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TOMORROW TODAY

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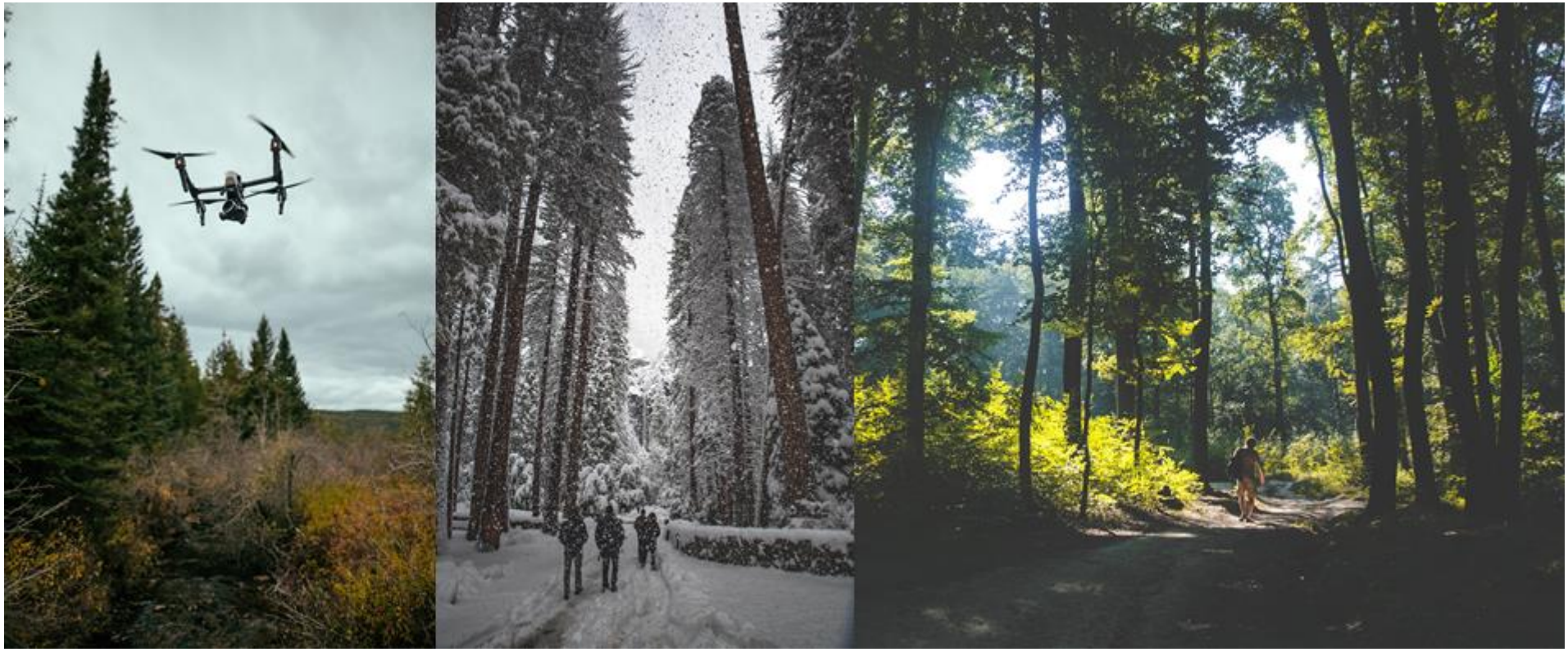
THROUGH FOLIAGE DETECTION, IN THE INNER AND OUTERMOST REGIONS OF THE EU

