technical	Delays in the ANDROMEDA system developments since the overall design, architecture and interoperability framework is in progress and will be finalized in M7 (March 2020)	Approved	M	L	Ensure that complete draft version of WP3 deliverables are available early enough and consensus among technical partners regarding the system architecture is met during the 1 st Technical Meeting held in Rome in early November 2019.
R19	11/02/2020	STWS	WP5	Technical	Delays in the integration of the ANDROMEDA system developments due to potential delays in the purchase of the necessary equipment from the end-users through procurement processes.	Approved	M	L	Collect technical specifications of the necessary hardware per ANDROMEDA component on time and share the specifications with the end-users before starting WP5 activities.
R20	11/02/2020	MMAIP, KEMEA	WP1	Management	Inability to physically meet at Consortium level due to the outbreak of Coronavirus COVID-19 worldwide.	Approved	H	L	Organize often teleconferences at WP level in order to monitor the progress of work and schedule a remote technical, innovation and user community meetings if necessary.
R21	21/02/2020	KEMEA	WP6	Pilots	Inability to schedule our first pilot visit to the Greek-Bulgarian borders due to the tense situation in the Greek borders following the announcement of Turkey	Approved	H	M	The mitigation action was to organize dedicated teleconferences with the Greek End-Users at Ministerial level in order to schedule ahead the purchase of the necessary equipment for the Trial#2 and discuss on time technical details for the interconnection with

Risk number	Risk opening date	Risk creator	WP(s) involved	Risk type	Risk description	Risk status	Probability of occurrence	Expected impact	Possible solution/way to prevent
					that opens its borders for refugees who want to cross into Greece and Europe.				their Legacy Systems. Moreover, through the organization of bi-weekly teleconferences, WP6 started early enough the activities for preparing the Validation approach and plan.
R22	23/09/2020	MMAIP, KEMEA	WP1, WP6	Management, Pilots	COVID-19 outbreak continues during autumn/winter 2020 when the monthly validation activities take place and the trials in their full-extend are going to be executed. Inability for the Consortium to travel and meet physically.	Approved	H	H	Follow the new Horizon 2020 FAQs in relation to the COVID-19 outbreak and apply teleworking conditions organizing frequently teleconferences at WP6 level to monitor the progress of the trials' preparations. The partners in the Consortium are currently working under the COVID-19 crisis in various projects and follow all the instructions arisen by World Health Organization (WHO) and European Commission. In case the Consortium is not able to travel to the borders for executing the monthly validation activities and the trials, the mitigation action could be to extend the duration of the trials or execute some of them with the presence of the local border guard personnel only. An alternative could be to run some of the pilots or all the pilots remotely. In any case, considering the nature of the Border Guard Authorities, the services provided by these entities are currently running smoothly.
R23	23/09/2020	MMAIP, KEMEA	WP1	Management	Personnel from partners is diagnosed with COVID-19 symptoms. Disorganization and difficulties to complete the allocated work on time.	Approved	H	M	All partners follow the instructions of their National Health Organization regarding the measures to be taken in order their personnel to be protected from the COVID-19 crisis. Moreover, teleworking conditions and social distancing for the personnel who necessarily work at the offices are applied. The project is followed by

Risk number	Risk opening date	Risk creator	WP(s) involved	Risk type	Risk description	Risk status	Probability of occurrence	Expected impact	Possible solution/way to prevent
									more than one person per partner to ensure its smooth transition in case of confirmed COVID-19 cases.
R24	23/09/2020	MMAIP, KEMEA	WP1, WP6	Pilots	Tense political situation in EU external borders. Inability to schedule timely visits to the pilot areas due to the current political situation in the East Mediterranean.	Approved	H	H	The participation of the Border Guard Authorities guarantees that the pilot areas can be seamlessly accessed by their local personnel. Dedicated teleconferences with the end-users are scheduled in order to discuss on time technical details for the interconnection of their Legacy Systems with ANDROMEDA. In case the political situation goes even worse and the local border guards by command are alerted to protect the borders due to the external threat, then the mitigation action could be to extend the duration of the trials and execute them either physically or remotely ensuring that the necessary health and safety procedures are applied safeguarding workers' safety.
R25	23/09/2020	KEMEA	WP7	Dissemination	COVID-19 is resulting in cancelled or postponed live conferences & workshops, which limits impact	Approved	H	M	The partners could switch to online gatherings. Alternative options to spread the project's results that do not require in-person meetings can regularly be discussed by WP7 partners.
R26	30/05/2020	ICCS	WP7	Dissemination	Risk in planning the 1 st ANDROMEDA Workshop physically for September 2020 due to COVID-19: - Travel restrictions or any other kind of restriction which might be imposed by the national	Approved	H	H	Organize the 1 st Workshop in the form of a remote on-line event.

