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

Grant Agreement Number: 833881

D.7.6 Initial Workshops Organization and Results

Deliverable Identifier:	D.7.6
Deliverable Due Date:	2020/09/30
Deliverable Submission Date:	2021/01/04
Deliverable Version:	v.1.0
Author(s) and Organisation:	Pantelis Kanellopoulos (ICCS)
Work Package:	WP7 Impact Creation, Exploitation and Standardization Activities
Task:	Task 7.2 Workshops Coordination
Dissemination Level:	PU: Public

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 833881.

Document Control Page

Deliverable Number:	D.7.6	
Deliverable Title:	Initial Workshops Organization and Results	
Deliverable Version:	v.1.0	
Work Package Number:	WP7	
Work Package Title:	Impact Creation, Exploitation and Standardization Activities	
Submission Date:	2021/01/04	
Dissemination Level:	☒ PU: Public ☐ CO: Confidential, only for members of the Consortium (including the Commission Services) ☐ RE: RESTREINT UE (Commission Decision 2015/444/EC)	
Status:	☒ Draft ☒ Consortium reviewed ☒ Peer reviewed ☒ Management Support Team reviewed ☒ Project Coordinator accepted	
Author(s):	Pantelis Kanellopoulos	ICCS
Contributor(s):	Alkis Astyakopoulos	KEMEA
Peer Reviewer(s):	David Merino	GMV
	Dimitris Katsaros	EXUS
Security Assessment:	☒ Passed ☐ Rejected Comments: -	
Funding Authority:	European Commission	
Funding Program:	Horizon 2020 Secure Societies Work Programme 2018 – 2020	
Topic:	SU-BES03-2018 Demonstration of applied solutions to enhance border and external security, Subtopic [2018]: Open	
Rights:	ANDROMEDA Consortium	

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Version History

Version	Date	Edited by	Description
v.0.1	2020/10/28	Pantelis Kanellopoulos (ICCS)	Initial Draft
v.0.2	2020/12/06	Pantelis Kanellopoulos (ICCS)	Final Draft
v.0.3	2020/12/07	Pantelis Kanellopoulos (ICCS)	Updates
v.0.4	2020/12/14	David Merino (GMV)	Comments Provided (peer review)
v.0.5	2020/12/17	Dimitris Katsaros (EXUS)	Comments Provided (peer review)
v.0.6	2020/12/23	Pantelis Kanellopoulos (ICCS)	Comments Incorporated
v.0.7	2020/12/23	SAB	Review by the SAB
v.0.8	2020/12/24	Alkis Astyakopoulos (KEMEA)	Internal approval review by the PM
v.1.0	2021/01/04	Athena Foka (MMAIP)	Final version submitted

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Executive Summary

The current deliverable is a report of the activities made within Task 7.2 "*Workshops Coordination"* in regards to the organization of the first ANDROMEDA workshop that was held virtually on the 28th and 29th September 2020. These activities include the creation of event's programme *(Agenda)*, the invitations sent to potential attendees, the digital promotional material created and the announcements made via social media for raising the visibility of the event. It should be stressed that the physical workshop would have taken place in Tres Cantos *(Spain)* in early September of 2020 and preparatory activities towards its realization were made. After the outbreak of COVID-19, the ANDROMEDA consortium following the guidelines of national authorities, decided to turn the event from physical into a virtual one. Nevertheless, the core part of this document is dedicated in presenting the topics elaborated by the speakers and the discussions made.

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1. Introduction

This document describes the activities that the ANDROMEDA consortium made towards organizing its 1st Workshop, in order to present and promote the project results to the Consortium partners, end-users, practitioners and other policy makers and stakeholders. Additionally, brief reports from speakers' presentations are provided in order to present the topics elaborated and the discussions made during the event.

1.1 The project: ANDROMEDA

The ANDROMEDA project aims to unlock the full capabilities of the CISE by enhancing the Maritime CISE Model, extending its scope to the Land Surveillance Information Exchange and providing and demonstrating fully compatible Command & Control, Data Fusion and Decision Support systems.

The project will address the "*fragmentation*" and close *"gaps*" providing a secure, effective common situational awareness and information exchange system integrated with CISE. Furthermore, based on the analysis of past and current initiatives in the sphere of Border Security, the project will aim to develop solutions leveraging on the results extracted from relevant projects formerly funded by the EU.

1.2 WP7 Impact Creation, Exploitation and Standardization Activities

WP7 "*Impact Creation, Exploitation and Standardization Activities*" includes dissemination, communication, standardization and exploitation tasks. Its scope is to disseminate the project's results and communicate its objectives to a wide group of stakeholders by utilizing various dissemination and communication channels *(online and offline)* such as web tools, social media, publications, conferences and events *(via participation)* and so on. Moreover, by increasing the visibility of ANDROMEDA and its potential impact to improve the opportunities for exploitation of the project's outcomes. The Work Package is consisted of five interrelated tasks which namely are:

- T7.1 Dissemination and Communication *(M1-M18);*
- T7.2 Workshops Coordination *(M1-M18);*
- T7.3 IPR Review and Patenting Process *(M8-M18);*
- T7.4 Exploitation Plan and Market Large Uptake Assessment *(M1-M18);*
- T7.5 Standardization *(M1-M18).*

It should be noted that WP7 obtains inputs from all other WPs and ensures that the communication and dissemination of results have been achieved within the individual WPs to the outside parties as well as to participating entities.

1.3 Scope and Objective of D7.6

According to the DoA, the deliverable "*D7.6 Initial Workshops Organization and Results"* reports the results from the initial workshop. Within this framework the preparatory activities of organizing the first ANDROMEDA Workshop are described and the topics as well as the discussions made during the event are explicated. Moreover, its performance in terms of registrants, attendance rate and duration is outlined.

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1.4 Intended Audience

Table 1: Intended Audience

Intended Audience	Reason for interest in reading
European Commission	As the funding authority to assess the effort made towards the realization of the 1st ANDROMEDA workshop and to receive a report regarding the activities undertaken by the consortium as well as the discussions and presentations made. This deliverable constitutes an official report to REA / EC as foreseen in the GA.
Project Partners	To be informed about the actions made towards the realization of the event, the presentations made and overall have a common view of the effort spent for its successful realisation.
Stakeholders *(National Border and Coast Guards, Software Industry, End users community, EU institutions, Research institutions, Scientific and Technological community, etc.)*	To be informed about the ANDROMEDA project in general *(scope, motivation, expected impact etc.)*, the offered solution and the results produced so far.
Representatives of organizations involved in EU funded projects under similar topic	To share knowledge, lessons learned and best practices related to the project's topic. Moreover, it can assist in expanding the network of ANDROMEDA project by introducing it to other related EU funded ones.
General Public	To be informed about the project, its scope, its results as well as the discussion and presentations made during the 1st ANDROMEDA workshop.

1.5 Structure

This deliverable is consisted of **four chapters** and **one appendix**. The **first chapter** is an introductory one where the reader is informed about the purpose of the project, the tasks included in work package 7 and the scope and objectives of the current deliverable. Moreover, the intended audience is presented along with the reasons for interest in reading D7.6 per each. The **second chapter** outlines the activities made towards organising the event which include the agenda creation, the invitations sent to potential attendees, the digital promotional material created, the announcements made via the project's website and its social media accounts for raising the visibility of the workshop. The **third chapter** constitutes the core part of the document where the topics and the discussions made around them are provided. Lastly, the **fourth chapter** concludes this deliverable and the appendix includes screenshots from the original Agenda.

1.6 List of Acronyms

List of Acronyms	
CISE	Common Information Sharing Environment
EC	European Commission
Mx	Month x
REA	Research Executive Agency
Tx.y	Task x.y

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2. Workshop Organization

Task 7.2 which also includes the organization of the **1st ANDROMEDA Workshop** started in M1 *(Sep. 2019)* and spans throughout the project's lifecycle. The activities linked to the workshop organization were defined and discussed within the consortium taking into account the stakeholder analysis performed in T7.1. The process that was initially agreed for the related task was followed up until the successful organization of the event and the main steps taken towards its realization were:

- ICCS team (*T7.2 leader)* asked from GMV (organizer), KEMEA and STWS to nominate a main contact point from their organization in order to create the team that will work on the organization of the event.
- Location *(venue)* and potential dates were defined *(for the physical event).*
- Decision was made to turn the event from physical into a virtual one for ensuring all participants' safety and health due to COVID-19 outbreak and the related containment and precaution measures.
- The date for the organization of the online event *(28th – 29th of September 2020*) was agreed.
- Defined and agreed the online tool that hosted the virtual event *(GoTo Webinar tool).*
- Created the invitation list for attracting potential participants.
- Finalized the draft Agenda.
- Created the flyer dedicated to the event.
- Online announcements were made in project's website and social media accounts.
- Invitations sent to potential participants and the event was communicated within the consortium networks and contacts.

The activities were leaded and coordinated by ICCS *(Task 7.2 leader)* and together with GMV *(organizer)*, KEMEA and STWS the 1st ANDROMEDA Workshop was accomplished

2.1 Invitations List

Based on the stakeholder analysis made in T7.1 and in conjunction with end users list created by LAU, the T7.2 leader *(ICCS)* structured the initial invitation list. It was circulated to the consortium and partners were asked to suggest contacts with interest on the project's topic. The invitation list was enriched by their contributions and it was finalized by KEMEA. All contacts included were invited via various channels and available professional networks were also utilized.

2.2 Agenda

The preparatory activities for building the Agenda of the 1st ANDROMEDA Workshop had begun since May 2020 when Task 7.2 leader *(ICCS)* started the discussion regarding the structure of the event. After the consortium's decision to organize the event virtually *(given COVID-19 pandemic's impact and precaution measurements for avoiding its widespread),* ICCS circulated the first draft version of the Agenda where project partners commented and made several suggestions. The final version with topics and speakers was made by GMV and KEMEA. The programme of the event is provided at the following sub-sections while screenshots from the original agenda are available in Annex I.

2.2.1 Day 1 – 28 September 2020

Time	Topic
Opening Session	

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Time	Topic
10:00 – 10:05 *Duration: 5 min*	**Welcome** *Mrs. Athena Foka, Project Coordinator, Special Service of European Union Structural Funds of the Hellenic Ministry of Maritime Affairs and Insular Policy*
10:05 – 10:15 *Duration: 10 min*	**Brief Introduction to ANDROMEDA Online Workshop** *Mr. Alkis Astyakopoulos, KEMEA*
10:15 – 12:15 **Technical Session – Present the ANDROMEDA Results achieved so far** *Moderators: Mr. Alkis Astyakopoulos, KEMEA; Dr. Antonis Kostaridis, STWS; Mr. David Merino, GMV*	
10:15 – 10:20 *Duration: 5 min*	**Introduction to the Session and Speakers** *Mr. Alkis Astyakopoulos, KEMEA*
10:20 – 10:40 *Duration: 15 min* *Q/A: 5 min*	**Invited speaker** **CISE Data model for Maritime Surveillance** *Mr. David Berger, JRC*
10:40 - 11:00 *Duration: 15 min* *Q/A: 5 min*	**Project speaker** **The ANDROMEDA high-level architecture and system components** *Mr. Fernando Labarga, GMV*
11:00 – 11:20 *Duration: 15 min* *Q/A: 5 min*	**Project speaker** **The extended CISE Data Model (e-CISE) of ANDROMEDA** *Dr. Antonis Kostaridis, SATWAYS*
11:20 – 11:40 *Duration: 15 min* *Q/A: 5 min*	**Project speaker** **The ANDROMEDA Command, Control & Coordination CISE-compatible systems** *Mr. Hugo Pinto, INOVAWORKS*
11:40 – 12:00 *Duration: 15 min* *Q/A: 5 min*	**Project speaker** **Advanced Data Fusion and Decision Support Services** *Mr. Vasilis Papadopoulos, EXUS*
12:00 – 12:15 *Duration: 15 min*	**Round-table discussion** • Challenges and expectations from CISE extension and applicability to the Land domain • Impact of the full compliance of ANDROMEDA's C2s and data fusion & decision support services with CISE
Lunch Break **(1 Hour)**	
13:15 – 16:00 **Stakeholders Session – Sharing Experiences on Maritime Border Surveillance** *Moderators: Mr. Alkis Astyakopoulos, KEMEA; Dr. Antonis Kostaridis, STWS; Mr. David Merino, GMV*	
13:15 – 13:20 *Duration: 5 min*	**Introduction to the Session and Speakers** *Dr. Antonis Kostaridis, STWS*
13:20 – 13:40 *Duration: 15 min* *Q/A: 5 min*	**Invited speaker CISE Transitional Phase - state of play** *Mr. Gianluca Luraschi, EMSA*
13:40 – 14:00 *Duration: 15 min* *Q/A: 5 min*	**Project speaker** **Italian Navy in ANDROMEDA and expectations** *Cdr. Luca Bertocchi, Italian Navy General Staff*
14:00 – 14:20 *Duration: 15 min* *Q/A: 5 min*	**Invited speaker** **French Coast guard Function and maritime surveillance**

