

# ARESIBO

**Augmented Reality Enriched Situation awareness for  
Border Security**

# The problem

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- **TOPIC:** Technologies to enhance border and external security
- **SCOPE:** Providing integrated situational awareness and applying augmented reality to border security.

## **Specific Challenge:** Innovation for border and external security

- Novel and affordable technologies
- Accepted by citizens
- Customized and implemented according to the security practitioners' needs.

## **Current operational status**

- Border and coast guards handle several formats of information under different non-interoperable displays.
- Information from several sources should be assessed by exploiting separate types of equipment.
- Relevant personnel operate on remote areas with limited telecommunication network capabilities.

## **Ambition:** Research and innovation should lead towards cloud-based integrated systems

- Complete and highly-standardized interfaces
- Real-time information via a user-friendly manner
- Decision making and in communication with the C&C
- Enhanced concept of employment and interoperability standards via water, land and air operating resources.

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## The ARESIBO answer...

# Concept

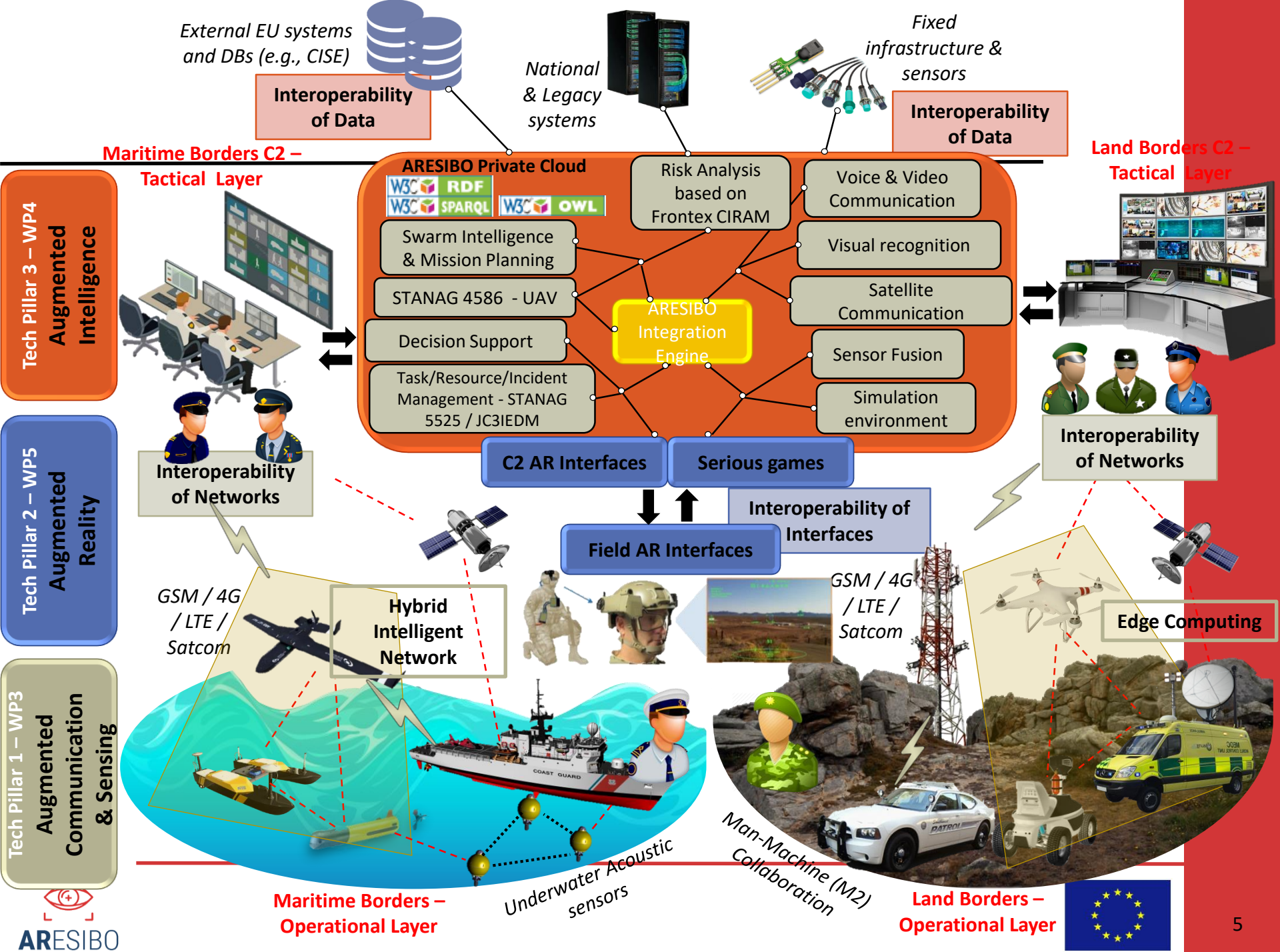
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**Objective:** Develop a border security system at operational and tactical layer