Risk number	Risk opening date	Risk creator	WP(s) involved	Risk type	Risk description	Risk status	Probability of occurrence	Expected impact	Possible solution/way to prevent
					authorities due to COVID-19 outbreak. - Social distancing precautions might also affect the participation (low attendance). - Situation around COVID-19 is still unpredictable according to the World Health Organization				
R27	30/05/2020	ICCS	WP7	Dissemination	Risk of not being able to meet the communication activity KPIs due to cancellation or re-scheduling of events due to COVID-19	Approved	L	M	Planning of dissemination and communication activities have been updated (see Annex A). A list of conferences have been selected for the partners and most of the ones initially selected will take place before the end of the ANDROMEDA project. Moreover, the number of scientific publications or social media divulgation can be increased so that the wanted impact is reached.
R28	30/09/2020	STWS	WP5	Technical	Delays due to execution of tests which require physical presence of assets hindered by the current health crisis	Approved	H	M	Monitor the situation ensuring any relaxation of measures can be taken advantage of to execute the tests. Correspondence with end-users for cooperation to execute the tests remotely with their active involvement
R29	30/11/2020	KEMEA	WP6	Pilots	Delays in deploying and upgrading the new surveillance equipment in Evros region due to COVID-19 traffic restrictions (e.g. radars, cameras, AIS receiver, environmental sensors, telecommunication links etc.)	Approved	H	M	Perform a gradual deployment and integration of the new equipment. Shift the execution of the trials close to the summer period when the traffic restrictions will be suspended in order to test and validation the ANDROMEDA system using real data integrated with legacy systems under operational conditions.

Risk number	Risk opening date	Risk creator	WP(s) involved	Risk type	Risk description	Risk status	Probability of occurrence	Expected impact	Possible solution/way to prevent
R30	15/02/2021	KEMEA	WP6	Pilots	An extreme snowstorm occurred in Athens and for almost one week it was difficult to move by car and visit the end-users' premises.	Approved	H	M	Slightly shift the execution of the Ionian – Adriatic trial in order to ensure the seamless presence of the Greek end-users.
R31	26/04/2021	KEMEA	WP7	Dissemination	Inability to organize physical demonstration dates due to COVID-19 crisis.	Approved	H	M	Organization of publicly accessible demonstration sessions per Trial during the project final workshop held remotely. Ensure active involvement of practitioners and related EU Agencies.

3.10 Replies to the recommendations from the Mid-term Review meeting

Table 13: Recommendations concerning the Period covered by the Report

No	Recommendations concerning the period covered by the report	Related WP	Reply/Action
1	The ambition of the project declared in DoA is not fully justified in the Deliverables yet. The new e-CISE is a valuable outcome of the project already (and will be even more valuable after tests). It meets most of the requirements stated by user community and is definitely a step in the good direction. However, further enhancement in future projects will be needed to include other sensors like perimeter guards, seismic sensors, radio sensors, etc.	WP3	The addition of more sensors enhances the Situation Awareness for the operators and ANDROMEDA will take it into account for future projects. E.g. ANDROMEDA results will be the baseline of the EFFECTOR project where additional data sources and systems will be exploited within the framework of an innovative multilayered data lake platform for end-to-end interoperability and data exploitation that will facilitate the seamless integration of maritime surveillance systems and the interoperation of information systems at tactical and strategic level. Currently ANDROMEDA integrates sensors from AIS, Maritime Radars, Cameras Feeds and Drone sensors (object detection and tracking from optical and thermal cameras). Also, mobile version of the C2s have been provided to the officers during the trials for dispatch, tasking etc. As one step forward, EFFECTOR will develop a data harmonization layer where a series of underutilized data sources will be exploited (e.g. SAT-AIS, Satellite Data Platforms, Environmental Sensors, CleanSeaNet, SafeSeaNet, IMDate, Maritime Single Window, Ship Registers, Radio Frequency Analyzers, mobile cameras etc.)
2	Some CISE enhancements could be described better. It is not always clear what exact changes will be made for each Command and Control station to adapt it to the new requirements.	WP3	To address this recommendation, the deliverables of WP4 were used to describe the e-CISE enhancements made to the system or service or component.
3	Furthermore, Data Fusion and Situational Awareness, as well as Decision Support Services are described in deliverables as already existing systems and the innovation itself is adjusting them to the new environment, while according to DoA, an increase of the TRL for most services is expected. At the final review, the accomplished TRL improvement should be clearly compared with the expectations set forward in the DoA.	WP3	The Data Fusion Services and Decision Support Tools have been adapted to the ANDROMEDA architecture. All services and tools have been extended to support the e-CISE data model and cover JDL Level 1-2-3 Data Fusion for object, situation and threat refinement. These enhancements have been described in detail in the Deliverable D4.4, while the justification of the corresponding TRL improvement in terms of the innovation itself is documented in the Deliverable D7.9.
4	An important contribution of the project is a set of requirements based on user community input. The concern is however that most of the members of the end user community are maritime parties which may lead to restricted completeness of land user requirements (like lack of some sensors as stated above). It is hard to be assessed at this stage and we rather have to believe that proposed solutions will be sufficient.	WP2	The extension of the User Community was a continuous process throughout the whole duration of the project. Four dedicate recruiting campaigns have been organized to enlarge the User Community. The fourth campaign, and following the recommendations from the mid-term review, was mainly focused on land border authorities outside Mediterranean area. Discussions with FRONTEX have been organized by the

