

# ROBORDER

FRONTEX

Warsaw, Poland

8 June 2017



# ROBORDER Overview

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- Agenda
  - Project information
  - The problem
  - The H2020 topic
  - The ROBORDER answer
  - Project consortium
  - How to contribute
  - Project contacts
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# ROBORDER Project Information

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- Project Information

- Acronym: ROBORDER
- Project Title: autonomous swarm of heterogeneous Robots for BORDER surveillance
- Grant Agreement No: 740593
- Total budget: 8 997 781.50 €
- Total grant: 7 999 315.82 €
- Start date: 01 May 2017
- Duration: 36 months
- End date: 30 April 2020



# ROBORDER Overview

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- The Problem
  - **Low levels of situational awareness on the EU borders**, high at sea and on unpopulated or scarcely populated land areas, are important **factors of cost of border surveillance**. This could improve if the different **prototypes of unmanned vehicles** tested today to perform automatically a very limited set of functions and routines could be **transformed into autonomous, long-enduring agents able to operate in complex maritime and land environments**.



# ROBORDER Overview



- H2020 Topic

- SEC-20-BES-2016: Border Security: autonomous systems and control systems (2016 Call)

- **Sub-topic 1 Autonomous Surveillance**

- Autonomous agents should be adaptable: in order to deal, where applicable, with extreme and diverse weather and sea condition, including in the Arctic region; interconnected: **interoperable and capable of exchanging information among themselves and with the system's ground segment; tele-operable from the ground.** They should **support missions ranging from surveillance to detection of marine pollution incidents, and including early identification and tracking of illegal activities and illegal communication.** They should **operate as single units, but also in homogeneous or heterogeneous groups** i.e. mixing aerostats, aerial vehicles with fix, rotary wings (or tilt-rotor), unmanned surface vehicles (USV), unmanned under-surface vehicles (UUSV), unmanned ground vehicles (UGV) **with different types of sensor and communication suites on board, customized according to operational and environmental needs and addressing cross-cueing.** Autonomous agents should **exchange information at tactical level and interface with each other and with command and control systems** as they exist, today, at different levels.



# The ROBORDER answer

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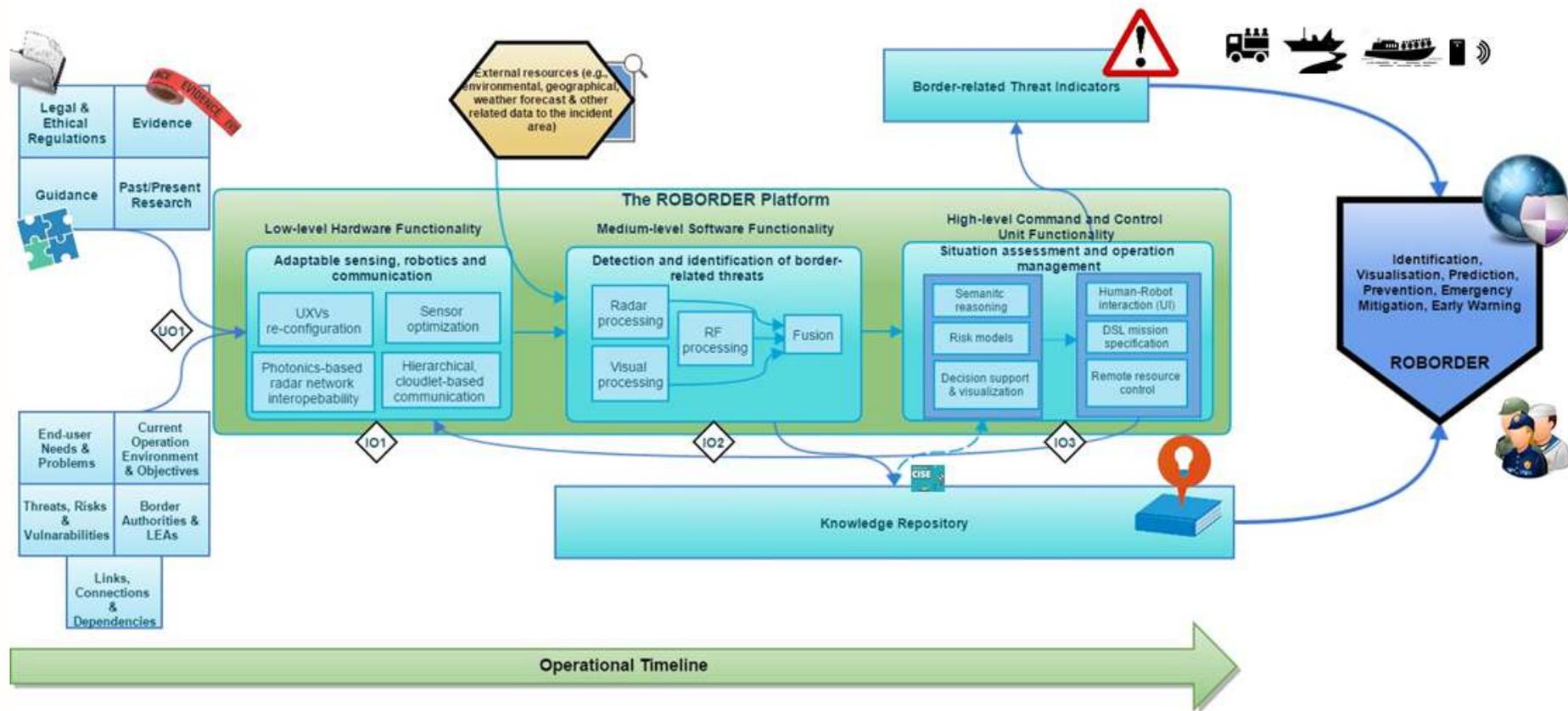
- ROBORDER aims at
  - **Developing and demonstrating a fully-functional autonomous border surveillance system with unmanned mobile robots** including aerial, water surface, underwater and ground vehicles, capable of functioning both as **standalone** and in **swarms**, which will **incorporate multimodal sensors** as part of an **interoperable network**.