- Enhanced situation awareness for both field and C2 operator
- Covering a wide range of multipurpose borderland operational tasks and coast guard functions
- Analysis of potential threats, search and rescue activities, joint planning of field operations
- Customized for land, sea borders as well as mixed environments
- Interoperability of networks, data & interfaces

## Key Technologies

- Augmented Reality tools for improved user perception
- Networks for supporting remote areas
- Unmanned Ground Vehicles (UGV), Unmanned Aerial Vehicles (UAVs), Unmanned Underwater Vehicles (UUVs), and Unmanned Surface Vehicles (USVs)
- Augmented Intelligence capabilities
- Integration of diverse surveillance platforms
- Interoperability Layer for data and interfaces
- Decision-support tools
- Serious games for user training



# Overall structure

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## Package list

- **WP1:** Project management
- **WP2:** Requirement analysis and pilot use cases
- **WP3:** Augmented communication and sensing for integrated situation awareness
- **WP4:** Augmented intelligence for integrated situation awareness
- **WP5:** Augmented reality for integrated situation awareness
- **WP6:** Integration of Aresibo platform
- **WP7:** Live trials and assessment
- **WP8:** Dissemination and exploitation
- **WP9:** Ethics

## Milestone list

- **MS1:** Kick-off
- **MS2:** Preliminary system requirements
- **MS3:** System design
- **MS4:** Operational prototype
- **MS5:** Demo 1
- **MS6:** Demo 2
- **MS7:** Final Review

# Augmented Comm. & Sensing

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**Objective #1:** Stable connectivity between

- Field commanders (operational level) and the C2 commanders (tactical level)
- Field commanders and other field units
- UxVs and sensing infrastructure

**Objective #2:** Sensors and sensing optimization

**Objective #3:** UxVs and Swarm Intelligence

**Objective #4:** Voice/video communication

**Objective #5:** Cyber-security

**Objective #6:** Edge Computing

Technical developments reflected by **WP3**

# Augmented Intelligence

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**Objective #1:** Task/Resource/Incident Management (e.g. STANAG-5525/JC3IEDM)