No	Recommendations concerning the period covered by the report	Related WP	Reply/Action
	<p>As a result, the user community should be extended to include land border authorities, with the support of the Commission and/or FRONTEX.</p>		<p>Management Support Team for engaging land border partners to join ANDROMEDA User Community. As a result, the following land border authorities eventually followed our project activities apart from Hellenic Police and Israel National Police who are already members of the Consortium: Guardia Civil, Bulgarian Defence Institute, Bulgarian Border Police, Montenegro Border Police, General Inspectorate of Border Police Ministry of Internal Affairs of the Republic of Moldova (though the provision of official letters of support), Hungary Border Police, Department for Border Affairs and Migration of North Macedonia (by participating with a presentation during project’s workshops).</p>
5	<p>It is evident that the Consortium has the necessary know-how to easily accomplish all project assignments. On the other hand, the involvement of numerous actors can represent a serious risk when coordination and information sharing level are inadequate. Moreover, the innovative system for Border Control purposes is a complex spatial distributed architecture formed by heterogeneous pre-existing systems adopting multiple communication standards. For this reason, in order to solve in advance possible integration problems an accurate system design is a key factor for success. As reported in WP 3, the methodology selected for the present project is the NATO Architecture Framework (NAF), which is the NATO standard used for military system development. The standardized NAF views represent an extremely powerful tool to communicate the enterprise architecture to different stakeholders. Given the Consortium nature and the complexity of the project it is recommendable that, whenever possible, elaborated views are shared among all partners and, if necessary, better refined.</p>	WP3	<p>The elaboration process followed started with a set of views proposed by the coordinator of the work package. There were some technical meetings scheduled where the views were introduced by the WP3 leader, so all the partners were totally aligned when this information had to be included in the other deliverables describing the other technical developments, so from the very beginning all the partners had enough knowledge. Specific one-to-one meetings were held if some doubts appeared.</p>
6	<p>With regard to the rest of the project, the consortium is advised to get as much feedback from land end users as possible and to provide direct information of enhancement of C2s and services. This is particularly important regarding the reporting of technological innovations in the regards of DoA, as the ANDROMEDA ambition is to do more than use existing blocks as services.</p>	WP2, WP6	<p>End-users from both domains (land and maritime) have been involved in all the meetings/trials/demonstrations, so they had the chance to provide their feedback regarding the innovation provided by ANDROMEDA. The GR-BG Trial has focused specifically on the land domain. Additionally, a specific User Community Session was organised for sharing the ANDROMEDA innovation and its utilities with end users. For getting feedback from the User Community the following methodology has been followed:</p> <ul style="list-style-type: none"> • Collection of feedback forms per system release validation: The number of the feedback forms collected for the releases

No	Recommendations concerning the period covered by the report	Related WP	Reply/Action
			<p>have been increasing as the releases were executed until reaching a total of 105 collected feedback forms from different end-users (including land operators).</p> <ul style="list-style-type: none"> • Collection of validation surveys: 23 surveys have been completed in order to validate the final ANDROMEDA system towards its KPIs and MOEs (including land operators). • Collection of evaluation surveys: 37 surveys have been completed following trials' execution and final workshop (including land operators and EU Agencies, e.g. SATCEN.) • Collection of ethics surveys: 21 surveys have been completed to assess the necessary compliance with the codes of ethics. <p>Finally, the ANDROMEDA Forum as discussion platform provided channel for external partners to provide their feedback for the project.</p>
7	<p>It is sometimes also not clear in the deliverables how many C2 stations will be used in ANDROMEDA. In some deliverables there are 3, as in DoA and in some additional SMART station exists. It was clarified during review meeting that 4 C2 station will be used Simultaneously the declaration was made that no additional workload is needed for this purpose. The consistency should be implemented in deliverables regarding this issue.</p>	WP3	<p>The ANDROMEDA Projects consists of a number of C2s. The following C2s operate in the LAND Domain - SOCRATES C2, ENGAGE BME, GEOC2. The same C2s operate also in the MARITIME Domain with the addition of the SMART C2. This distinction will also be made inside the WP4 deliverables (D4.1, D4.2)</p>
8	<p>The deliverable D8.3 basically states that the different partners have no ethical committee, but promise to adhere to the regulations. However, not having an own ethical committee does not exempt the partners to seek authorization for the trials with the competent national data protection authority / privacy commission for performing the trial. The consortium should investigate whether they really do not require this in the countries where the trials take place (check https://www.dataprotectionauthority.be/privacy-commissions-european-union).</p>	WP8	<p>A specific inquiry has been sent to the partners located in the countries where the ANDROMEDA trials take place: Spain and Portugal (Iberian Maritime Border Trial in the context of T6.2), Greece and Bulgaria (Greece-Bulgaria Land Border – Maritime Trial in the context of T6.3) and Greece, Italy, Montenegro (Ionian-Adriatic Maritime Border Trial in the context of T6.4). Based on the responses of the partners, as they have been communicated to the reviewers through a dedicated letter and as presented in the revised version of D8.3 H-Requirement No.3 which has been re-submitted, no authorisation is required by the national supervisory authorities.</p>
9	<p>D1.1 discusses a dataset (#7) consisting of personnel tracks obtained through EO data. The anonymization / pseudonymisation techniques for this dataset do not seem to be discussed in D8.6, while they do seem relevant. Only for the SOCARTES and ENGAGE systems, the anonymization / pseudonymisation functionalities are discussed in D8.6. The status for the other C2 and subsystems is unknown.</p>	WP8	<p>A specific inquiry has been sent to all consortium members, and specifically to those who are involved with the electro-optical devices (for example, ICCS due to their involvement with the drones equipped with cameras) in order to clarify, first, the need for anonymization/pseudonymization techniques, and secondly, if that need is relevant, the specific techniques to be used.</p>