# The ROBORDER answer



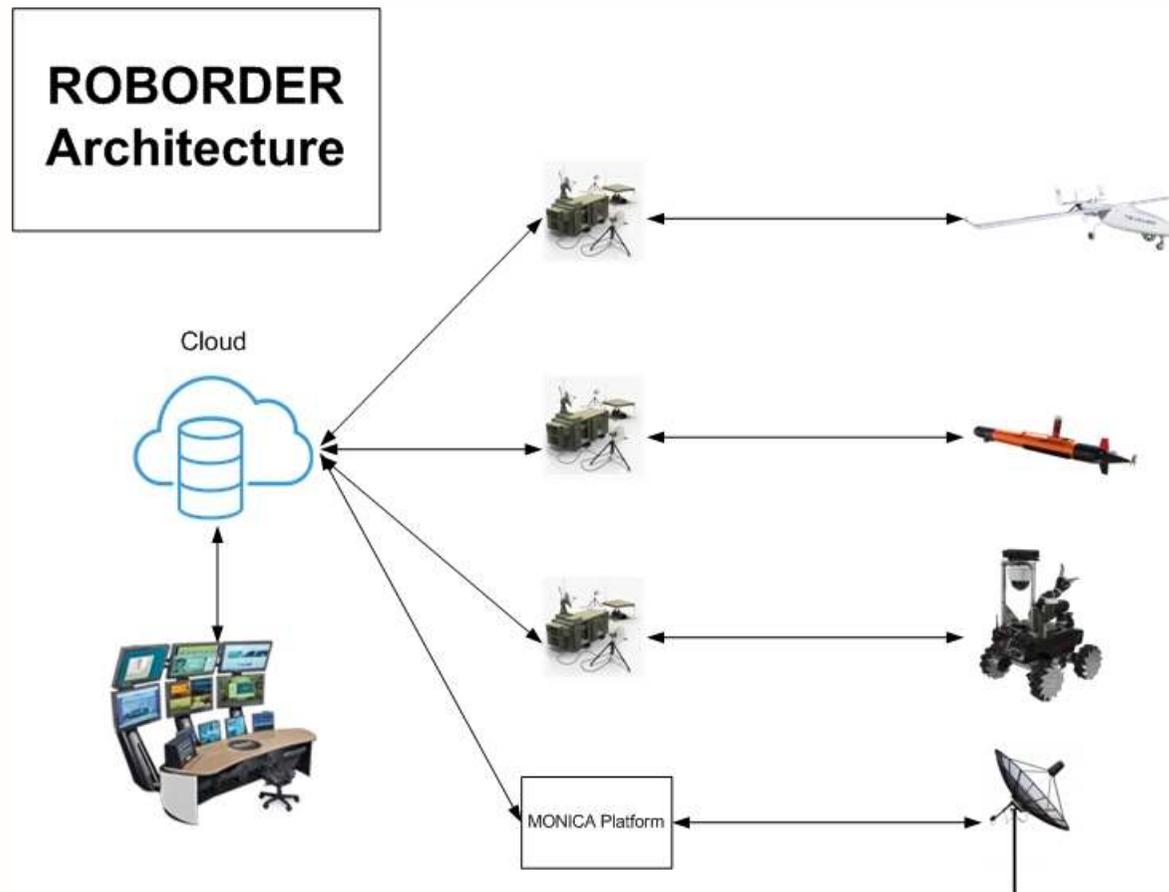
- The ROBORDER Architecture



# The ROBORDER answer



- The ROBORDER Architecture



# The ROBORDER answer

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- ROBORDER Objectives
  - Innovation Objectives
    - Adaptable sensing, robotics and communication technologies for different operational and environmental needs
    - Detection and identification of border-related threats