Center for Digital Safety & Security

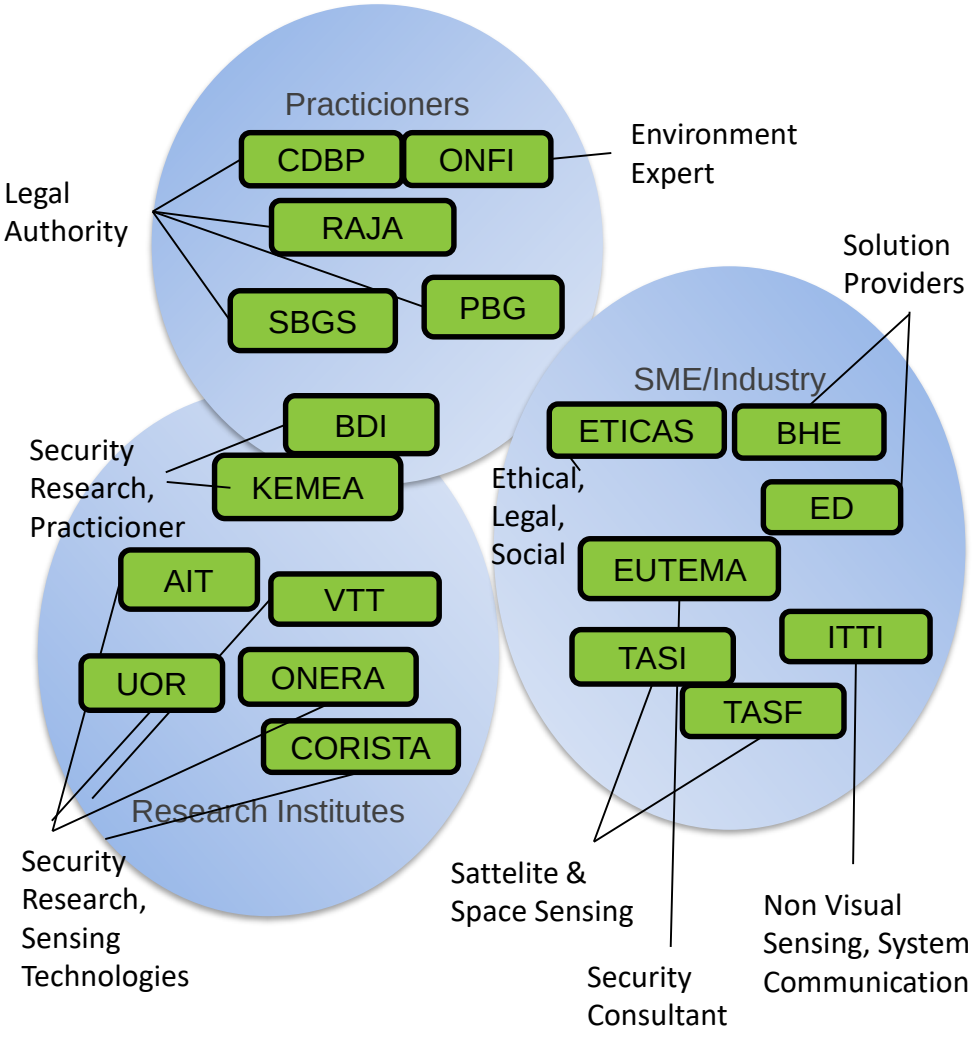
AIT Austrian Institute of Technology GmbH

PROJECT FACTSHEET

- Project start: 1.9.2018
- Project duration 42 months
- Funding Frame: EU H2020 SEC-16-BES-2017 – RIA
- GRANT EUR 8,199,387.75, Grant Agreement Nr.: 787021
- Coordinator: AIT Austrian Institute of Technology GmbH