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Time	Topic
	Mr. Alexis Blum, Chargé de mission «projets européens», Secrétariat général de la Mer
14:20 – 14:40 *Duration: 15 min* *Q/A: 5 min*	**Project speaker** **Maritime Surveillance – Sharing HCG Experience** *Cdr. (HCG) Georgios Christianos, Head of IMSB (Integrated Maritime Surveillance Bureau) of the Hellenic Coast Guard*
14:40 – 15:00 *Duration: 15 min* *Q/A: 5 min*	**Project speaker** **Sharing Experiences from Portugal on maritime surveillance** *Cdr. (Navy) João Fidalgo Neves, MARINHA Escola Naval*
15:00 – 15:20 *Duration: 15 min* *Q/A: 5 min*	**Project speaker** **Intersectoral cooperation in the maritime domain in Montenegro** *Mr. Žarko Lukšić, Deputy Director at MSD and* *Mr. Lasica Zoran, Head of NCC Podgorica, Montenegro Border Police*
15:20 – 15:35 *Duration: 15 min*	**Round-table discussion** • Limitations in information exchange and maritime border surveillance that end users face • Benefits that the ANDROMEDA system could bring in other regions of Europe • Overall added value of ANDROMEDA system
15:35 – 15:50	**ANDROMEDA Advisory Board feedback** • Feedback and recommendations from the technical, operational, business & exploitational point of view
Closing Session	
15:50 – 16:00 *Duration: 10 min*	**Conclusions and Wrap Up of Day 1** *Mr. David Merino, GMV*

Table 2: Day 1 Programme

2.2.2 Day 2 – 29 September 2020

Time	Topic
Opening Session	
10:00 – 10:05 *Duration: 5 min*	**Welcome** *Mrs. Athena Foka, Project Coordinator, Special Service of European Union Structural Funds of the Hellenic Ministry of Maritime Affairs and Insular Policy*
10:05 – 10:15 *Duration: 10 min*	**Summary of Day 1** *Mr. David Merino, GMV*
10:15 – 12:35 **Stakeholders Session – Sharing Experiences on Land Border Surveillance** *Moderators: Mr. Alkis Astyakopoulos, KEMEA; Dr. Antonis Kostaridis, STWS; Mr. David Merino, GMV*	
10:15 – 10:20 *Duration: 5 min*	**Introduction to the Session and Speakers** *Mr. David Merino, GMV*
10:20 – 10:40 *Duration: 15 min* *Q/A: 5 min*	**Invited speaker** **FRONTEX Aerial Surveillance Activity – a successful case during land border patrol** *Mr. Mirco Negro, FRONTEX*

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Time	Topic
10:40 - 11:00 *Duration: 15 min* *Q/A: 5 min*	**Project speaker** **Integrated border management in Evros region - Implementation of ANDROMEDA project** *Police Major Dimosthenis Kamargios, Hellenic Police*
11:00 – 11:20 *Duration: 15 min* *Q/A: 5 min*	**Invited speaker** **Sharing Experiences from Spain on land and maritime border surveillance** *Major Moises Vos Martinez, Guardia Civil*
11:20 – 11:40 *Duration: 15 min* *Q/A: 5 min*	**Invited speaker** **Applied Research and Innovation for European Security** *Mr. Lénárd Zsákai, Chief Security Officer of Székely Family&Co and Senior Police Executive at the MoI of Hungary*
11:40 – 12:00 *Duration: 15 min* *Q/A: 5 min*	**Invited speaker** **Experiences on the Land Border Surveillance** *Mr. Nicola Mircevski, Department for Border Affairs and Migration, Ministry of Interior of North Macedonia*
12:00 – 12:20 *Duration: 15 min* *Q/A: 5 min*	**Project speaker** **The Israeli National Police experience in land border surveillance** *Mr. Gal Levy, MOPS-INP*
12:20 – 12:35 *Duration: 15 min*	**Round-table discussion** • Limitations in information exchange and land border surveillance that end users face • Benefits that the ANDROMEDA system could bring in other regions of Europe • Overall added value of ANDROMEDA system
Lunch break **(1 Hour)**	
13:35 – 16:45 **Research results & lessons learnt from EU funded projects on Maritime and Land Border Surveillance** *Moderators: Mr. Alkis Astyakopoulos, KEMEA; Dr. Antonis Kostaridis, STWS; Mr. David Merino, GMV*	
13:35 – 13:40 *Duration: 5 min*	**Introduction to the Session and Speakers** *Mr. David Merino, GMV*
13:40 – 14:00 *Duration: 15 min* *Q/A: 5 min*	**OCEAN2020 Project – A Technological Demonstrator of Enhanced Situation Awareness in Naval Environment with the Use of Unmanned Systems** *Mr. Matteo Lusignoli, Leonardo*
14:00 – 14:20 *Duration: 15 min* *Q/A: 5 min*	**COMPASS2020 – Multi-domain mission system for persistent surveillance** *Mrs. Aleksandra Nadziejko, Tekever*
14:20 – 14:40 *Duration: 15 min* *Q/A: 5 min*	**MARISA – Maritime Integrated Surveillance Awareness: "MARISA results and way forward"** *Mr. Agostino Longo, Leonardo*
14:40 – 15:00 *Duration: 15 min* *Q/A: 5 min*	**ROBORDER – Autonomous Swarm of Heterogenous Robots for Border Surveillance"** *Mr. Vagelis Chatzistavros, Centre for Research and Technology (CERTH)*

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Time	Topic
15:00 – 15:20 *Duration: 15 min* *Q/A: 5 min*	**FOLDOUT – Through foliage detection of illegal cross border activities** *Mr. Andreas Kriechbaum-Zabini, AIT Austrian Institute of Technology (AIT)*
15:20 – 15:40 *Duration: 15 min* *Q/A: 5 min*	**CAMELOT – C2 Advanced Multi-domain Environment and Live Observation Technologies** *Mr. Juan Gomez, Universitat Politècnica de València (UPV)*
15:40 – 16:00 *Duration: 15 min* *Q/A: 5 min*	**ARESIBO – Augmented Reality Enriched Situation awareness for Border security** *Prof. Stathes Hadjiefthymiades, Dept. of Informatics & Telecommunications, University of Athens (UoA)*
16:00 – 16:20 *Duration: 15 min* *Q/A: 5 min*	**EFFECTOR – An End to end Interoperability Framework For MaritimE Situational Awareness at StrategiC and TacTical OpeRations** *Mr. Patrick Mugnier, NAVAL Group*
16:20 – 16:35 *Duration: 15 min*	**Round-table discussion** • Common research challenges and standardization needs • Room for further research • Common communication efforts and activities
Closing Session	
16:35 – 16:45 *Duration: 10 min*	**Conclusions and Wrap up of Day 2** *Mr. David Merino, GMV*

Table 3: Day 2 Programme

2.3 Website Announcement

As the ANDROMEDA website is one of the main online communication channels of the project, STWS *(T7.1 leader)* announced the workshop. This call-to-action news article invited all stakeholders to register and attend the online event. It included a brief description of the event's programme, the registration link and the Agenda, where website visitor had the opportunity to download at the computer or mobile device. The table below provides the content included in the website announcement.

Website Announcement content
ANDROMEDA 1st Workshop Online September 28th & 29th, 2020
The ANDROMEDA project partner GMV is organizing the first Online ANDROMEDA Workshop that will take place on September 28th and 29th, 2020. The workshop objective is to present and promote the so far achieved results and to initiate stimulating discussions with the Consortium partners, end-users, practitioners and other policy makers and stakeholders. During these two days, four sessions will be developed. Starting from the Technical session, in which some partners will explain the architecture and system components, the CISE data model, the command, control and coordination CISE-compatible systems, as well as the data fusion and decision support services. In the first Stakeholders' session, the sharing experiences on maritime surveillance will be shown. The second and last day of the workshop, the second Stakeholders' session devoted to land border surveillance and the EU Projects' session will occur. In this last session, the research results and lessons learnt from EU funded project on maritime and land border surveillance will be discussed. You can register here. The workshop agenda can be downloaded from here.

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Website Announcement content
Your participation will help support An Enhanced Common Information Sharing Environment for Border Command, Control and Coordination Systems! Looking forward to seeing you there!

Figure 1: Screenshot of website announcement

2.4 Social Media Announcements

Social Media platforms are powerful channels for conveying messages and effectively communicate with the target audience. For this reason, several posts in ANDROMEDA Twitter and LinkedIn accounts were made from T7.1 leader *(STWS)* for announcing the date of the event and registration link *("save the date")* and for communicating the final Agenda version.

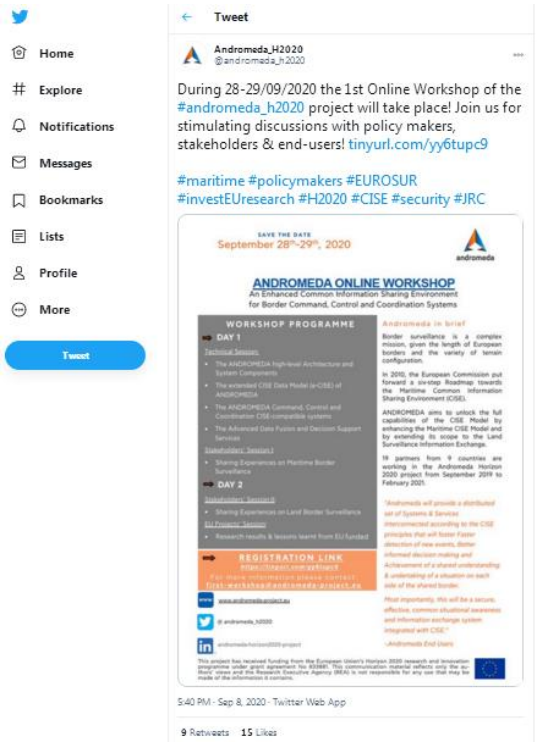

Figure 2: Save the date announcement (twitter account)

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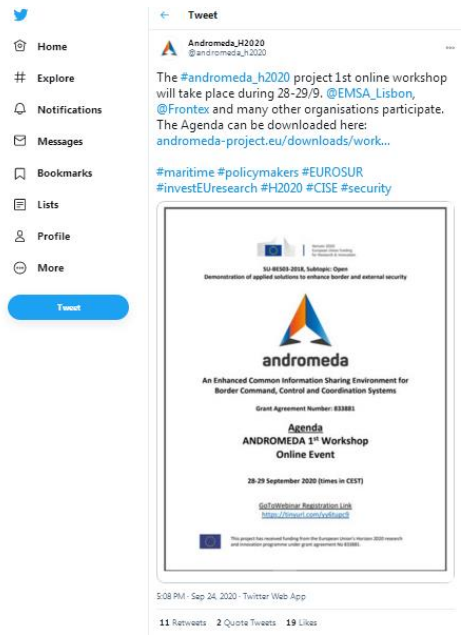

Figure 3: Announcement of event's Agenda (twitter account)

2.5 Leaflet (digital format)

The Task 7.1 leader *(STWS)* within the frame of effectively promoting the event to a wider audience created a leaflet dedicated to the 1st ANDROMEDA Workshop. It included a brief description of the ANDROMEDA project, an outline of event's programme and the registration link. This promotional material was produced only in digital format and the consortium communicated it to its network and contacts via various online channels.

Figure 4: Screenshot of 1st ANDROMEDA Workshop Leaflet

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2.6 Registration Link

The partner responsible for organizing the event *(GMV)* created the registration form for participating to the event. The registration link accompanied was promoted via the ANDROMEDA website, social media accounts and the leaflet dedicated to the 1st Workshop. Moreover, the registration link was also sent to partners' network via online correspondence. It should be stressed that all information collected from the registrations made were treated according to GDP Regulations. The table below provides the content included in the registration form.

Registration Form
Link for registering to the event both day: **https://register.gotowebinar.com/register/5805020481671862798**

First ANDROMEDA Workshop

This webinar meets 2 times.

Show in My Time Zone
Mon, Sep 28, 2020 11:00 AM - 5:00 PM EEST
Tue, Sep 29, 2020 11:00 AM - 5:30 PM EEST

GMV is organizing the 1st ANDROMEDA Workshop, via GoToWebinar. This online seminar will take place on 28th and 29th September. The webinar will be driven in English.

During these two days, four sessions will be developed. Starting from the Technical session, in which some partners will explain the architecture and system components, the CISE data model, the command, control and coordination CISE-compatible systems, as well as the data fusion and decision support services. In the first Stakeholders' session, the sharing experiences on maritime surveillance will be shown. The second and last day of the workshop, the second Stakeholders' session devoted to land border surveillance and the EU Projects' session will occur. In this last session, the research results and lessons learnt from EU funded project on maritime and land border surveillance will be discussed.

Your presence helps to make this event a great success. Hope that you enjoy it. ANDROMEDA in brief: Border surveillance is a complex mission, given the length of European borders and the variety of terrain configuration.

In 2010, the European Commission put forward a six-step Roadmap towards the Maritime Common Information Sharing Environment (CISE). ANDROMEDA aims to unlock the full capabilities of the CISE Model by enhancing the Maritime CISE Model and by extending its scope to the Land Surveillance Information Exchange.

19 partners from 9 countries are working in the ANDROMEDA Horizon 2020 project from September 2019 to February 2021.

***Required field**

- **First Name**
- **Last Name**
- **Email Address**
- **Country**
- **Organization**
- **Job Title**

Basic Data-Protection information * Data-protection supervisor: GMV Innovating Solutions S.L. CIF: B85717775 Address: C/ Isaac Newton 11. P.T.M. 28760 Tres Cantos (Madrid). * Privacy supervisor: privacy@gmv.com. * Purpose: development of trading, business and direct marketing activities. * Legitimation: consent of data subject * Rights: to access, modify or delete the personal data you have provided,

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Registration Form
send an email to privacy@gmv.com. * For further information, you can check out the additional and detailed data-protection information on our website (https://www.gmv.com/en/conditions.html). I expressly authorize the processing of my personal data, in accordance with the GMV Privacy Policy.