    - Tele-operation of autonomous agents through a 3D user interface and decision support
    - ROBORDER platform development and integration



# The ROBORDER answer

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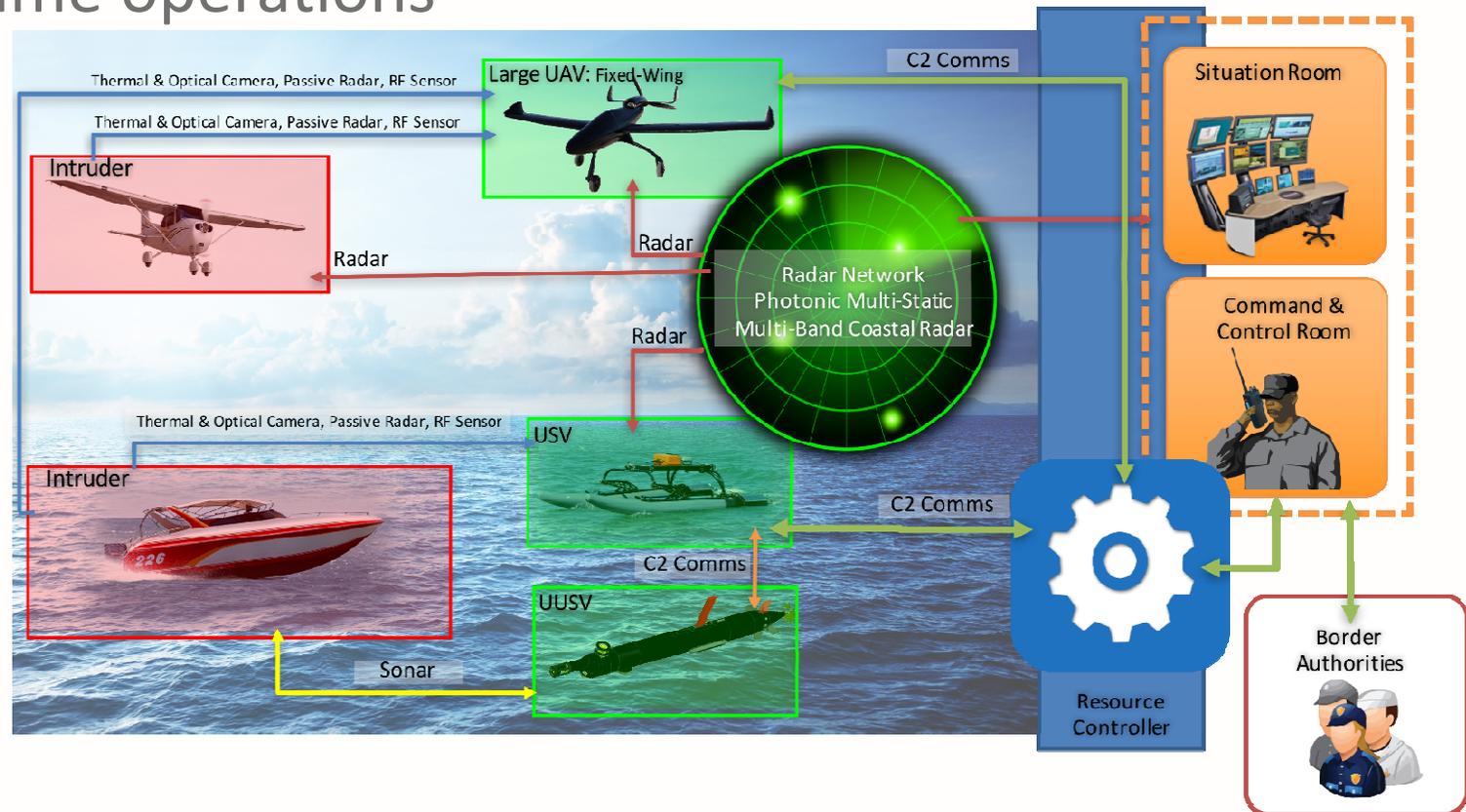
- ROBORDER Objectives
  - User oriented Objectives
    - User requirements definition, end-user evaluation and validation
  - Impact-making Objectives
    - Dissemination and collaboration
    - Exploitation and sustainability model