No	Recommendations concerning the period covered by the report	Related WP	Reply/Action
			<p>Only for the SOCRATES and ENGAGE systems, the anonymization/pseudonymization functionalities are discussed. The status for the other two C2 and subsystems is unknown.</p> <p>Regarding the second remark, an additional inquiry has been sent to all the consortium members that are contributing to the project with a C2 system to further clarify the need for anonymization/pseudonymization techniques, and to specify what those techniques are.</p> <p>All this information is included in the revised version of D8.6 POPD-Requirement No.6 which has been re-submitted.</p>

Table 14: Recommendations concerning the Future Work

No	Recommendations concerning future work, if applicable	Related WP	Reply/Action
1	<p>COVID-19 pandemic situation. The consortium reported already that due to the tension in the Greek borders following the announcement of Turkey that opens its borders for refugees, the field visit was postponed. The mitigation action was to organize dedicated teleconferences, however in future, the situation might change. The influence of COVID-19 for organizing international trials might be obvious, these are however serious concerns as the Consortium did not report this risk yet and they stated at the review meeting that the trials will be performed as planned. The possible implications on ANDROMEDA are various and in the worst case a severe time delay can afflict specific tasks with ensuing repercussion on planned project conclusion as well. In the last part of the work plan, indeed, field trials are scheduled which cannot be regularly performed in case working and/or travelling restrictions are imposed again. This could seriously impact the successful accomplishment of ANDROMEDA, as the proof of the pudding for the project will depend on the validation in the near future using the three validation and demonstration events. Next to the usual problems related to multisystem integration, the Corona-crisis can and will probably pose additional difficulties for the organisation and execution of these trials. Therefore, it is highly recommendable to update the risk management plan finding adequate mitigation measures.</p>	WP1	<p>The situation with the COVID-19 pandemic situation continued to be unstable during Autumn/Winter 2020 and the project has been inevitably affected. The Risk Management Plan has been updated in D1.3 as recommended by the experts in the mid-term review and the mitigation action to extend the duration of trials' execution took place. It has been given a high priority to run some operational scenarios of the Trials physically in the borders by exploiting real-time data from the involved legacy systems, assets and sensors. This has been achieved adhering to the dispersal protocols of COVID-19 and respecting the required health & safety procedures identified by the Border Guard Authorities with the support of project's legal and ethical experts.</p>
2	<p>Moreover, health policies established by EU and national Governments have to be carefully followed and additional measures set up by the</p>	WP1	<p>Based on the identified health and safety risks (deriving from the use of UAVs, radars and other tools and from the COVID-19 pandemic) the respective health and safety procedures as</p>

No	Recommendations concerning future work, if applicable	Related WP	Reply/Action
	Consortium need to be applied in order to ensure workers safety.		stipulated by European and national legislations have been presented in D8.11 EPQ-Requirement No.11. All necessary measures have been implemented during the carrying out of the relevant research activities with humans. The participants have been informed through Information Sheets before giving their consent for participation in the research.
3	In case of a new COVID-19 outbreak, whenever possible, smart working should be promoted so that project deadlines can be met while safeguarding worker's safety.	WP1	Each beneficiary of the Consortium follows the new Horizon 2020 FAQs in relation to the COVID-19 outbreak and applies teleworking conditions and social distancing organizing frequent teleconferences and online meetings (see Section 3.6) in order to closely monitor project activities and meet project deadlines. Partners follow the instructions of their National Health Organization regarding the measures to be taken in order their personnel to be protected from COVID-19 crisis, while the project is followed by more than one person per partner to ensure its smooth transition in case of confirmed COVID-19 cases.
4	Due to COVID-19, several events (i.e. WS and Conferences) have been cancelled or will be attended by a much lower number of participants. Consequently, the dissemination plan elaborated should be slightly modified increasing, for instance, the number of scientific publications or social media divulgation so that likewise the wanted impact is reached.	WP7	Dedicated teleconferences have taken place for the update of the dissemination and communication plan, and a new plan has been prepared, including the preparation of more scientific papers and a plan to utilise the social media tools and online events to communicate the project outcomes (see D1.3).
5	Strong liaising with EMSA, FRONTEX, JRC and DG HOME is advised.	WP1	The linkage activities with EMSA, FRONTEX, JRC and DG-HOME have been strengthened as advised. ANDROMEDA participated in various meetings organized by the Agencies (e.g. Policy to kick-off Seminar, FRONTEX Research Workshop, CISE Stakeholder Group Meetings etc.), while also set-up several bilateral communications at project level in order to communicate project objectives and achieved results to policy makers and stakeholders. Finally, the related EU Agencies have actively participated in the roundtable discussions of the Workshops and the Final Demonstration Event organized by the project providing valuable feedback and recommendations reported in D7.6 and D7.7.
6	Please address gender balance & issues in future reports. It can be important, as the ANDROMEDA developments impact the HMI.	WP1	A gender balance section has been added in D1.3. About 35% of the project workforce are female which is a good average. The statistics of the gender balance are regularly updated on the participant portal.
7	Please consider for further deliverables making the "Executive summary" a summary of the deliverable itself, not an (ever-repeating)	ALL	The comment has been taken into consideration. All further deliverables include an Executive summary of the deliverable itself.