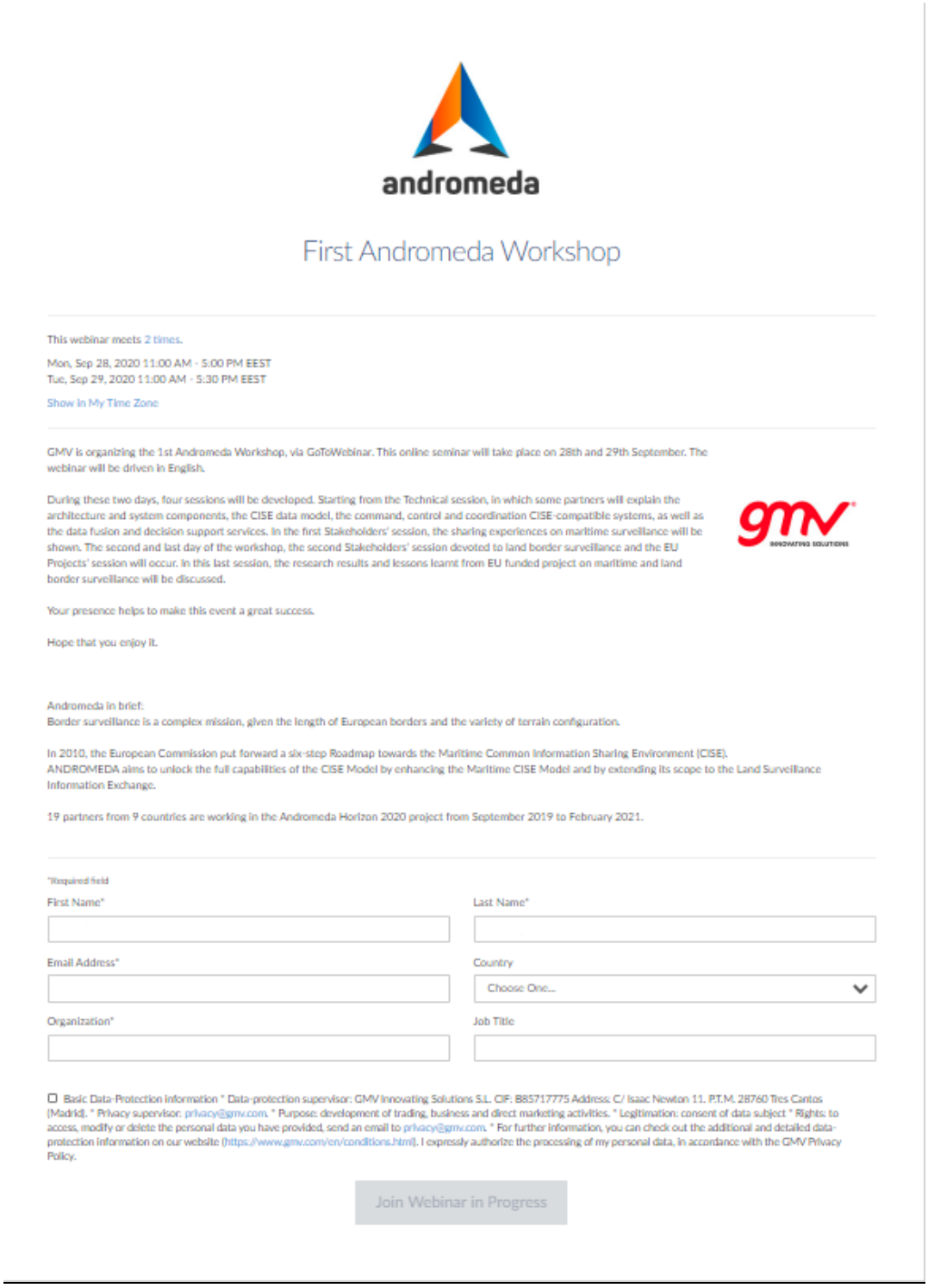

Figure 5: Screenshot of Registration form

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3. Workshop Results

The workshop took place on the 28th and 29th of September 2020 with a great of success. During this two-day event the project partners had the opportunity to reveal the ANDROMEDA results produced so far; discuss with stakeholders their experiences on maritime and border surveillance and receive valuable feedback; bring up the importance of CISE (e-CISE) also in the land border domain; and exchange ideas with other EU funded projects in the same domain.

Figure 6: Depiction of attendance per event's day

The duration of the online event in Day 1 was **7 hours and 12 minutes** *(including 1hour lunch break)* with 129 registrants and 83% attendance rate *(i.e. 107 attendees)*. The second day (*Day 2)* lasted for **8 hours and 16 minutes** *(including 1hour lunch break)* with 133 registrants and 71% attendance rate *(i.e. 95 attendees*). All information presented herein has been extracted by the GoToWebinar web tool where the online workshop was hosted and broadcasted.

Table 4: 1st ANDROMEDA Workshop's performance

Day	Date	Duration	Registrants	Attendees	Avg. Attendance Rate (%)
Day 1	09/28/2020	7 hours 12 minutes	129	107	83%
Day 2	09/29/2020	8 hours 16 minutes	133	95	71%

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3.1 Day 1 of the ANDROMEDA Workshop (28th Sept. 2020)

3.1.1 Opening Session (Day 1)

The first day of the event on the 28th September 2020, was opened by Mrs. Athina Foka from the Hellenic Ministry of Maritime Affairs and Insular Policy where she welcomed the speakers and the attendees. Later on, Mr. Alkis Astyakopoulos from KEMEA gave a brief description of the topics that were going to be discussed during both days of the event and particularly during the first day.

Figure 7: Mrs. Athina Foka (Hellenic Ministry of Maritime Affairs and Insular Policy) and Mr. Alkis Astyakopoulos (KEMEA) while opening Day I of the event

3.1.2 Technical Session – Present the ANDROMEDA results so far

The technical session of presenting the ANDROMEDA results produced so far was moderated by **Mr. Alkis Astyakopoulos** from KEMEA. Our invited speaker from JRC, **Mr. David Berger**, opened the Technical Session, introducing to the audience the CISE Data Model for maritime surveillance. Mr. David Berger is Project Manager in Transport and Border Security Unit of JRC (JRC.E.5), member of the Advisory Board of ANDROMEDA project and has been involved in the implementation of CISE project from 2009. The aim of this introductory presentation is to give some hints on how the CISE Data Model is built, what is about and how it will be maintained in the future during the CISE operational phase. Having so many authorities from different countries and sectors involved in the maritime surveillance using various complex systems, it has created the need of defining a single model to communicate and exchange information via an agreed interoperable way.

The CISE Data Model has been specifically designed for maritime surveillance and oriented to cross-sectorial information exchange in order each one of the 7 user communities in the maritime domain to understand in the same way what they request and what they provide to each other. Moreover, the CISE Data Model is independent from sectorial business processes and the 18 entities that currently participate in CISE are generic covering a broad set of business cases *(i.e. border control, safety & security, fisheries control, customs, environment, law enforcement, defence)*. For the design of the CISE Data Model, some specific code lists and vocabularies have been reused to facilitate the translation from specific domain languages to CISE. Some examples of the type of information exchanged in CISE is about vessel static information from the vessels' registration files, vessel tracks from different sources (like radars, AIS, LRIT, VM etc.), persons from the crew list/passengers list, reporting formalities, alerts & risks, real time positions of surveillance and intervention assets etc.

Regarding the CISE Service Model, it describes the communication protocol in the CISE Network and is based on a 4-corner model *(Adaptor – Node – Node – Adaptor).* The CISE adaptors which are installed in the legacy

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systems of the Member States translate the information to be exchanged to the common CISE Data Model and exchanged through the Nodes using 3 communication patters: PUSH, PULL, PUBLISH/SUBSCRIBE. Additionally, the CISE Service Model supports acknowledgment and feedback mechanisms while also a Service Discovery to multicast information to all entities without knowing details for all of them. Specifically, the CISE Service Model covers the message metadata *(message type, sender, recipient, payload etc.)* and the service description (*service name, description, type, features, access rights etc.).* It is worth mentioning that each Data entity in the CISE Data Model has one Service type in the CISE Service Model. Going back to the history of the CISE Data Model, it has been initially created by the Cooperation Project in 2012-2013 by a team of 30 experts with different background, technical expertise and nationality. They have studied different existing systems, initiatives and standards and they have defined the CORE Data entities of CISE. Since then, the CISE Data Model has been maintained by JRC improving the documentation (HTML, XSD), fixing issues and listing potential improvements, while it has been reused by the FP7 EUCISE 2020 project.

Today, there are more than 20 systems using the CISE Data Model during the CISE Transitional Phase and also used by research projects like ANDROMEDA, RANGER, ROBORDER, MARISA, EFFECTOR, CAMELOT, MARINE-EO and OCEAN 2020. Regarding the maintenance, it is important to understand that the CISE Data Model has been frozen from 2017 to facilitate the development of the CISE services. In the meantime, there are potential improvements identified by the JRC during this period *(2017-2020)* regarding new attributes and extensions of the code lists considering all the suggestions from the research projects, including ANDROMEDA, aiming at preparing a new version of the CISE Data Model. JRC also works on a new version 2 of the CISE Node in order to support Data Model versioning and enable backward compatibility for translating information from one version of the Data Model to the other. Another important thing to know regarding the maintenance is as a 1st step to standardize the current version of the CISE Data and Service Model in the ETSI CDM Group and as a 2nd step to integrate potential improvements as the ones proposed by ANDROMEDA. Two companies from the ANDROMEDA consortium participate in this Group *(Inovaworks II C&C and Satways Ltd.)*

The **second presentation** of this session was made by **Mr. Fernando Labarga** *(GMV)* who talked about the high-level architecture and the system components of ANDROMEDA highlighting the advantages of using the NAF methodology. In order to design the system-of-systems that constitutes ANDROMEDA, Mr. Labarga mentioned that the methodology selected is the NATO Architecture Framework *(NAF)*, which is the NATO standard used for system development, focused in the military. The standardized NAF views represent an extremely powerful tool to communicate the enterprise architecture to different stakeholders. The best feature at selecting NAFv.3.1 is that the development process of the High Level Architecture / System Design follows form the very beginning the sequence of activities needed to devise a new system. The Capabilities to achieve, the Operational activities that these capabilities will allow to execute and the System functions these activities will perform. The execution of this sequence allow the Definition of Services *(broadly speaking)* and at the same time, to foresee the future evolution of either the system and the technologies this system use. In regards to the Overall System and its Components, the ANDROMEDA architecture covers:

- Software design of the CISE compliant ANDROMEDA C2s,
- Data Fusion, Analytics and Decision Support tools, and
- Support legacy system Gateways and CISE Adaptors.

A system-of-systems has been defined where the exchange of information is based on the use of the enhanced CISE Model. This system-of-system has been defined to exploit the full potential of the CISE Data Model in domains not directly related to those for which it was initially conceived. The System Architecture defined allows to couple the use of advanced Data Fusion System and Decision Support Tools to C2 Systems. The flow of information allows the integration of the developed system components with the already operational Legacy Systems present in the Maritime and Land Border Surveillance Systems, converted in a flow of

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operational information/activities. The definition of these System Components and its System Functions allows also then the definition of the complete set of ANDROMEDA Services. Concluding, the Architecture Design describes how to embed these advanced services and C2 systems into the currently operating Legacy Systems. The Architecture Design shows how to interconnect different Legacy Systems in a unique network through the use of e-CISE Data Model and how this e-CISE DM based exchange of information could be connected to CISE Network. It has been set the ground to the System Design of the e-CISE compliant C2 Platforms, to be tested in the Operational Trials.

The **third presentation** was made by **Dr. Antonis Kostaridis** *(STWS)* who talked about the extended CISE Data Model *(e-CISE)* of ANDROMEDA. The e-CISE is the enhanced Common Information Sharing Environment Data Model as designed for ANDROMEDA. It provides the protocol and means for information sharing among ANDROMEDA systems *(C2s, Data Fusion Services and decision support tools).* e-CISE is based on the CISE principles and architecture and it inherits and extends the Maritime domain specific entities of the CISE Data Model. e-CISE introduces new entities for the Land Surveillance operations domain. At a glance the e-CISE:

- introduces Mission, Task, operation entities to support most Land Border Surveillance activities;
- provides richer set of Vessel Types;
- expresses more than 100 Land and Maritime Anomaly types with advanced features;
- defines the information exchange model of data fusion and decision support services;
- supports fused entities by providing correlation mechanism of the fusion process counterpart entities;
- supports object classification and detection capabilities;
- supports more Geometry types.

Operation, defines an optionally Joint Operation, requiring large scale cross-border operational engagement of different authorities to co-operate under pre-determined objectives and expected results for an extended period of time. The Mission, defines an agency effort for improving the situational awareness of Land and Maritime Border surveillance activities. A mission is consisted of a set of Tasks. The Task, defines a specific task assigned to operational assets with a set of special instructions to follow. A task can be dispatched to mobile forces who can acknowledge it, upon reception. An operation, mission or Task can be accompanied with a set of Documents, Intelligent Reports and Media.