CONSORTIUM



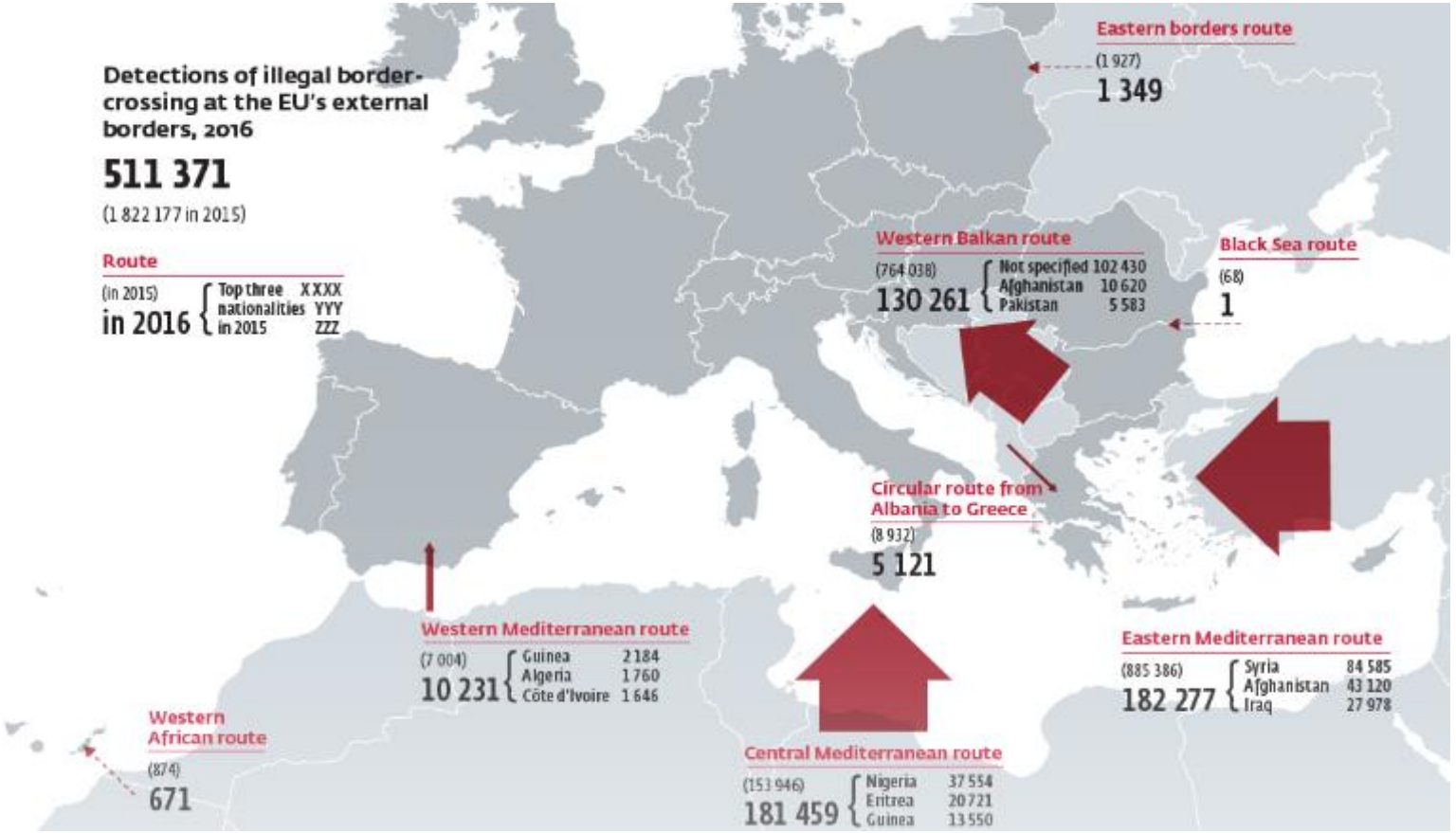
Green: Practitioners

Blue: Academia & RTOs

Transparent: Industry/SME

FOLDOUT partners	Short name	Country
AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH	AIT	AT
EUTEMA GMBH	EUTEMA	AT
EUROPEAN DYNAMICS BELGIUM BE	ED	BE
GLAVNA DIREKTSIA GRANICHNA POLITSIA	CDBP	BG
INSTITUT PO OTBRANA	BDI	BG
KENTRO MELETON ASFALEIAS	KEMEA	EL
ETICAS RESEARCH AND CONSULTING SL	ETICAS	ES
RAJAVARTIOLAITOS	RAJA	FI
TEKNOLOGIAN TUTKIMUSKESKUS VTT OY	VTT	FI
OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES	ONERA	FR
ONF INTERNATIONAL	ONFI	FR
THALES ALENIA SPACE FRANCE	TASF	FR
BHE BONN HUNGARY ELEKTRONIKAI Kft	BHE	HU
CO.RI.S.T.A. CONSORZIO DI RICERCA SU SISTEMI DI TELESENSORI AVANZATI	CORISTA	IT
THALES ALENIA SPACE ITALIA SPA	TASI	IT
ITTI SP ZOO	ITTI	PL
KOMENDA GLOWNA STRAZY GRANICZNEJ	PBG	PL
THE UNIVERSITY OF READING	UOR	UK
VALSTYBES SIENOS APSAUGOS TARNYBA PRIE LIETUVOS RESPUBLIKOS VIDAUS REIKALU MINISTERIJOS	SBGS	LT