No	Recommendations concerning future work, if applicable	Related WP	Reply/Action
	executive summary of the ANDROMEDA project		
8	Please make sure that all partners read D2.4.	WP2	This has been done.
9	Please try to engage some end-user partners from outside the Mediterranean basin.	WP2	<p>Land and Maritime Border and other relevant authorities should collaborate regionally to exchange information and advance common security-related issues. Developing regional (The Black Sea, The Mediterranean Sea, The North Atlantic, The Baltic Sea, and The Arctic) information sharing platforms and procedures could be based on existing border and maritime surveillance networks and systems. The external end-users that have been engaged per applied basin are the following:</p> <ul style="list-style-type: none"> - Mediterranean Sea: Spanish Navy, Guardia Civil, Montenegro Border Police, General Maritime Directorate of Albania, Slovenian Maritime Administration - Black Sea: Bulgarian Navy, Bulgarian Defence Institute, Bulgarian Border Police, General Inspectorate of Border Police Ministry of Internal Affairs of the Republic of Moldova - North Atlantic: Home Office: Border Force Maritime Command, MAOC-N – Maritime Analysis and Operations Centre – Narcotics - Baltic Sea: Polish Naval Academy of the Heroes of Westerplatte in Gdynia
10	Please incorporate more real (stored and live) data in the test packages.	WP5	During the extended trial period and the actual pilot demonstrations, the testing was conducted using mainly real live and real stored data. This is also evident from the testing monitoring tool that was used to monitor the gradual integration of real data and assets (live and stored).
11	The achieved KPI's towards communication and dissemination should also be updated on the Funding & Tenders Portal- The WP6 trials should also be seen as important dissemination and exploitation events, in order to attract end user to make use of the ANDROMEDA tools. Please consider devoting enough resources towards the production of high-quality video material from each of these trials.	WP6, WP7	1) Information on Audiences size and type for each communication activity is continuously collected and has been uploaded in the portal. It will be further updated once the Total Funding Amount has been finalized. 2) As instructed, several Communication actions involved the WP6 trials. Stakeholders have been invited to the trials and the ANDROMEDA partners' communication channels have been used to attract end users. Moreover, the external partners from the User Community have been invited to participate in the Trials and the Final Demonstration Event. 3) The trials will be used for the production of a high-quality video which will be prepared by professionals in the field.
12	Please submit a publishable summary for the project on the Portal.	WP1	It will be done online and will be available for the Final Report.
13	Attempts should be taken to gather more feedback from land border users on trials or	WP2, WP6	There was a continuous effort during all the stages of the project to involve users from land domain.

No	Recommendations concerning future work, if applicable	Related WP	Reply/Action
	even at the stage of results analysis. Directions for further enhancement of CISE should be given.		In order to gather more feedback from land border authorities was a challenging process due to the fact that was on voluntary basis while needed to be achieved within a short period of time and under the current circumstances with the pandemic. However, the engagement was satisfactory as already reported in previous points.
14	It is recommended to pay more attention on the quality of services during trials. KPIs in fact focus on the quantities, while quality of services is in fact not being directly assessed. In this situation feedback from trial users should be crucial.	WP6	The MoEs defined within D6.1 depict qualitative attributes of the system as they measure effectiveness. The end-users provided a continuous validation of the ANDROMEDA system at both quantitative and qualitative way. The validation results are reported in D6.2.
15	Planned trials should (if possible) include at least one area in which land and maritime border are next to each other to present direct data integration and seamless data exchange between land and maritime users.	WP6	This has been planned in the context of the GR-BG trial. One of the areas that has been selected to run the trial was the southern part of Delta of Evros where land and maritime border are next to each other and ANDROMEDA had the chance to integrate data from land (received from the 18m fixed mast constructed by the project in Delta of Evros) and maritime domain (received from the surveillance equipment installed in the river patrol boat). The seamless information exchange between land (Hellenic Police) and maritime users (Hellenic Coast Guard, Hellenic Navy, EAMA) has been tested using the advanced capabilities of e-CISE.
16	D6.1 Validation in operational trial approach and plan (M11) should be made available to the reviewers at the earliest opportunity (prior to trial execution).	WP6	D6.1 submitted prior to Official Trials of December
17	Enhancement of particular C2s should be clearly indicated.	WP4	This has been shown in the WP4 deliverables D4.1 and D4.2
18	Enhancement of Data Fusion and Situational Awareness, as well as Decision Support Services should be clearly indicated and should follow a declaration in the DoA.	WP4	The enhancements of the Data Fusion and Decision Support Tools are reported in D4.4. From the exploitation point view and TRL assessment, D7.9 provides the corresponding information per result/component.
19	Communications and dissemination actions, including future ANDROMEDA workshops should address a wider geographical audience, including other EU and non-EU states.	WP7	The consortium has performed dissemination and communication activities in many EU and non-EU countries. As a result, the User Community is composed from external partners that cover a wide geographical area representing 12 countries (6 from the EU and 6 outside the EU), while the audience of the Final Workshop & Demonstration Event represented 22 countries from which 8 were non-EU countries.
20	D7.8 ANDROMEDA Exploitation Plan (M12) should be made available to the reviewers at the earliest opportunity. It should include actions necessary to implement Joint and Individual Exploitation Plans, including IPR considerations.	WP7	A first version was shared with the D7.8 and a final one with the D7.9.