The **fourth presentation** was made by **Mr. Hugo Pinto** *(INW)* who talked about C2 Systems for Land and Sea. **Mr. Pinto** described the C2 Systems on ANDROMEDA and particularly four Command and Control systems will be used in ANDROMEDA: **a)** the SOCRATES C2 (sea scenarios); **b)** the ENGAGE C3i Suite *(both sea and land scenarios);* **c)** the GeoC2 *(both land and sea scenarios); and* **d)** SMART *(sea scenarios).*

- **SOCRATES C2** ***(GMV):*** Socrates C2 offers a common set of generic capabilities regarding surveillance, resource management, mission planning, tasking and reporting. These capabilities are compliant with the enhanced CISE Data Model, allowing the users of the different connected C2`s to interact with each other. SOCRATES C2 will be deployed in Montenegro for MSD.
- **ENGAGE C3i Suite** ***(STWS):*** ENGAGE is a Command, Control and Coordination System for Security and Defence. ENGAGE integrates information from multiple, diverse systems into a single command environment, and coordinates a response plan based on a real-time dat. ENGAGE's unified management approach tackles the complete lifecycle o incident capture, response (mission, task, dispatch), resolution (field reports) and recovery.
    - Maritime and Land Border Editions compliant with the e-CISE model
    - Integration of Decision Support Tools

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- Integration with ANDROMEDA Sensors
- Integration of Legacy Systems and Sensors

ENGAGE will be deployed at HCG, HN, HP.

- **GeoC2 *(Inovaworks):*** Open standards, highly interoperable, high performance command and control software solution suite that allows organizations to:
  - ingest massive amounts of structured and unstructured geospatial information
  - turn it into a Consolidated Operational Picture that mimics as close as possible to Field Truth
  - analyse it in real time looking for interesting and relevant trends and /or abnormal behavior
  - select actionable events and triage them through a decision-support pipeline
  - suggest and plan operational missions to address those actionable events
  - instantiate, deploy and monitor the execution of such missions.

  GEoC2 will be deployed at the Portuguese Navy and EAMA.

- **SMART *(Engineering):*** SMART *(Service-oriented infrastructure for MARitime Traffic tracking)* is an information system developed by Engineering with the aim to gather, process and deploy the data concerning the maritime traffic, as it received from several heterogeneous sources. The collected data allows producing a Recognized Maritime Picture (RMP) able to support the activities related to the Maritime Situational Awareness *(MSA)* SMART will be deployed at the Italian Navy.

Concluding, the C2s in ANDROMEDA:

- Aggregate and integrate four robust Command and Control systems via eCISE;
- Creates a common interoperability layer that enables operational collaboration;
- Provides mature tools to exercise end-user needs both in Land and Sea.

The **fifth presentation** was made by **Mr. Vasilis Papadopoulos** *(EXUS*) who talked about the advanced data fusion and decision support services integrated in the ANDROMEDA system. The main objectives of this integration are to enhance the end-user's situational awareness and assist the end-user in Decision Making. The main capabilities are: **a)** combine several data sources *(e.g. AIs, Radar, Video, Meteorological)*, **b)** interoperability between several systems, **c)** produce meaningful information (e.g. alerts, warnings, incident reports), **d)** compliance with eCISE data model.

The services that constitute the Data Fusion Gateway are:

- **Socrates DF:** Track correlation based on Kalman Filters.
- **Triton:** Warnings and alerts based on geospatial data and complex rules.
- **EWE**: Threat Assessment based on correlating geospatial data of anomalies and events.
- **INUS**: Object detections and geolocation from video stream.
- **GeoC2**: Vessel abnormal behavior based on ML and Big Data.
- **ESSG:** Alerts for divergent behavior of ships.

The decision support services of the ANDROMEDA network are:

- **WITOIL:** Prediction of transport and transformation of oil spills. Simulation based on Oceanographic and Meteorological data.
- **VISIR:** Provides optimized nautical routes. Depends on model forecasts of sea-state and wind.

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- **OCEAN-SAR**: Search and Rescue operations, simulates possible trajectories of persons or objects at sea.

3.1.3 Highlights from the presentation of ANDROMEDA results (Technical Session)

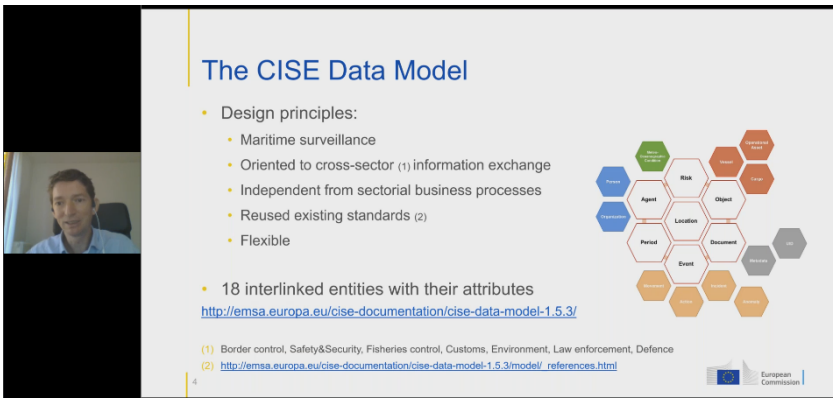

Figure 8: Mr. David Berger, JRC while talking about CISE Data model for Maritime Surveillance

Figure 9: Mr. Fernando Labarga, GMV while presenting the ANDROMEDA high-level architecture and system components

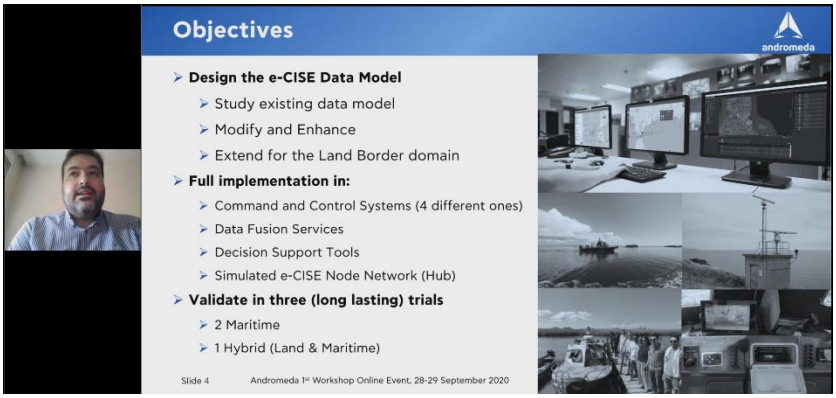

Figure 10: Dr. Antonis Kostaridis, SATWAYS while presenting the extended CISE Data Model (e-CISE) of ANDROMEDA

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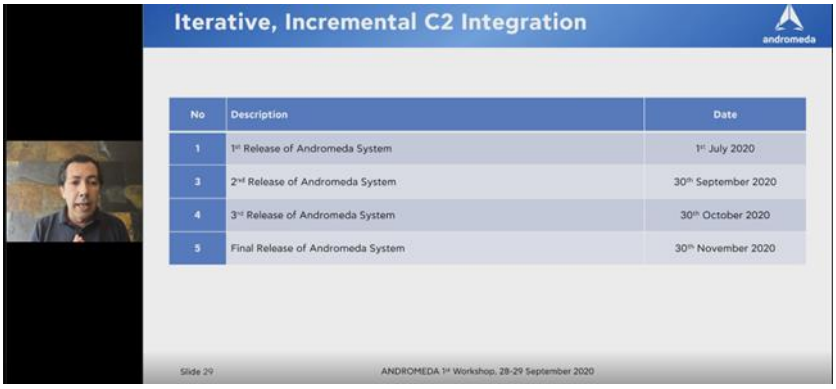

Figure 11: Mr. Hugo Pinto, INOVAWORKS while presenting the ANDROMEDA Command, Control & Coordination CISE-compatible systems

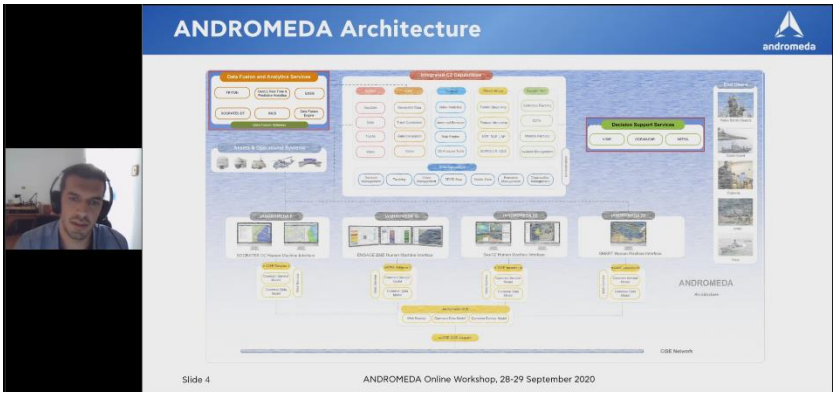

Figure 12: Mr. Vasilis Papadopoulos, EXUS while presenting the Advanced Data Fusion and Decision Support Services

Figure 13: Round table discussion of the Technical Session

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3.1.4 Stakeholders Session – Sharing Experiences on Maritime Border Surveillance

The stakeholder session of sharing experiences on maritime border surveillance was moderated by **Dr. Antonis Kostaridis**, STWS. Dr. Kostaridis opened the session and made the introduction to speakers.

The first speaker of this session, **Mr. Gianluca Luraschi**, EMSA talked about the CISE (*Common Information Sharing Environment)* transitional phase. CISE is an EU initiative aiming to make existing European and EU/EEA Member States surveillance systems interoperable and enhance classified/unclassified information sharing among Public Authorities from different sectors through a voluntary and decentralized network. Additionally, it aims to foster cooperation as well as to create synergies among the stakeholders involved *(including civil military cooperation)* and avoid duplication of data acquisition, and to increase the complementary of the information and services delivered.

The coordination of CISE smoothly handed from EUCISE2020 to the Transitional Phase (DGMARE/EMSA/JRC). The Cooperation Agreement is under final revision and EMSA is launching the procurement to define the RTS methodology. The provision of the technical an operational support and the implementation of the version 2.0 of the node are on track and the revision of the use cases for establishing pre operational services has started. Lastly, it was mentioned by **Mr. Luraschi**, that there is an increased interested in CISE both in term of new nodes (EMSA, EFCA), and new stakeholders *(i.e. MAOC(N)).*

The **second presentation** of the session, made by **Cdr Luca Bertocchi *(****Italian Navy Staff)* was about the Italian Navy in ANDROMEDA project and expectations from it. The aim of the ANDROMEDA project is to provide a solution that fulfils **four main objectives**: define Maritime CISE Model Enhancements and extending it to support Land Border Operations; deliver Innovative CISE-compliant Border Command & Control Systems; deliver enhanced Border Surveillance Knowledge through advanced Data Fusion and Analytics Services; and validate the new capabilities in trials across different user sites. Within this frame the expectations of the Italian Navy from ANDROMEDA project are:

- data quality;
- pattern of life;
- single track with as many attributes as possible;
- understanding vessel behaviour;
- big data management & services capability;
- interoperability & CISE compliancy *(nodes/ls adaptors);*
- maritime & land border surveillance data sharing;
- CISE data model and CISE services enhancements.

Concluding, **Cdr Bertocchi** mentioned that when we talk about information flow and associate data in the security domain we are referred to information superiority that would support decision making and help the cooperation between EU Agencies –Member States Authorities.

The **third presentation** of the session, made by **Mr. Alexis Blum** *(SGmer)*, was about the French coast guard functions and maritime surveillance. Mr. Blum explicated the coexistence of activities of the French coast guard which namely are: the protected areas; the main fishing areas; the ecological energy's plans; maritime exploration ground's plans; the nuclear power plants and the ports. A detailed presentation of French coast guard's assets and their range of operation was given as provided at the table below.

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Table 5: French Coast Guard's assets and range of operation

Administration	Range	Ships /Centers	Aircrafts
French navy and Gendarmerie maritime	Without restriction EEZ / ZEP	- Public service patrol boats - Assets specialized in fighting pollutions - Every needed asset - Patrol boats, speed boat sand coastal surveillance units - Semaphores	- Maritime supervision aircrafts - Light and heavy helicopters /
Maritime affairs	EEZ / ZEP	- CROSS (MRCC) - Fishing surveillance - Patrol boats - Regional speed boats = Coastal units	/
Fr Customs	EEZ / ZEP	- Patrol boats - Coastal units	- Patrol aircrafts - Light helicopters
Gendarmerie nationale	3Nq from the coast	- Light boats - Speed boats	- Light helicopters
SNSM (Voluntary SAR association)	20 nautical miles from coast	- Heavy weather boats - Speed boats - Light boats	/

The **fourth presentation** of the session, made by **Cdr. Georgios Christianos** *(Hellenic Coast Guard)*, was about sharing experiences of the Hellenic Coast Guard on Maritime Surveillance. **Cdr. Christianos** at the beginning of his speech he talked about the challenges of the Hellenic maritime domain which namely are the Greek extensive coastline and its numerous islands; the dense maritime traffic; the crossroad of 3 continents and the proximity to conflict areas, harsh weather conditions and overall the broad maritime area. Later on, he gave an overview on the illegal migration and mentioned that the Hellenic Coast Guard is conducting a huge effort in safe guarding Europe's external borders, thus ensuring a secure internal environment. The operational challenges of this effort are:

- Limited response time;
- Navigational Hazards;
- Evacuations;
- Mass Arrivals.