# The ROBORDER answer



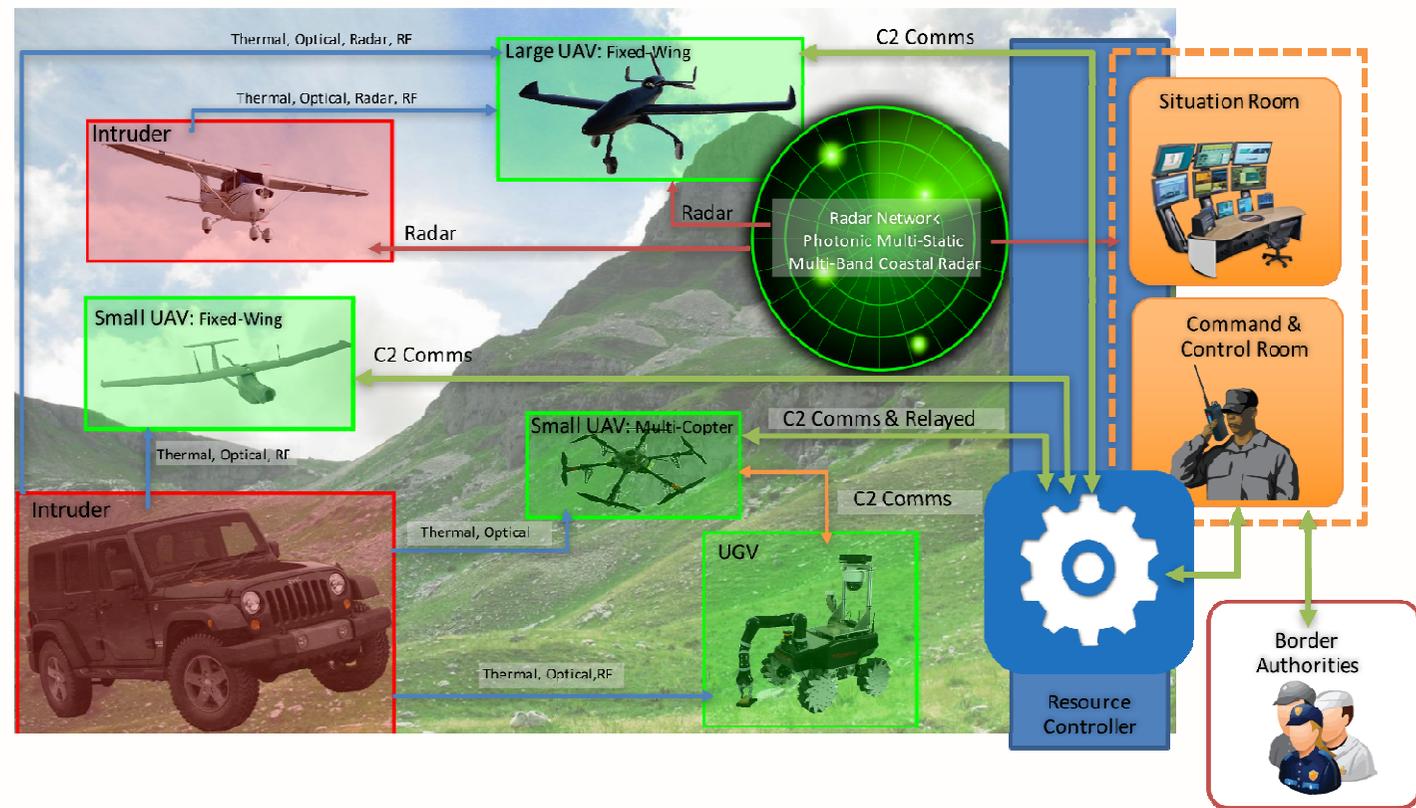
- The ROBORDER Concept
  - Maritime operations