No	Recommendations concerning future work, if applicable	Related WP	Reply/Action
21	The EU – Restricted deliverables should be prepared in a manner suitable for black and white printing as they are delivered in paper black and white hard copy.	ALL	This has been considered for the final set of EU-RE deliverables that will be delivered to EC and experts.

Table 15: Other Recommendations

No	Other Recommendations	Related WP	Reply/Action
1	In particular, while the early engagement of end-users responsible of the current border surveillance has consented to mitigate the risk of seamless system integration due to security restrictions, the risks recap as follows continue to be the utmost critical factors that can undermine the ANDROMEDA project success: - Technical risk in the design phase of ANDROMEDA solution that shall be only detected at verification/validation time; - The major risk at the integration phase is clearly that a number of components do not match the agreed specification, functionalities or simply interfaces. - The risk related to the COVID-19 pandemic is probably underestimated and should be considered more thoroughly.	WP1	The Risk Management Plan has been first updated in D1.3 as advised and here in Section 3.9, it is reported the Final Risk Management Plan including all risks that the project has faced during its lifecycle at Management, Technical, Pilots and Dissemination levels. The risks have been continuously monitored and updated, while additional unforeseen risks have been included in the Risks Register giving more emphasis to COVID-19 side effects.
2	According to the Communication and Dissemination Strategy and Plan (see section 4.4 of D.7.1) until M3, 2 out of 6 planned presentations in scientific conferences have been completed, whereas no scientific papers have been published yet in Journals. The production of scientific papers based on Andromeda foreground could be improved.	WP7	In total, Andromeda has published 8 articles in peer reviewed means: 4 articles have been published in Referred Conference Proceedings, 1 book chapter and 3 papers have been published in Referred Journals.
3	Two papers have been published in scientific journals. However, they are not yet introduced in SygMa.	WP7	The scientific papers' details are being introduced in SygMa.

Table 16: Deliverables

Deliverable No	Deliverable Title	Recommendation	Status	Reply/Action
D1.5	Legal, Societal, Ethical Initial	The deliverable is adequate. Although explicitly stated in the GA, the policy to exclude classified deliverables from ethical compliance checks raises serious doubt on the effectiveness of the ethical management. Furthermore, it is written in this deliverable that "deliverables were peer reviewed by members of the WP8, but this is not really reflected within the list of reviewers for the deliverables.	Accepted	No actions needed

Deliverable No	Deliverable Title	Recommendation	Status	Reply/Action
D2.2	User Requirements & Technical Specifications	Comments will be provided at a later stage (EU RESTRICTED) - if any	Request for revision	D2.2 has been finally accepted and no further actions have been required.
D2.4	Legal, Ethical and Societal Aspects	An additional barrier to take into account and hopefully overcome (see Table 14) is the perception that systems like radars can harm people or have a negative impact on their health in the long term	Request for revision	D2.4 has been finally accepted. Changing the perception of public of possible harmful impacts of radiation or such was unlikely to be achieved during the project's lifespan and/or resources, nor was it appropriate. However, ethical awareness was stressed to the consortium (e.g. during several presentations), so that this question and others alike will not be neglected e.g. in the execution phase.
D2.6	Operational Scenarios and Trials	Comments will be provided at a later stage (EU RESTRICTED) - if any	Request for revision	D2.6 has been finally accepted and no further actions have been required.
D3.2	Architecture Design	Following aspects should be better addressed: 1. Whenever possible it is preferable to include all selected system design views on the same document; in case for security reasons this cannot be done an exact indication where they can be found is necessary (i.e. in Section x.y of D Z.Z instead than "They are supposed to be described in the deliverables D3.3 [7] for Land Border C2 Systems"); 2. Each view has to be compliant with standards defined in the NAF methodology and use the foreseen standard notation (i.e. NSV-4 views are UML activity diagrams which foresee a starting and ending point whereas boxes are not part of the standard notation at all - see, for instance, fig. 5.18) thus a meticulous check of the whole document is requested; 3. It is common practice to properly cite (i.e. as represented in fig X.Y) a figure in the document and furnish a brief description to clarify what is represented on it. Moreover, often the description is insufficient and the notation not clear as user defined models have been used rather than NAF standard views. 4. Although in the GA it has been specified to adopt NAFv3 standard it is unclear	Request for revision	There are several documents with design information. So, in the overall design we have included generic views and, in the documents, devoted to specific areas of the solutions (C2, fusion...) we have included those specific views.