The distribution of incidents during the year 2020 shows that pressures have been recorded along the entire length of the eastern border line and mainly in Lesvos, Chios and Samos. The development of the national integrated maritime surveillance system *(NIMSS)* will help in early maritime domain awareness within the Hellenic Coast guard area of jurisdiction through real-time and on 24/7 basis surveillance of the sea borders and critical passages. The expected results of this project are:

- Fight against criminal activities at sea.
- Protect life at sea.
- Change of the surveillance concept from patrol driven to intelligence driven.
- Optimize fleet management and increase efficiency of operational resources.
- Improve further timely response capacity.

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- Reduction of assets running expenses and fatigue.
- Real-time exchange of information with competent stakeholders enhancing interagency cooperation.

The **fifth presentation** of the current session, made by **Cdr. João Fidalgo Neves** *(MARINHA Escola Naval)* shared experiences from Portugal on maritime surveillance. In brief, the permanent Naval support system is in 3 areas: Mainland, Azores and Madeira. The Naval support is responsible for SaR operations, fishery control and inspection at the sea and other support tasks to national authorities. Some of the main challenges is the Fishing inspection activities, oil spill and pollution as well as illegal migration. In terms of the technical challenges linked to CISE are divided at national and international level and they are presented in the table that follows.

Table 6: National and international challenges of CISE in Portugal (MARINHA)

At National Level	At International / Cooperative Level
Data Network Exchange • Ship - Ship / ship - shore • Sensors *(including aircrafts and / or UAVs)* - ship / shore • Between Maritime authorities • Data integrity, availability, confidentiality	Data Network exchange • Between Authorities • Data integrity, Availability, confidentiality
Reduce the use of SATCOM	Share resources: Sensors, Satellite data, C2 channels
Increase the use of satellite information	Balance between military and civilian entities
Increase the system intelligence (*AI/ML, Data fusion, etc.)*	Take benefit of the available fundings
Take benefit of the available fundings	Use R&D projects outcome *(ANDROMEDA)*
Use R&D projects outcome *(ANDROMEDA)*	

The last presentation of this session was made by **Mr. Žarko Lukšić** *(MSD)*. Mr. Lukšić talked about the intersectoral cooperation in the maritime domain in Montenegro. Focusing on the requirements and benefits of the CISE implementation in Montenegro there is a clearly identified need in the country to share data regarding maritime safety and security at national level among governmental institutions such as MSD, Navy, Border Police, Custom, Port State Control, Harbour Master Offices, Fishery control agency, etc. National CISE node as proposed solution could be used for sharing data with EU member states and other agencies on a voluntary basis. It should be noted that Montenegro is not an EU member but the official request to join CISE has been sent in 2019 to EC. Concluding, the implementation of CISE in Montenegro will support also the further international and national projects in safety-security and maritime/land surveillance areas. The main benefits of CISE implementation in Montenegro would be:

- Increased volume and richness of information retrieval and awareness in the maritime operations and border domain.
- Installation of a technological platform for the advancement of the capabilities in wide-ranging related fields in maritime surveillance and affairs. For Montenegro, it is envisaged the SOCRATES programme which will be fully deployed in the Adriatic-Ionian Trial.
- Extending the CISE features such as to land border surveillance which will benefit the Border Police of Montenegro as well.

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3.1.5 Highlights from the Stakeholders Session of Sharing Experiences on Maritime Border Surveillance

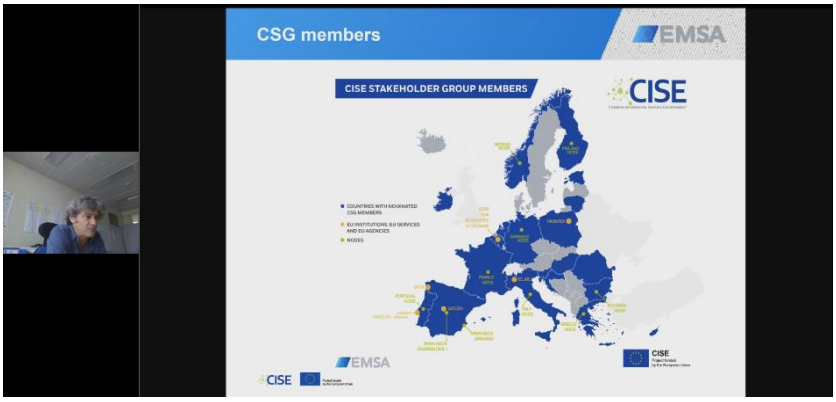

Figure 14: Mr. Gianluca Luraschi, EMSA while presenting the CISE Transitional Phase - state of play

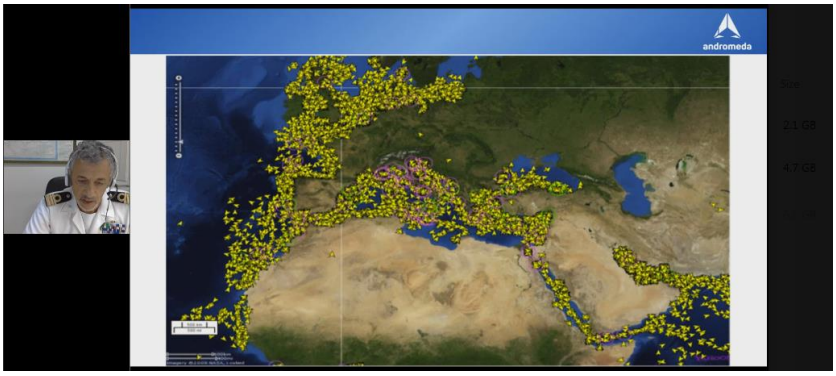

Figure 15: Cdr. Luca Bertocchi, Italian Navy General Staff, while talking about the Italian Navy in ANDROMEDA and expectations

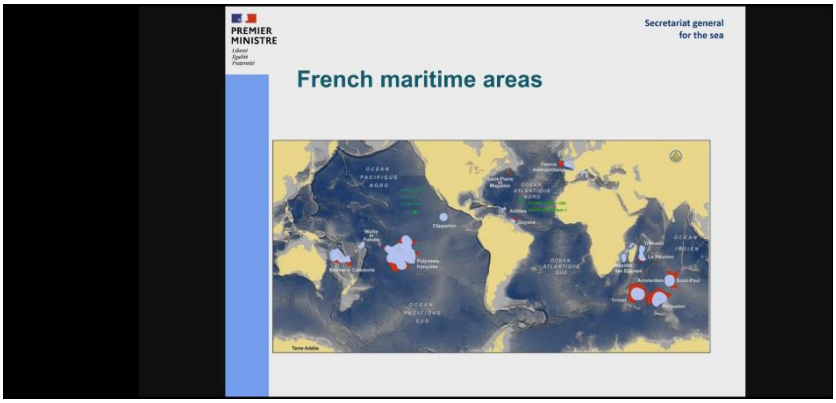

Figure 16: Mr. Alexis Blum, Chargé de mission «projets européens», Secrétariat général de la Mer while talking about the French Coast guard Function and maritime surveillance

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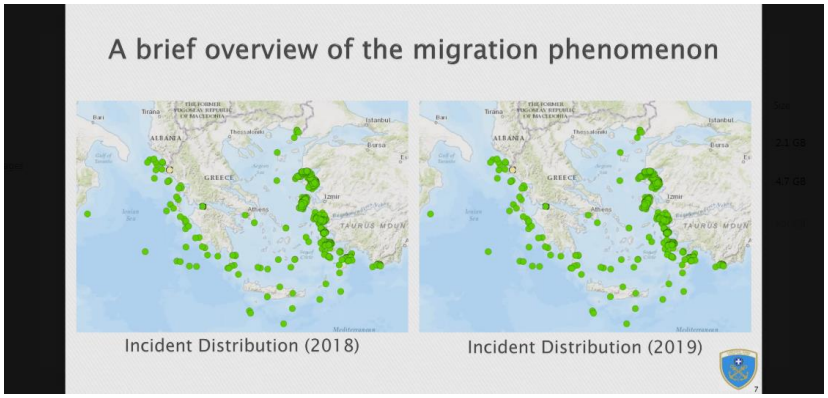

Figure 17: Cdr. Georgios Christianos, Head of IMSB (Integrated Maritime Surveillance Bureau) of the Hellenic Coast Guard while talking about the Maritime Surveillance and Sharing HCG Experience

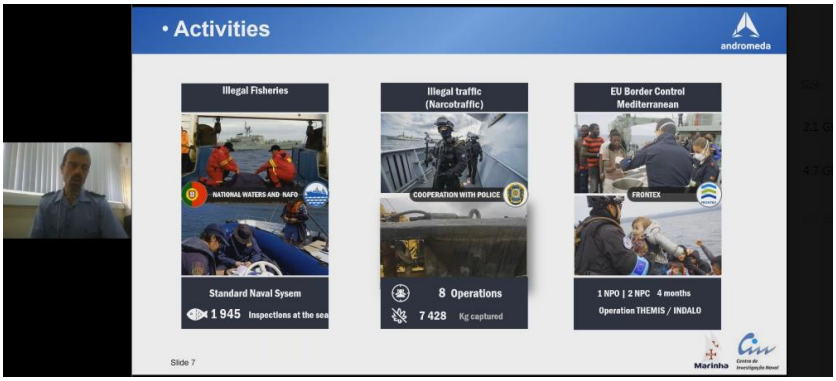

Figure 18: Cdr. João Fidalgo Neves, MARINHA Escola Naval while Sharing Experiences from Portugal on maritime surveillance

Figure 19: Mr. Žarko Lukšić, Deputy Director at MSD while presenting the Intersectoral cooperation in the maritime domain in Montenegro

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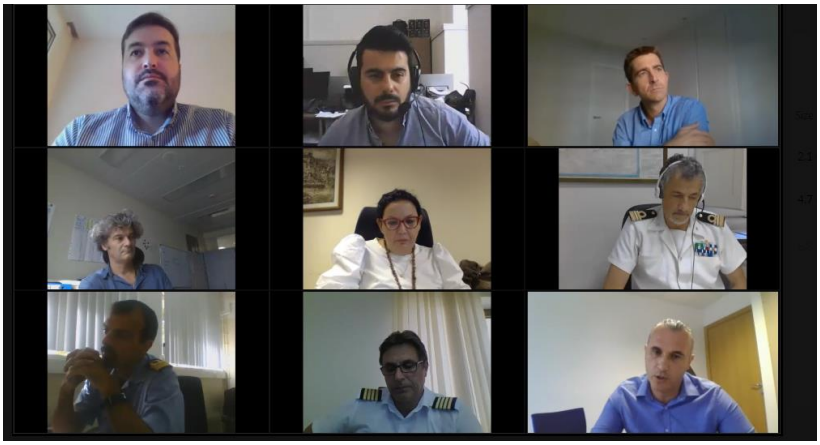

Figure 20: Round table discussion of the Stakeholders Session – Sharing Experiences on Maritime Border Surveillance

3.2 Day 2 of the ANDROMEDA Workshop (29th Sept. 2020)

3.2.1 Opening Session (Day 2)

The second day of the event on the 29th September 2020 was started by **Mrs. Athina Foka** from the Hellenic Ministry of Maritime Affairs and Insular Policy and welcomed the speakers and the attendees. **Mr. Alkis Astyakopoulos** from KEMEA, later on, took the floor and gave a brief description of the topics that will be elaborated. A summary of Day 1 was given by Mr. David Merino from GMV before starting the stakeholders' session of sharing experiences on land border surveillance

Figure 21: Round table discussion of the Stakeholders Session – Sharing Experiences on Maritime Border Surveillance

3.2.2 Stakeholders Session – Sharing Experiences on Land Border Surveillance

The stakeholders session of sharing experiences on land border surveillance was moderated by **Mr. David Merino** (GMV). The **first presentation** of this session was made by **Mr. Mirco Negro** *(FRONTEX)* who talked about the FRONTEX aerial surveillance activity as a successful case during land border patrol. Mr, Negro described the legal basis of European Border and Coast Guard Regulation

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- **Art. 7:** Shared responsibility
- **Art. 10:** Tasks of the Agency *(incl. monitoring migratory flows, operating Eurosur, supporting coast guard functions)*
- **Art. 28**: Eurosur Fusion Services
- **Art. 68:** Cooperation with Union institutions and international org.
- **Art. 69**: European cooperation on coast guard functions
- **Art. 71:** Cooperation with third countries

The purposes of the aerial surveillance are search and rescue, fighting cross-border crime and land border operations. It is conducted via fixed-wing airplane, RPAS and helicopter. The European Monitoring Team (FSC) collects all information in real time from aircrafts and conveys it to the sectors of search and rescue, national law enforcement, fisheries monitoring centre, FRONTEX situational picture.

The **second presentation** of the current session was made by **Major Dimosthenis Kamargias** *(Hellenic Police)* who talked about the integrated border management in Evros region and the implementation of the ANDROMEDA project at the area. Major Kamargias described the interagency cooperation of national authorities and European agencies cooperation with Hellenic Army, Hellenic Coast Guard and customs. The Hellenic Army contributes with joint observations close to the river bank, joint patrols and with the installation of technical obstacles close to the river. The Hellenic Coast Guard contributes with the exchange of information, providing support in Frontex Operations *(Poseidon)*, cooperation in cases that occur in Delta Evros, Coastal area of Alexandroupolis and Samothraki island and take over the administrative issues of apprehended migrants by Hellenic Coast Guard *(HCG)*. Lastly, the customs contribute via close cooperation in B.C.P. Kipi, the ne stop control and the exchange of information,

The interagency cooperation of E.B.C.G. agency, FRONTEX and EUROPOL includes the close cooperation between Hellenic Police and Europol's Guest Officers, the exchange of information related to illegal migration in order to dismantle criminal networks, the fight against terrorism and cross border crime. Guest Officers from Europol have been deployed in Evros region since 01-11-2019.