# The ROBORDER answer



- The ROBORDER Concept
  - Land operations



# The ROBORDER answer

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- **ROBORDER technologies & building blocks**
  - Hierarchical, cloudlet based communication network architecture to support context-aware reliable and secure communications in large UxV fleets
  - Optimized passive radar on board UAVs and USVs
  - Passive RF sensor on board unmanned platforms
  - Simulation environment for ROBORDER
  - Agents re-configuration capabilities to adapt to extreme and adverse weather
  - Multi-static photonics based radar network



# The ROBORDER answer

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- ROBORDER technologies & building blocks (cont.)
  - Video and radar based automatic detection of pollution
  - Activity and tracking techniques to detect illegal activities
  - Low-level fusion to increase recognition capabilities
  - Framework for detection of cyber and cyber-physical attacks
  - Identification and tracking of unauthorized communications



# The ROBORDER answer

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- ROBORDER technologies & building blocks (cont.)
  - UxV virtual controller, 3D environment interface
  - DSL mission authoring tool
  - Resource controller
  - CISE-compliant common representation model and reasoning
  - Dynamic data-driven assimilation toolkit
  - Visual analytics and decision support modules



# ROBORDER Integration & testing

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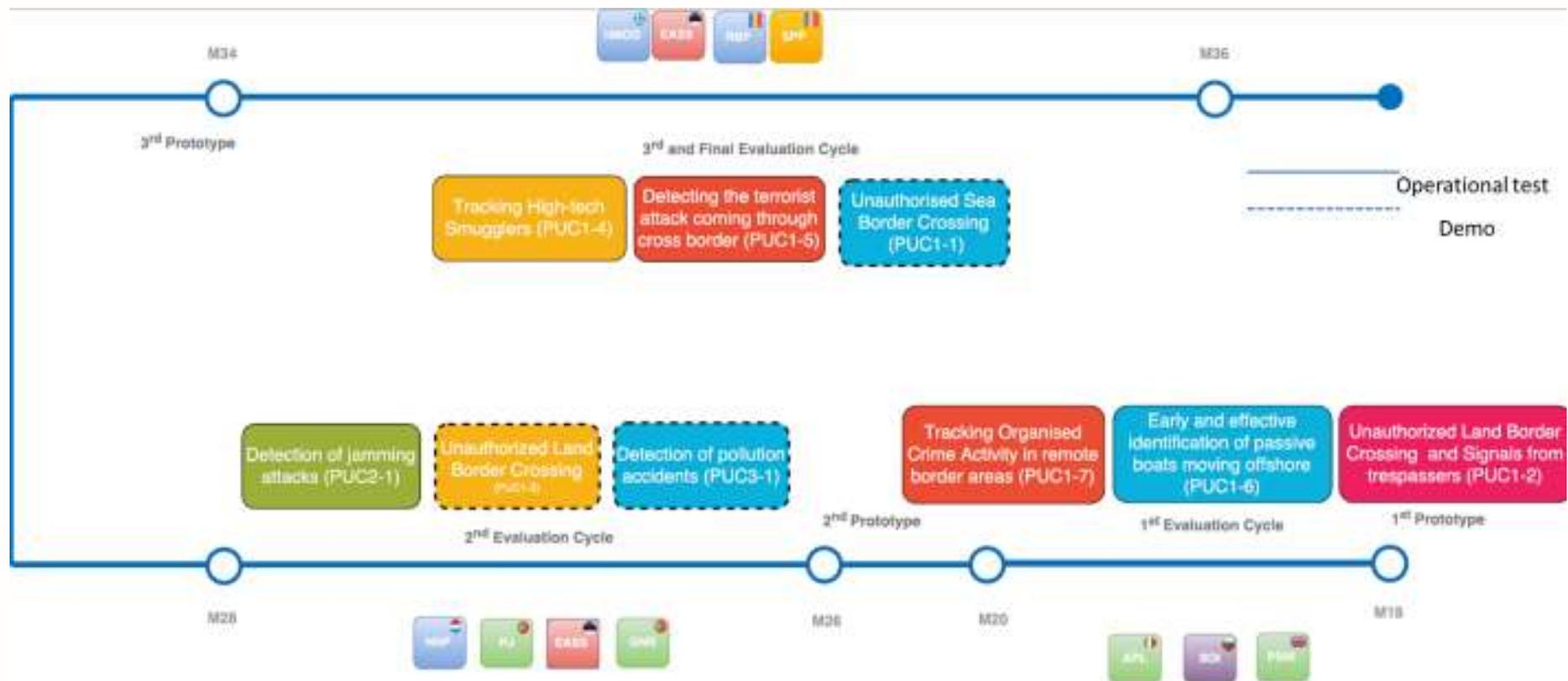
- Integration & testing
  - Three prototyping iterations throughout the project
  - Each iteration ends with testing of three Pilot Use Cases (PUC)
    - PUC 1 comprises two Demonstrations and five Operational tests
    - PUC 2 corresponds to one Operational test
    - PUC 3 corresponds to one Demonstration