Deliverable No	Deliverable Title	Recommendation	Status	Reply/Action
		why this older standard has been preferred instead than NAFv4 (January 2018). 5. The ANDROMEDA technical concept is not quite clear in the document (Network or Hub?) and should be further detailed. 6. The relation to other project should be extended: D3.2 includes only two of them while many more are described in other deliverables. 7. In the use-cases of the system, the land part is not included at all, which makes it incomplete. This should be extended.		
D5.1	Test Architecture and Data Integration	The majority of the tests are based on simulated data. The consortium members are advised to incorporate more real (stored and live) data in the test packages, as for maritime operations, the quality of the input data can vary a lot depending on the meteorological conditions and it should be validated to what degree whether the system can cope with this.	Accepted	The final tests were based on real data and in real operational environment, both land and maritime as part of the trials and pilot demonstration activities.
D7.1	Communication and Dissemination Strategy and Plan	The consortium is advised to make an update of the dissemination and action plan taking into consideration the effects of the Corona-crisis which will induce a shift towards virtual events and more focus on 'cyber'-communication and dissemination tools.	Accepted	No actions needed
D8.3	H Requirement No. 3	The deliverable basically states that the different partners have no ethical committee but promise to adhere to the regulations. However, not having an own ethical committee does not exempt the partners to seek authorization for the trials from the competent national data protection authority / privacy commission. The consortium partners should check whether this is not required in the countries where the trials take place (check https://www.dataprotectionauthority.be/privacy-commissions-european-union).	Accepted	No actions needed
D8.6	POPD Requirement No. 6	The document describes the anonymization / pseudonymisation techniques to be followed in ANDROMEDA project. However, some items seem to be missing in this deliverable: - D1.1 discusses a dataset	Request for revision	A specific inquiry has been sent to all consortium members, and specifically to those who are involved with the electro-optical devices (for example, ICCS due to

Deliverable No	Deliverable Title	Recommendation	Status	Reply/Action
		<p>(#7) consisting of personnel tracks obtained through Electro-Optical data. The anonymization / pseudonymisation techniques for this dataset do not seem to be discussed in D8.6, while they do seem relevant. - Only for the SOCARTES and ENGAGE systems, the anonymization / pseudonymisation functionalities are discussed. The status for the other two C2 and subsystems is unknown.</p>		<p>their involvement with the drones equipped with cameras) in order to clarify, first, the need for anonymization/pseudonymization techniques, and secondly, if that need is relevant, the specific techniques to be used.</p> <p>Only for the SOCRATES and ENGAGE systems, the anonymization/pseudonymization functionalities are discussed. The status for the other two C2 and subsystems is unknown.</p> <p>Regarding the second remark, an additional inquiry has been sent to all the consortium members that are contributing to the project with a C2 system to further clarify the need for anonymization/pseudonymization techniques, and to specify what those techniques are.</p> <p>All this information is included in the revised version of D8.6 POPD-Requirement No.6 that has been re-submitted.</p>

3.11 Use of Resources

This section shows the effort of each partner, in terms of person months, both within the project as planned in the DoA and with a specific focus within the last period of the project. The analysis shows the effort spent against planned and highlights the differences.

3.11.1 Summary of the project effort in person months

Table 17: Planned person-months per partner and per WP (M1-M24)

Planned PMs	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	Total PMs
1 - MMAIP	22	13	5	2	4	17	5		68
2 - GMV	4	2	17	24	8	8	7		70
3 - SATWAYS	5	4	24	32	10	19	11		105
4 - ICCS	1	2	7	6	8	4	11		39
5 - EXUS	1	2	11	15	8	11	4		52
6 - INOVAWORKS C&C	2	3	17	23	15	13	3		76
7 - FONDAZIONE CMCC	1	1	7	12	5	7	2		35
8 - LAUREA	10	14	0	0	0	3	2		29
9 - CODIN	1	3	10	10	10	9	3		46
10 - STEMTO	1	2	1	8	6	5	2		25
11 - KEMEA	2	13	2	0	4	12	7		40
12 - ENGINEERING	1	8	12	16	6	8	3		54
13 - HELLENIC POLICE	1	8	1	0	1	10	1		22
14 - MARINA MILITARE	0	5	1	0	0	1	0		7
15 - Difesa	1	8	6	8	1	8	2		34
16 - MOPS-INP	1	2	1	0	0	2	2		8
17 - EAMA	3	10	6	0	1	10	2		32
18 - HMOD	3	13	9	0	1	15	2		43
19 - MSD	4	13	8	0	1	13	2		41
Total PMs	64	126	145	156	89	175	71		826

3.11.2 Spent effort

Table 18: Spent person-months per partner and per WP (M13-M24)