The migratory crisis in Evros region in March 2020 was managed through an operational plan that had as a main target to prevent the illegal border crossing and detect and arrest migrants as well as facilitators who managed to cross the borderline.

The expectations from the ANDROMEDA project are:

- Combination of different sensors provided by law enforcement Institutions;
- Pre–monitoring picture;
- Enhanced border surveillance;
- Information provision to C2 and support decision making process effectively.

The **third presentation** was made by **Mr. Nicola Mircevski** *(Department for Border Affairs and Migration, Ministry of Interior of North Macedonia)* who talked about experiences on the Land Border Surveillance in North Macedonia.

The **fourth presentation** was made by **Major Moises Vos Martinez** *(Guardia Civil)* who shared experiences from Spain on land and maritime border surveillance. **Major Martinez** at the beginning of his speech he briefly presented the Guardia Civil which is an integrated border management agency in Spain. The agency is consisted of Customs Police, Border Guard, Law Enforcement and Coast Guard and it is deployed throughout all the Spanish Territory, land waters and overseas. Later on, he gave few examples of land border surveillance from Ceuta, Melilla and Ceuta on the methods and equipment used in those areas.

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The **fifth presentation** was made by **Mr. Lénárd Zsákai** *(Székely Family&Co)* who talked about the applied research and innovation for European Security. **Mr. Zsákai** described the relation of the Székely Family company with the ANDROMEDA project which is listed as follows:

- Member of the User Community;
- Székely Family Company has competence and expertise in land border surveillance *(Hungarian Schengen external borders);*
- Supporting the aim of extending CISE.

The **last presentation** of the current session was made by **Mr. Gal Levy** *(MOPS-INP)* who presented the Israeli National Police experience in land border surveillance. **Mr. Levy** initially described the main threats of the Israel's land borders for military and police. The Israeli military confronts military attacks with missiles, artillery, UAV's etc., and terror attacks. The Israeli police is dealing with crime activities of human trafficking, drugs smuggling and weapon smuggling. The main challenges that occur in the southern region of the country are:

- Family relations on both sides of the border *(cross border links);*
- "Old-School" habits –leaves no tech-signature;
- High sensitivity & awareness to the presence of police forces;
- High capability in survival skills;
- Combined operating methods-vehicular, on foot, camels etc.

The ANDROMEDA contribution to Israel National Police:

- Med-Sea as mutual maritime border;
- Gain new insights on data fusion and decision support tools;
- Acquire know-how on better integration of all assets and legacy systems into one national information system *(Army, Police, Customs);*
- Gather all data into the system in order to better predict next criminal attempts *(big data analysis);*
- Build common data base with EU and share knowledge on:
    - Smuggling organizations and methods
    - New Illegal crossing trends
    - Cross-Border terror activity.
- Share new technologies that can be used in land borders;
- Build user interface that is focused on mission success *(planning, management).*

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3.2.3 Highlights from Stakeholders Session of Sharing Experiences on Land Border Surveillance

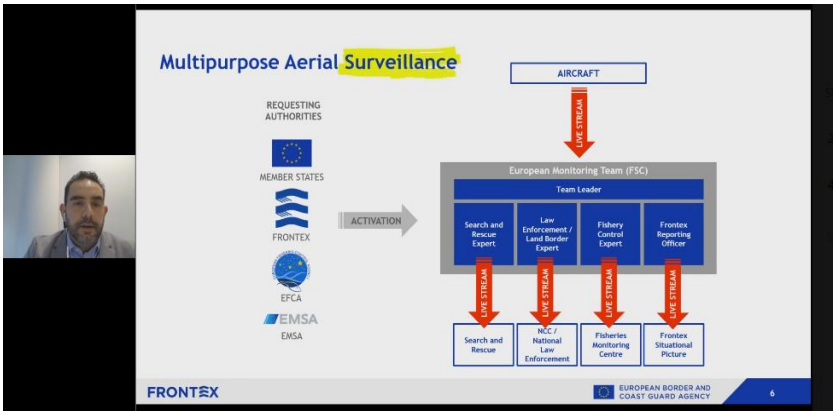

Figure 22: Mr. Mirco Negro, FRONTEX while presenting FRONTEX Aerial Surveillance Activity – a successful case during land border patrol

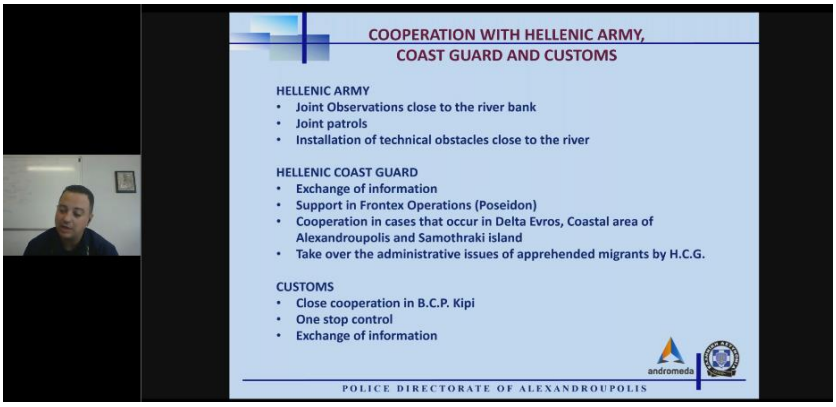

Figure 23: Police Major Dimosthenis Kamargios, Hellenic Police while talking about the Integrated border management in Evros region - Implementation of ANDROMEDA project

Figure 24: Mr. Nicola Mircevski, Department for Border Affairs and Migration, Ministry of Interior of North Macedonia while presenting Experiences on the Land Border Surveillance

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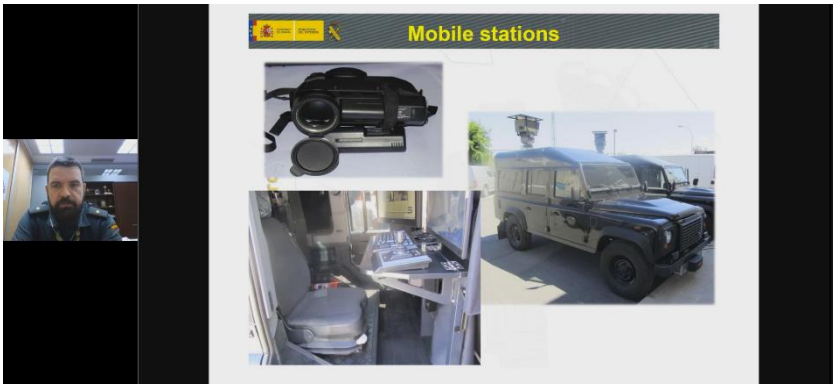

Figure 25: Major Moises Vos Martinez, Guardia Civil while Sharing Experiences from Spain on land and maritime border surveillance

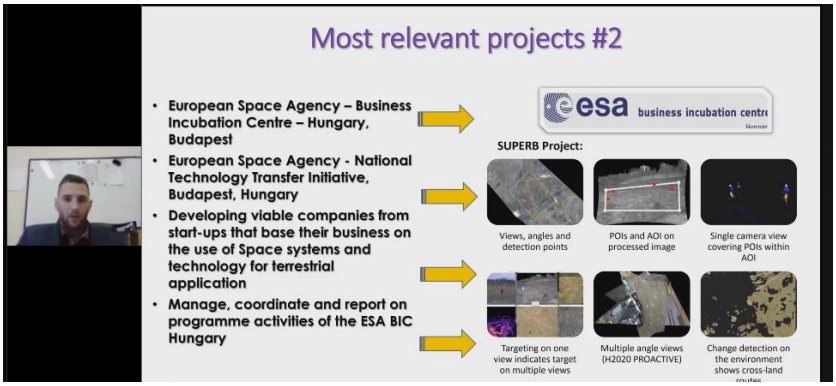

Figure 26: Mr. Lénárd Zsákai, Chief Security Officer of Székely Family&Co while talking about Applied Research and Innovation for European Security

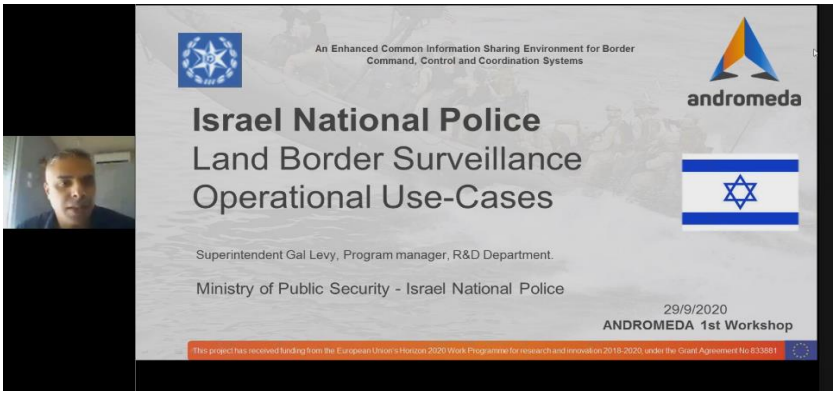

Figure 27: Mr. Gal Levy, MOPS-INP while presenting the Israeli National Police experience in land border surveillance

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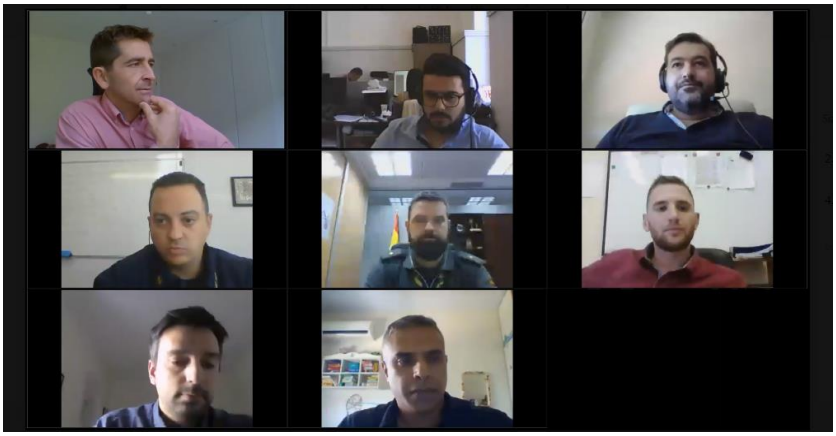

Figure 28: Round table of Stakeholders Session - Sharing Experiences on Land Border Surveillance

3.2.4 Research results & lessons learnt from EU funded projects on Maritime and Land Border Surveillance

The session of presenting the research results and lessons learnt from similar EU funded projects was moderated by **Mr. David Merino** (GMV).

The session started with the presentation of **Mr. Matteo Lusignoli** *(Leonardo)* who talked about the **OCEAN2020 project**. The operational objectives of the project are the significant improvement of maritime Situation Awareness through the integration of UXS *(Unmanned Systems)* with ISTAR *(Intelligence Surveillance Target Acquisition and Reconnaissance)* payload capabilities and the interoperability by use of open architecture and recognised standards. The technical objectives are listed as:

- High integration among EU countries and heterogeneous systems, demonstrated in full-scale live trials;
- Development of EU C4ISR open architecture;
- Integration of EU/NATO/civil data framework;
- Advanced data and information fusion techniques for shorter decision time at CMS (*Combat Management System)* and MOC *(Maritime Operations Centre)* levels;
- Increased autonomy for UXS, swarm operations, cooperation of assets.

The **second presentation** of this session was made by **Mrs. Aleksandra Nadziejko** *(Tekever)* who talked about the **COMPASS2020 project.** The project aims to demonstrate the combined use and seamless coordination of manned and unmanned assets to achieve greater coverage, better quality of information and shorter response times in maritime surveillance operations. Provide to Coast Guards and Maritime authorities a solution with improved cost-effectiveness, availability and reliability of the operations. As a solution Innovative CONOPS is proposed in order to make use of multiple aerial and underwater unmanned vehicles with improved surveillance capabilities, deployed from OPVs or from land, and supported by a central, multi-domain and interoperable, Mission System (MS) to enable the operation of these from both locations. Moreover, UxVs may act as deported ship sensors, providing critical mission data to the MS that can be exploited through dedicated services developed within the project *(e.g. data fusion and threat risk analysis).*

The **third presentation** was made by **Mr. Agostino Longo** *(Leonardo)* who talked about the **MARISA project.** The project will deliver a toolkit providing a suite of services to correlate and fuse heterogeneous and homogeneous data from different sources. Additionally, it will improve information exchange, situational awareness, decision-making and reaction capabilities. The project supports the cooperation among different Member States and User Communities by providing networking and infrastructural services and adopting the

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CISE data model as the basis for the definition of the MARISA Data Model. Moreover, it aims in complying with ethical and societal requirements set by EU fundamental rights and the General Data Protection Regulation (GDPR):

- Defining & implementing ethical requirements as project features;
- Defining the data protection policy for the project.

The **fourth presentation** was made by **Mr. Vagelis Chatzistavros** *(CERTH)* who talked about the ROBORDER project. The main objectives of the project are: the autonomous border surveillance system with unmanned mobile robots; incorporate multimodal sensors as part of an interoperable network; wide range of operational and environmental settings; enhanced static networked sensors; complete and situational awareness picture; early identification of criminal activities and hazardous incidents. The innovation objectives of the project are **a)** adaptable sensing, robotics, and communication technologies; and **b)** tele-operation of autonomous agents through a 3D user interface decision support.