**Objective #2:** Modeling UxVs (e.g. STANAG 4586)

**Objective #3:** Autonomous robotic missions

**Objective #4:** Simulation environment

**Objective #5:** Decision-support

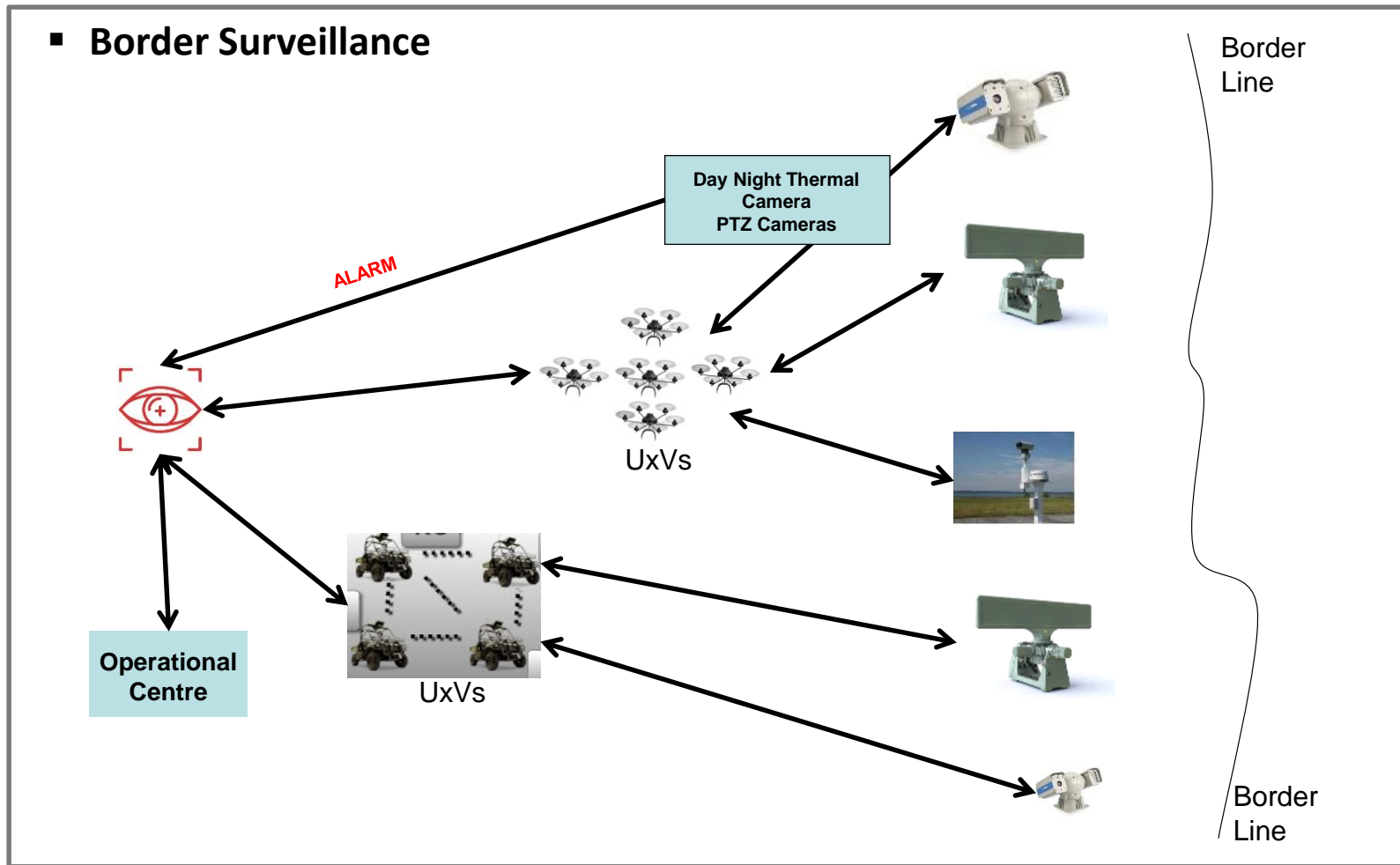
**Objective #6:** Data fusion and Risk analysis

Technical developments reflected by **WP4**



# Mission example

## ■ Border Surveillance



# Augmented Reality

**Objective #1:** Capabilities at tactical and operational level

- In-field commanders and C2 operators

**Objective #2:** Operational assistance to the border and coast guard

- By decreasing the interaction cost to perform a task
- By reducing the cognitive load of the user
- By integrating multiple sources of information and minimizing attention switches.

**Objective #3:** Increased capabilities provided to the operator

- “Jump in” and assess current situation with enriched situation awareness
- See across time, which helps to understand current situation and provide an estimation
- Evaluate various situation scenarios based on real and simulated data.
- Serious Games

Technical developments reflected by **WP5**.



# AR Indicative benefits

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- The on-the-field teams and the C2 operators can produce information that could be circulated among the entire organisation and most significantly with the decision-making levels.
- The operators will no longer need to process the received data permitting them to concentrate on more significant tasks.
- The remote capability shall allow the operators to connect to the virtual briefing room to participate in the mission preparation by interacting on the same map with the same data from the “cloud”.
- The system will be able to present past, present and risk situations with lessons learnt and decision support.
- The teams can benefit from the previous mission results without the need to have a physical briefing in the C2 centre. They have an easily legible display of the current situation augmented by information and knowledge about the risks.
- They can optimise their mission and prepare/update their missions as well as the missions of the surveillance platforms.