Spent PMs	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	Total PMs
1 - MMAIP	8,00	2,00	1,00	1,00	2,00	13,50	2,50	0,00	30,00
2 - GMV	3,00	0,00	0,00	10,00	5,00	9,20	4,00	0,00	31,20
3 - SATWAYS	4,90	6,49	0,00	14,36	12,11	29,51	12,99	0,00	80,35
4 - ICCS	1,12	1,91	0,00	1,41	5,02	3,27	5,27	0,00	18,00
5 - EXUS	0,86	1,04	0,00	5,21	4,19	8,51	3,06	0,00	22,87
6 - INOVAWORKS C&C	1,00	0,00	0,00	10,00	4,00	10,00	2,50	0,00	27,50
7 - FONDAZIONE CMCC	0,34	0,00	0,00	2,45	1,56	5,81	0,40	0,00	10,56

Spent PMs	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	Total PMs
8 - LAUREA	3,39	4,31	0,00	0,00	0,00	2,53	1,27	0,00	11,50
9 - CODIN	0,45	0,00	0,00	4,50	2,48	8,47	2,06	0,00	17,96
10 - STEMO	0,50	0,00	0,00	0,00	1,25	10,25	0,00	0,00	12,00
11 - KEMEA	2,00	1,32	0,00	0,00	0,00	9,00	4,23	0,00	16,55
12 - ENGINEERING	0,37	1,45	0,00	4,84	0,63	2,73	0,78	0,00	10,80
13 - HELLENIC POLICE	1,00	2,50	0,00	0,00	0,00	11,54	0,50	0,00	15,54
14 - MARINA MILITARE	0,00	5,24	1,20	0,00	0,00	1,78	0,00	0,00	8,22
15 - Defesa	0,15	0,10	0,00	0,00	0,00	2,50	0,00	0,00	2,75
16 - MOPS-INP	0,05	0,05	0,00	0,00	0,00	0,80	0,70	0,00	1,60
17 - EAMA	0,52	3,36	0,00	0,00	0,00	5,20	0,20	0,00	9,28
18 - HMOD	1,89	4,01	1,34	0,00	0,00	15,89	0,83	0,00	23,96
20 - AMPSM	0,89	2,8	0	0	0	9,62	2,71	0,00	16,02
Total PMs	30,43	36,58	3,54	53,77	38,24	160,11	44,00	0,00	366,66

4. Conclusions

This is the last deliverable at administrative level which reports the progress achieved during the period M13-M24. The main achievements were related to the finalization of the development and integration activities which resulted in testing and validating the ANDROMEDA system in 4 successive releases. Reaching the closure of the project, emphasis has been given to the live demonstration of project results in the Final Workshop & Demonstration event which attracted more 100+ attendees including representatives from the User Community, the Advisory Board and related EU Agencies (e.g. DG-HOME, EMSA, FRONTEX and JRC). Given the maturity of the ANDROMEDA components and their significant added value in Border Security and interoperability, the project has defined a detailed plan about exploiting its results and contributing to its market uptake.

5. Annex A: Quality Review Report

The ANDROMEDA Consortium uses the Quality Review Report process for its internal quality assurance for deliverables to assure consistency and high standard for documented project results.

The Quality Review Report is used individually by selected peer reviewers. The allocated time for the review is 7 calendar days. The author of the document has the final responsibility to reply on the comments and suggestions of the peer reviewers and decide what changes are needed to the document and what actions are to be undertaken.

5.1 Reviewers

Project Coordinator	Ms. Athena Foka (MMAIP)
Management Support Team Member	Mr. Alkis Astyakopoulos (KEMEA)
Internal Peer Reviewer(s)	Dr. Antonis Kostaridis (SATWAYS), Ms. Mirela Rosgova (KEMEA)

5.2 Overall Peer Review Result

The Deliverable is:

- Fully accepted
- Accepted with minor corrections, as suggested by the reviewers
- Rejected unless major corrections are applied, as suggested by the reviewers

5.3 Consolidated Comments of Quality Reviewers

General Comments	
Deliverable contents thoroughness	Reviewers comment: Very clear Author's reply: -
Innovation level	Reviewers comment: Administrative document which summarises in some terms the innovation achieved per Task. Author's reply: -
Correspondence to project and programme objectives	Reviewers comment: Fully in line. Some minor comments are provided using track changes. Author's reply: -
Specific Comments	
Relevance with the objectives of the deliverable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partially <input type="checkbox"/> Not applicable Reviewers comment: Author's reply:
Completeness of the document according to the its objectives	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partially <input type="checkbox"/> Not applicable

	Reviewers comment: Author's reply:	
Methodological framework soundness	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partially <input type="checkbox"/> Not applicable Reviewers comment: Author's reply:	
Quality of the results achieved	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partially <input type="checkbox"/> Not applicable Reviewers comment: Author's reply:	
Structure of the deliverable with clear objectives, methodology, implementation, results and conclusions	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partially <input type="checkbox"/> Not applicable Reviewers comment: Author's reply:	
Clarity and quality of presentation, language and format	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partially <input type="checkbox"/> Not applicable Reviewers comment: Author's reply:	
Detailed Comments (please add rows as appropriate)		
No.	Reference	Remark
1		
2		
3		
4		
5		