The **fifth presentation** of the current session was made by **Mr. Andreas Kriechbaum-Zabini**, *(AIT)* who talked about the **FOLDOUT project**. Mr. Kriechbaum-Zabini stated that the current systems do not meet difficult operational outdoor environment requirements such as 24/7 operation, weather conditions, different vegetation, different distances and detection of different events. There is a performance problem of detecting critical scenarios and difficult deployment in terrain with low IT infrastructure. The FOLDOUT approach is to create a transportable, autonomous border surveillance system to monitor critical areas. Particularly, the Smartsense platform's capabilities are:

- Multi sensor detection system for usage in harsh environment *(RGB, thermal, hyperspectral)*
- Designed for day/night, harsh weather conditions, different vegetation types
- Configurable for different distances
- Transportable and robust
- Simple deployable mountable on trees or masts
- GPS/IMU for self-localization
- LTE/ Wi-Fi communication on board
- Self-sustaining with battery

The **sixth presentation** was given **by Mr. Juan Gomez** *(UPV)* who talked about the **CAMELOT project**. Mr. Gomez explained the CAMELOT's motivation to create a solution that would solve the low levels of situational awareness on the EU borders and the high cost of border surveillance at sea and on scarcely populated land areas. Moreover, the current border control systems involve a wide range of heterogeneous assets to survey from air, surface *(land and sea)* and underwater while UxV are closed systems with proprietary interfaces. The lack of standardization and consequently of the interoperability between similar systems as well as the higher costs of training and logistic support are also considered significant challenges. The CAMELOT solution is an enhanced C2 system using advanced 3D models offering an accurate representation of the position of surveillance assets and external objects or threats. Advanced C2 service modules for multiple platform domains and sensors based on a state-of-the-art architecture. Delivering complex services such automatic asset tasking, mission planning and re planning or 3D representation of threats.

The **seventh presentation** was given by **Prof. Stathes Hadjiefthymiades** *(University of Athens)* who talked about the **ARESIBO project.** At the beginning of his speech, **Prof. Hadjiefthymiades** presented the objectives of the ARESIBO project which namely are **a)** Integrated situation awareness and improved perception for field and C2 operators through intuitive AR interfaces, **b)** Better human-robot collaboration via Dynamic UxV swarm intelligence for optimised surveillance, and **c)** Secure the network connectivity between the field units and the C2 via Intelligent Hybrid Networks and Edge Computing. Later on, he talked about the

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tests and demonstrations made by ARESIBO. The End-user involvement was explicated and particularly the project is end-user driven in:

1. top-down approach *(requirements to design the system / s)*, and
2. bottom-up in monitoring the technologies development and integration.
3. making the link with other governmental initiatives.

Prof. Hadjiefthymiades mentioned that the end-users will fully operate the system during tests and demonstrations and the External Advisory Board will participate to the validation steps with Frontex already being invited to join EAB

The **last presentation** was made by **Mr. Patrick Mugnier** ***(****NAVAL Group)* who talked about the **EFFECTOR project.** Mr. Mugnier explicated the **two main objectives** of the project which are: **a)** use of under-utilised data and Artificial Intelligence to improve the search of weak signals; and b) connection of national systems to CISE to demonstrate its efficiency and benefits for practitioners. Continuing, the speaker presented the detailed objectives of the project which are listed as follows:

- Enhance the information sharing at local, regional, national and transnational level of advanced maritime situational picture and the interoperability with CISE and EUROSUR;
- Interconnect underutilized surveillance data sources and legacy systems;
- Improve knowledge extraction and decision support by introducing AI technics;
- Provide enhanced interoperability at tactical and strategic level;
- Strengthen the collaboration and cooperation of EU maritime safety and security Authorities and exploiting results and findings of previous relevant EU projects and initiatives;
- Deliver realistic demonstration trials for a multiplicity of use cases;
- Promote and contribute to CISE standardization efforts;
- Ensure compliance with legal and regulatory framework of privacy and personal data protection.

The request from EFFECTOR to ANDROMEDA project is to exploit the e-CISE data model of ANDROMEDA and adopt extensions that are related to enhanced cross-border situational awareness and operational collaboration between member states coordination centres. Also, technical feedback on CISE implementation *(CISE nodes, CISE Adapter, Implementation & Connection)* and feedback from “End users” of CISE. Lastly, sharing of data collected during ANDROMEDA Trials and sharing of samples / simulators developed.

There was also a proposition from the EFFECTOR side to ANDROMEDA for

- Feedback on technical implementation;
- Feedback on real-connection to legacy systems of Member States;
- Feedback on sea trials and benefits of the using of the e-CISE data model.

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3.2.5 Highlights from the session of Research results & lessons learnt from EU funded projects on Maritime and Land Border Surveillance

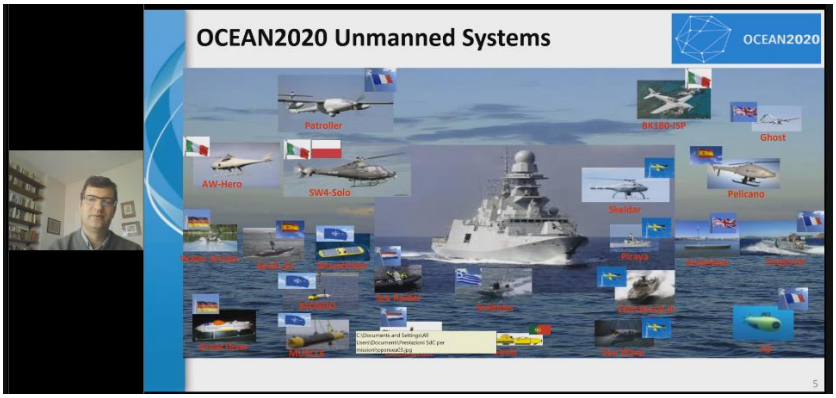

Figure 29: Mr. Matteo Lusignoli, Leonardo while presenting the OCEAN2020 Project

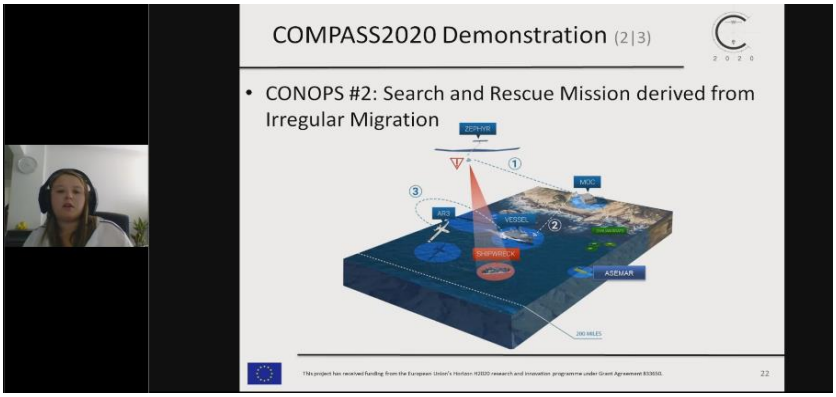

Figure 30: Mrs. Aleksandra Nadziejko, Tekever while presenting the COMPASS2020 project

Figure 31: Mr. Agostino Longo, Leonardo while presenting the MARISA project

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Figure 32: Mr. Vagelis Chatzistavros, Centre for Research and Technology (CERTH) while presenting the ROBORDER project

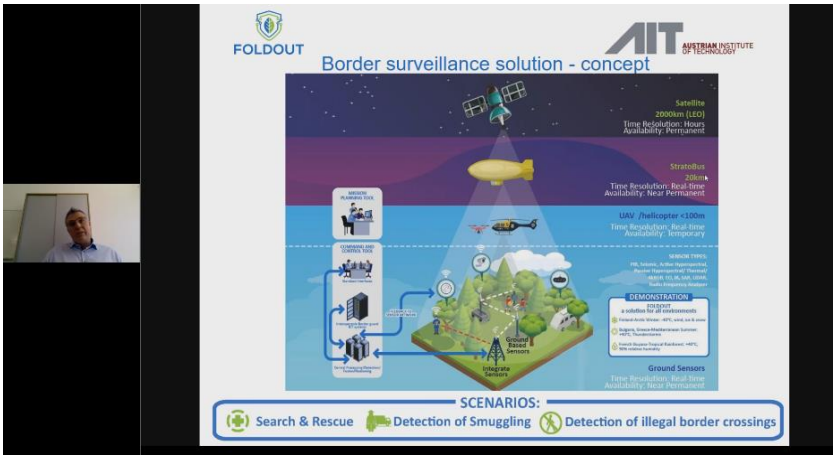

Figure 33: Mr. Andreas Kriechbaum-Zabini, AIT Austrian Institute of Technology (AIT) while presenting FOLDOUT project

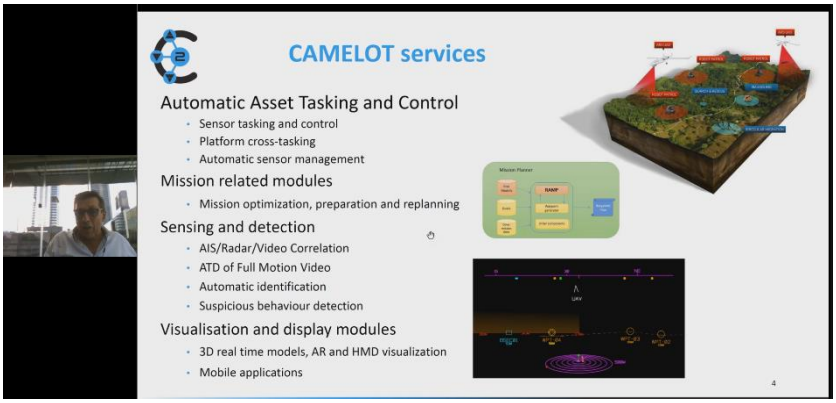

Figure 34: Mr. Juan Gomez, Universitat Politècnica de València (UPV) while presenting CAMELOT project

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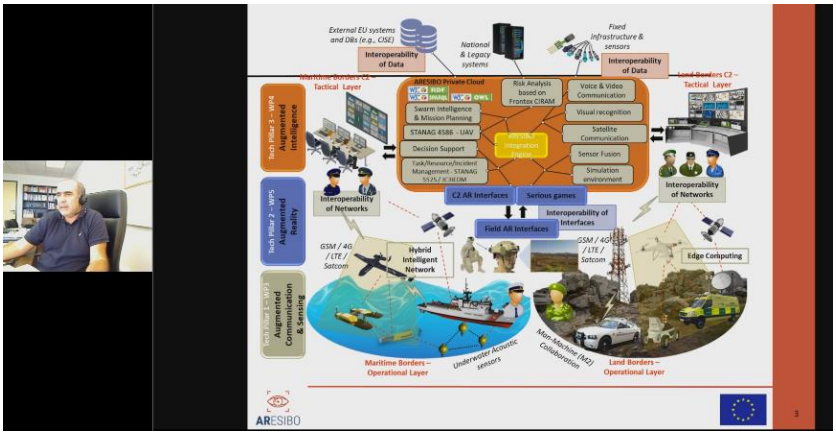

Figure 35: Prof. Stathes Hadjiefthymiades, Dept. of Informatics & Telecommunications, University of Athens (UoA) while presenting ARESIBO project

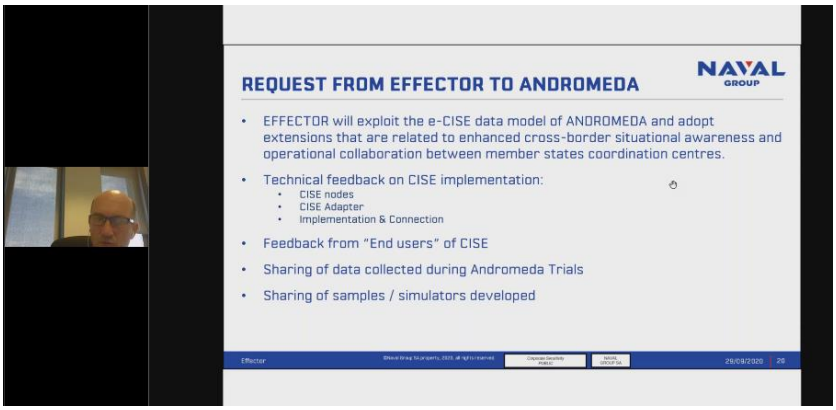

Figure 36: Mr. Patrick Mugnier, NAVAL Group while presenting EFFECTOR project

Figure 37: Round-table discussion of the session Research results & lessons learnt from EU funded projects on Maritime and Land Border Surveillance

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4. Conclusion

This document outlined the activities that the ANROMEDA consortium made towards organizing its 1st Workshop in order to present and promote the project results to the consortium partners, end-users, practitioners and other policy makers and stakeholders. During the two-day workshop **twenty-five** presentations were given by respective speakers and **four round table** discussions took place. Project partners had the opportunity to reveal the ANDROMEDA results produced so far; discuss with stakeholders their experiences on maritime and border surveillance and receive valuable feedback; bring up the importance of CISE (e-CISE) also in the land border domain; and exchange ideas with other EU funded projects in the same domain.

The event was of great success with actual attendance of **107 people** in **Day 1** *(28th Sep. 2020)* and **95 people** in **Day 2** (*29th Sep. 2020)* while the number of registrations was higher with **129 registrants** in Day 1 and **113 registrants** in Day 2. The attendees' interest that was expressed ex-ante and ex-post of the workshop regarding the ANDROMEDA produced results is very promising for the upcoming second workshop of the project that will take place at the end of its lifecycle.