# Validation

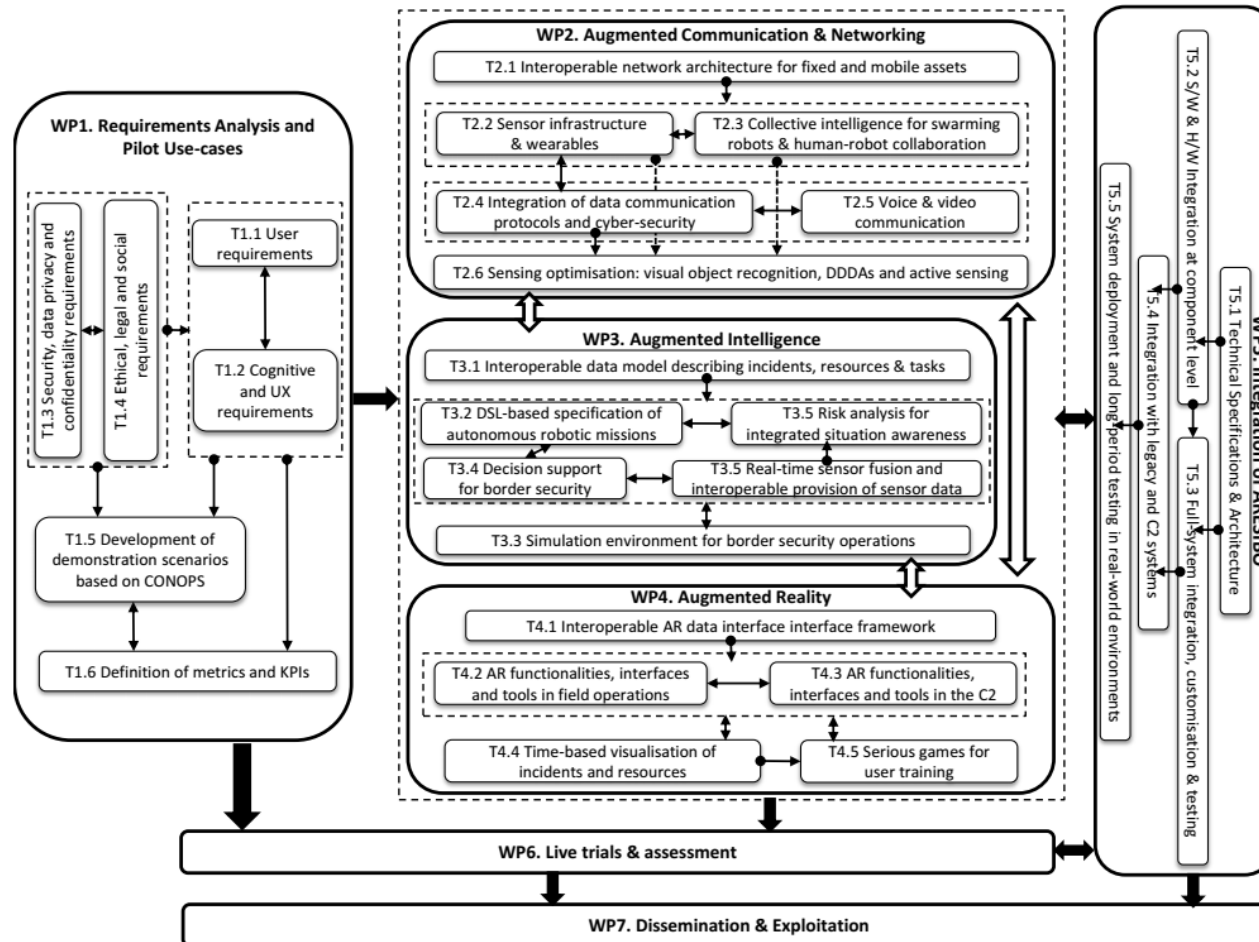
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- Various evaluation tests using testbeds provided by partners within the consortium.
- Diverse terrains and several operational areas.
- Multiple simulation tests will be conducted.