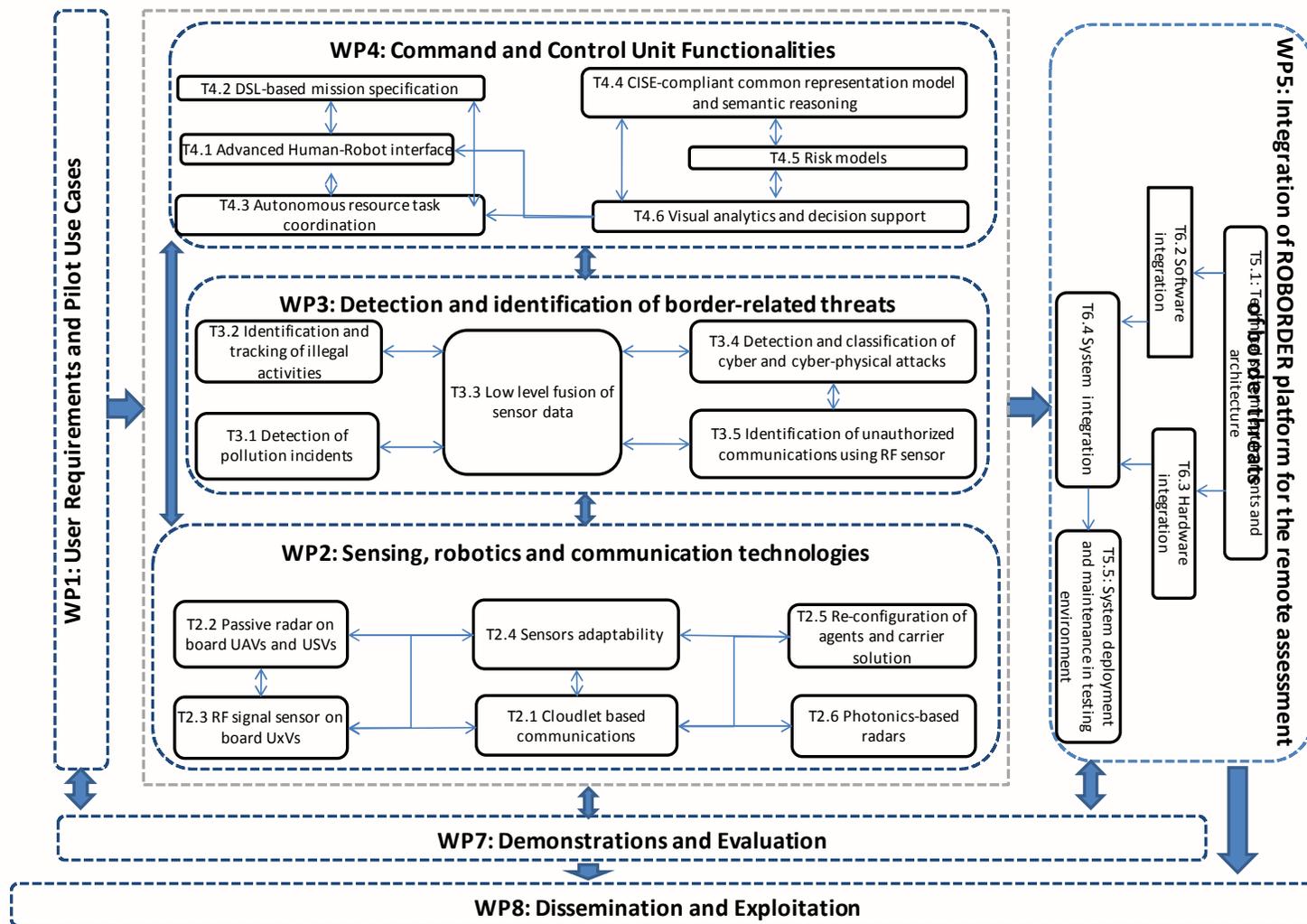
# ROBORDER Integration & testing



- Integration & testing



# ROBORDER WBS





# ROBORDER Consortium



- **14 Technical partners**

- TEKEVER Autonomous Systems (PT)
- Centre for Research and Technology Hellas (GR)
- Fraunhofer Institute for High Frequency Physics and Radar Techniques (DE)
- VTT Technical Research Centre of Finland (FI)
- EVERIS (ES)
- Robotnik Automation (ES)
- Elettronica GmbH (DE)
- Centre of Excellence in Terrorism, Resilience, Intelligence and Organised Crime Research (UK)
- Oceanscan (PT)
- Copting GmbH (DE)
- National and Kapodistrian University of Athens (GR)
- Swiss Centre for Electronics and Microtechnology SA (CH)
- National Interuniversity Consortium for Telecommunications (IT)
- Capritech Limited (UK)

- **11 Practitioners**

- Estonian Academy of Security Sciences (EE)
- Police Service of Northern Ireland (UK)
- Guarda Nacional Republicana (PT)
- NATO Centre for Maritime Research and Experimentation (IT)
- Hungarian National Police (HU)
- Romanian Protection and Guard Service (RO)
- Hellenic Ministry of Defence (GR)
- Autorità di Sistema Portuale del Mar Tirreno Settentrionale (IT)
- Defence Institute Professor Tsvetan Lazarov (BU)
- Polícia Judiciária (PT)
- Romanian Border Police (RO)



# ROBORDER – How can you contribute

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- External advisory board (EAB)
  - Currently considering 9 entities including universities, companies and international institutions
  - Will be consulted throughout the project
  - Will receive privileged information
  - May be invited to join Project Workshops
  - May be requested to provide inputs and expert opinions
  - You're more than welcome to join!!!



# ROBORDER Contacts

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- Project contacts

- Coordinator: TEKEVER Autonomous Systems



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- 1990-164 Lisbon

- Portugal



- E-mail:

- Skype:

- TEKEVER Team:



# ROBORDER

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## Q&A