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5. Annex A: Screenshots from the original Agenda

SU-BES03-2018, Subtopic: Open
Demonstration of applied solutions to enhance border and external security

andromeda

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

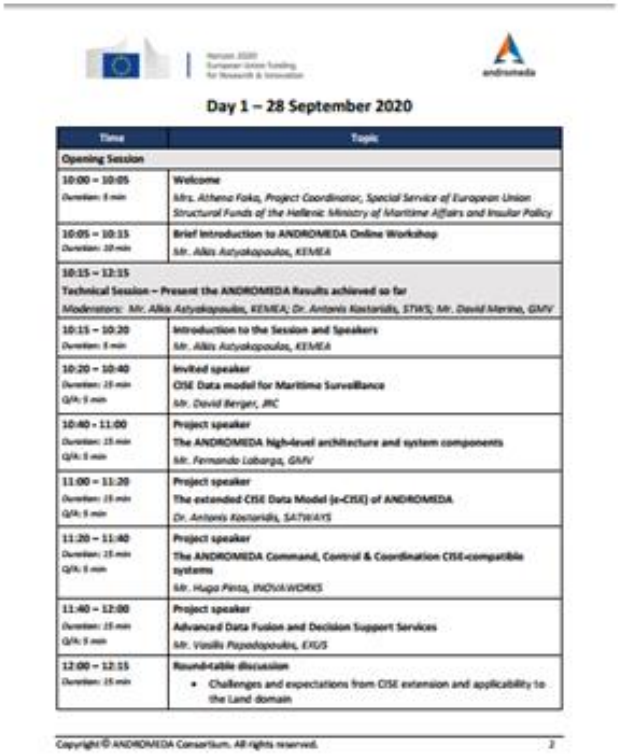
Grant Agreement Number: 833881

Agenda
ANDROMEDA 1st Workshop
Online Event

28-29 September 2020 (times in CEST)

GoToWebinar Registration Link
https://tinyurl.com/ydtupc9

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 833881.



Day 1 – 28 September 2020

Time	Topic
Opening Session	
10:00 – 10:05	**Welcome** *Mrs. Athena Foka, Project Coordinator, Special Service of European Union Structural Funds of the Hellenic Ministry of Maritime Affairs and Insular Policy*
10:05 – 10:15	**Brief Introduction to ANDROMEDA Online Workshop** *Mr. Alkis Astyakopoulos, KEMEA*
10:15 – 12:15	**Technical Session – Present the ANDROMEDA Results achieved so far** *Moderators: Mr. Alkis Astyakopoulos, KEMEA; Dr. Antonis Kastaridis, STWS; Mr. David Merino, GMV*
10:15 – 10:20	**Introduction to the Session and Speakers** *Mr. Alkis Astyakopoulos, KEMEA*
10:20 – 10:40	**Invited speaker** **CISE Data model for Maritime Surveillance** *Mr. David Berger, JRC*
10:40 – 11:00	**Project speaker** **The ANDROMEDA high-level architecture and system components** *Mr. Fernando Labarga, GMV*
11:00 – 11:20	**Project speaker** **The extended CISE Data Model (e-CISE) of ANDROMEDA** *Dr. Antonis Kastaridis, SATWAYS*
11:20 – 11:40	**Project speaker** **The ANDROMEDA Command, Control & Coordination CISE-compatible systems** *Mr. Hugo Pinto, INOVAWORKS*
11:40 – 12:00	**Project speaker** **Advanced Data Fusion and Decision Support Services** *Mr. Vasilis Papadopoulos, EXUS*
12:00 – 12:15	**Round-table discussion** • Challenges and expectations from CISE extension and applicability to the Land domain

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Time	Topic
	• Impact of the full compliance of ANDROMEDA's CIs and data fusion & decision support services with CISE
Lunch break (1 Hour)	
13:15 – 16:00 **Stakeholders Session – Sharing Experiences on Maritime Border Surveillance** *Moderators: Mr. Alkis Astyakopoulos, KEMEA; Dr. Antonis Kastaridis, STWS; Mr. David Merino, GMV*	
13:15 – 13:20	**Introduction to the Session and Speakers** *Dr. Antonis Kastaridis, STWS*
13:20 – 13:40	**Invited speaker** **CISE Transitional Phase - state of play** *Mr. Gianluca Luraschi, EMSA*
13:40 – 14:00	**Project speaker** **Italian Navy in ANDROMEDA and expectations** *Cdr. Luca Bertocchi, Italian Navy General Staff*
14:00 – 14:20	**Invited speaker** **French Coast guard Function and maritime surveillance** *Mr. Alexis Blum, Chargé de mission «projets européens», Secrétariat général de la Mer*
14:20 – 14:40	**Project speaker** **Maritime Surveillance – Sharing HCG Experience** *Cdr. (HCG) Georgios Christianos, Head of IMSB (Integrated Maritime Surveillance Bureau) of the Hellenic Coast Guard*
14:40 – 15:00	**Project speaker** **Sharing Experiences from Portugal on maritime surveillance** *Cdr. (Navy) João Fidalgo Neves, MARINHA Escola Naval*
15:00 – 15:20	**Project speaker** **Intersectoral cooperation in the maritime domain in Montenegro** *Mr. Žarko Lukšić, Deputy Director at MSD and* *Mr. Lasica Zoran, Head of NCC Podgorica, Montenegro Border Police*
15:20 – 15:35	**Round-table discussion** • Limitations in information exchange and maritime border surveillance that end users face

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Time	Topic
	• Benefits that the ANDROMEDA system could bring in other regions of Europe • Overall added value of ANDROMEDA system
15:35 – 15:50	**ANDROMEDA Advisory Board feedback** • Feedback and recommendations from the technical, operational, business & exploitational point of view
Closing Session	
15:50 – 16:00	**Conclusions and Wrap Up of Day 1** *Mr. David Merino, GMV*

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Day 2 – 29 September 2020

Time	Topic
Opening Session	
10:00 – 10:05 *Duration: 5 min*	**Welcome** *Mrs. Athena Foka, Project Coordinator, Special Service of European Union Structural Funds of the Hellenic Ministry of Maritime Affairs and Insular Policy*
10:05 – 10:15 *Duration: 10 min*	**Summary of Day 1** *Mr. David Merino, GMV*
10:15 – 12:35 **Stakeholders Session – Sharing Experiences on Land Border Surveillance** *Moderators: Mr. Alkis Astyakopoulos, KEMEA; Dr. Antonis Kastanidis, STWS; Mr. David Merino, GMV*	
10:15 – 10:20 *Duration: 5 min*	**Introduction to the Session and Speakers** *Mr. David Merino, GMV*
10:20 – 10:40 *Duration: 15 min* *Q/A: 5 min*	**Invited speaker** **FRONTEX Aerial Surveillance Activity – a successful case during land border patrol** *Mr. Mirco Negro, FRONTEX*
10:40 – 11:00 *Duration: 15 min* *Q/A: 5 min*	**Project speaker** **Integrated border management in Evros region - implementation of ANDROMEDA project** *Police Major Dimosthenis Kamargios, Hellenic Police*
11:00 – 11:20 *Duration: 15 min* *Q/A: 5 min*	**Invited speaker** **Sharing Experiences from Spain on land and maritime border surveillance** *Major Moises Vas Martinez, Guardia Civil*
11:20 – 11:40 *Duration: 15 min* *Q/A: 5 min*	**Invited speaker** **Applied Research and Innovation for European Security** *Mr. Lénárd Zudkai, Chief Security Officer of Sükkely Family&Co and Senior Police Executive at the Mol of Hungary*
11:40 – 12:00 *Duration: 15 min* *Q/A: 5 min*	**Invited speaker** **Experiences on the Land Border Surveillance** *Mr. Risto Shpritov, Head of Support Unit in the Department for Border Affairs and Migration, Ministry of Interior of North Macedonia*
12:00 – 12:20	**Project speaker**

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Time	Topic
Duration: 15 min *Q/A: 5 min*	**The Israeli National Police experience in land border surveillance** *Mr. Gal Levy, MOPS-INP*
12:20 – 12:35 *Duration: 15 min*	**Round-table discussion** • Limitations in information exchange and land border surveillance that end users face • Benefits that the ANDROMEDA system could bring in other regions of Europe • Overall added value of ANDROMEDA system
Lunch break **(1 Hour)**	
13:35 – 16:45 **Research results & lessons learnt from EU funded projects on Maritime and Land Border Surveillance** *Moderators: Mr. Alkis Astyakopoulos, KEMEA; Dr. Antonis Kastanidis, STWS; Mr. David Merino, GMV*	
13:35 – 13:40 *Duration: 5 min*	**Introduction to the Session and Speakers** *Mr. David Merino, GMV*
13:40 – 14:00 *Duration: 15 min* *Q/A: 5 min*	**OCEAN2020 Project – A Technological Demonstrator of Enhanced Situation Awareness in Naval Environment with the Use of Unmanned Systems** *Mr. Matteo Lusignoli, Leonardo*
14:00 – 14:20 *Duration: 15 min* *Q/A: 5 min*	**COMPASS2020 – Multi-domain mission system for persistent surveillance** *Commander (Navy) (OF-4), João Carlos Lourenço do Piedade, Maritime Administration of Portugal*
14:20 – 14:40 *Duration: 15 min* *Q/A: 5 min*	**MARISA – Maritime Integrated Surveillance Awareness: "MARISA results and way forward"** *Mr. Agostino Longo, Leonardo*
14:40 – 15:00 *Duration: 15 min* *Q/A: 5 min*	**ROBORDER – Autonomous Swarm of Heterogenous Robots for Border Surveillance"** *Mr. Vagelis Chatzistavros, Centre for Research and Technology (CERTH)*
15:00 – 15:20 *Duration: 15 min* *Q/A: 5 min*	**FOLDOUT – Through foliage detection of illegal cross border activities** *Mr. Andreas Kriechbaum-Zabini, AIT Austrian Institute of Technology (AIT)*
15:20 – 15:40 *Duration: 15 min* *Q/A: 5 min*	**CAMELOT – C2 Advanced Multi-domain Environment and Live Observation Technologies** *Mr. Juan Gomez, Universitat Politècnica de València (UPV)*

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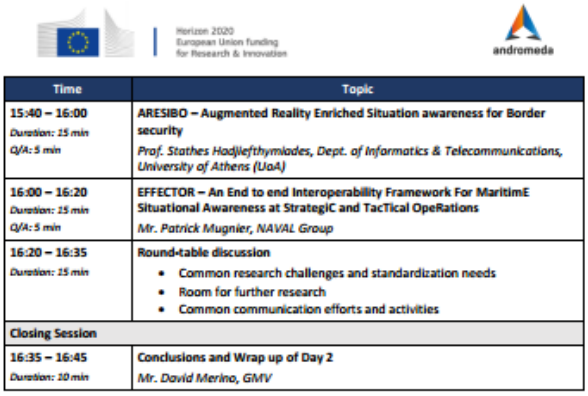

Time	Topic
15:40 – 16:00 *Duration: 15 min* *Q/A: 5 min*	**ARESIBO – Augmented Reality Enriched Situation awareness for Border security** *Prof. Stathes Hadjiefthymiades, Dept. of Informatics & Telecommunications, University of Athens (UoA)*
16:00 – 16:20 *Duration: 15 min* *Q/A: 5 min*	**EFFECTOR – An End to end Interoperability Framework For MaritimE Situational Awareness at StrategiC and TacTical OpeRations** *Mr. Patrick Mugnier, NAVAL Group*
16:20 – 16:35 *Duration: 15 min*	**Round-table discussion** • Common research challenges and standardization needs • Room for further research • Common communication efforts and activities
Closing Session	
16:35 – 16:45 *Duration: 10 min*	**Conclusions and Wrap up of Day 2** *Mr. David Merino, GMV*

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6. Annex B: 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.

6.1 Reviewers

Project Coordinator	Athena Foka (MMAIP)
Management Support Team Member	Alkis Astyakopoulos (KEMEA)
Internal Peer Reviewers	David Merino (GMV) – Dimitris Katsaros (EXUS)

6.2 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

6.3 Consolidated Comments of Quality Reviewers

General Comments	
Deliverable contents thoroughness	Reviewers comment: Check comments provided with track changes Author's reply: Addressed
Innovation level	Reviewers comment: Author's reply:
Correspondence to project and programme objectives	Reviewers comment: Author's reply:
Specific Comments	
Relevance with the objectives of the deliverable	☒ Yes ☐ No ☐ Partially ☐ Not applicable Reviewers comment: Author's reply:
Completeness of the document according to its objectives	☒ Yes ☐ No ☐ Partially ☐ Not applicable Reviewers comment:

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	Author's reply:
Methodological framework soundness	☐ Yes ☐ No ☐ Partially ☐ Not applicable Reviewers comment: Author's reply:
Quality of the results achieved	☒ Yes ☐ No ☐ Partially ☐ Not applicable Reviewers comment: Author's reply:
Structure of the deliverable with clear objectives, methodology, implementation, results and conclusions	☒ Yes ☐ No ☐ Partially ☐ Not applicable Reviewers comment: Author's reply:
Clarity and quality of presentation, language and format	☒ Yes ☐ No ☐ Partially ☐ Not applicable Reviewers comment: Author's reply:

Detailed Comments (please add rows as appropriate)		
No.	**Reference**	**Remark**
1		
2		
3		
4		
5		

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