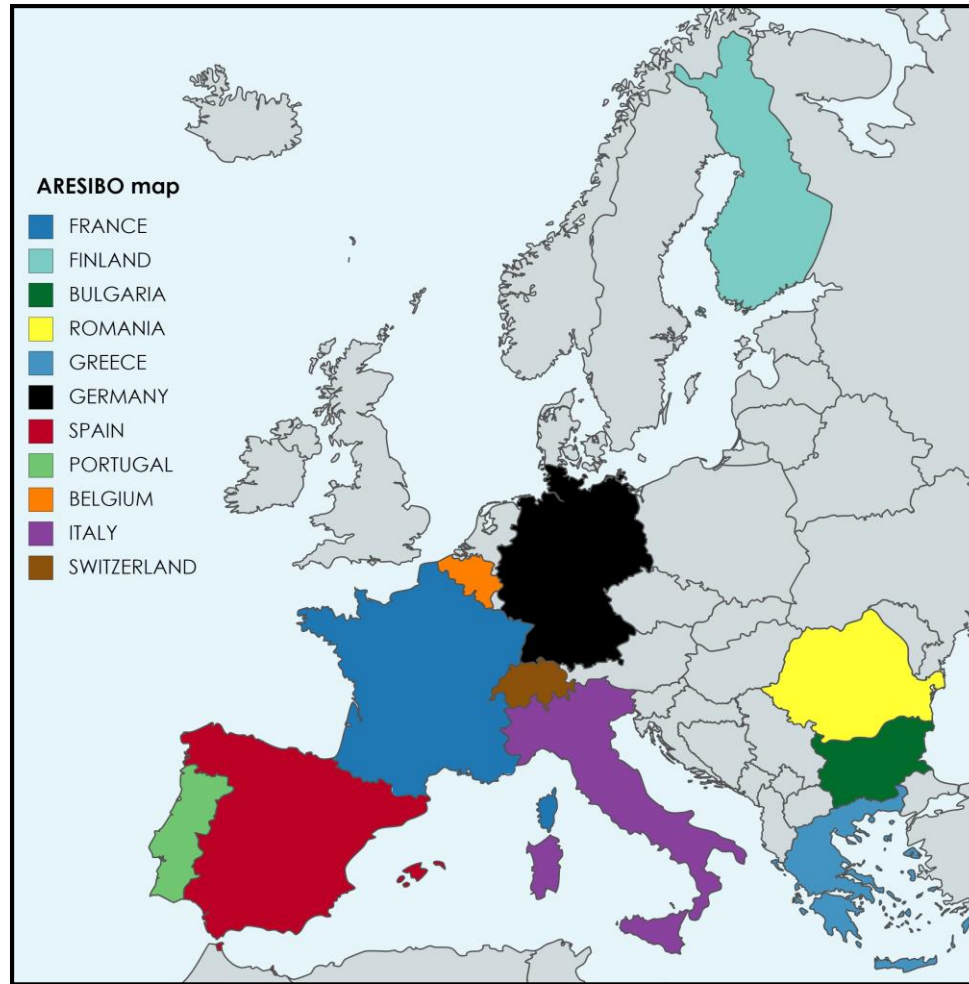
## **Pilot use cases:** Demonstrations in under control environments

- **PUC-1:** Land-border trespassing
- **PUC-2:** Smuggling of goods
- **PUC-3:** Human trafficking
- **PUC-4:** Drug trafficking

# Work Packages interplay



# Geo distribution of partners



# Exploitation and Dissemination

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## Exploitation of results

- Development of modules and tools
- Technical outcomes to be exploited by the technical partners

## Dissemination of results

- Publications in scientific conferences and journals
- Visits of website and social media (<http://aresibo.eu/>)
- Downloads of publicly available online material
- Participation/attendance in workshops
- Demonstration of results in end-users group

# Contact

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# Thank You!

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## Questions?