FRONTEX ANNUAL RISK ANALYSIS 2017



- crossings are not detected with current environment because of
  - routes in forests
  - lack of effective equipment for foliage penetration

Source: http://www.dw.com/en/smuggling-migrants-through-bulgaria

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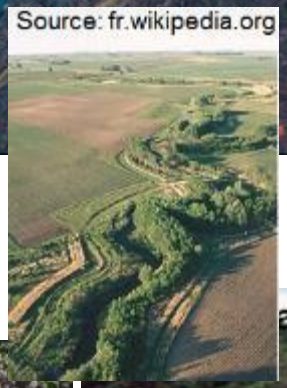
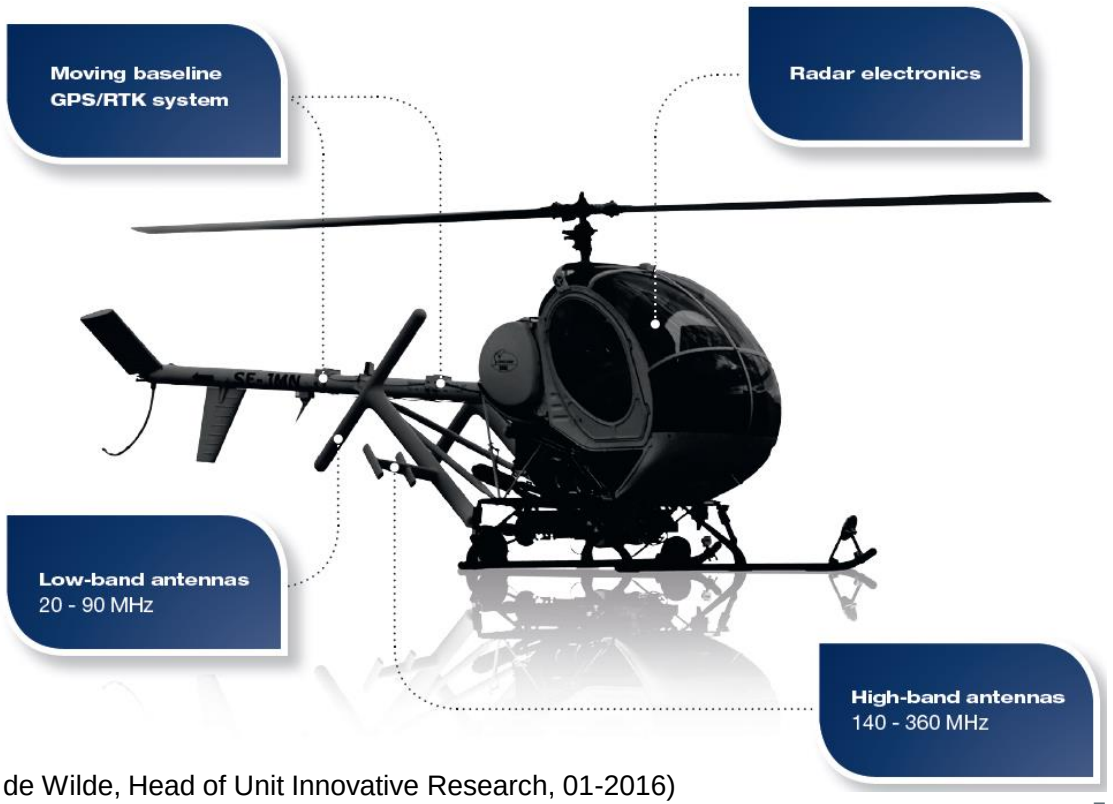
VEGETATIONS AS DETECTION-BARRIER



STATE OF THE ART

- SAAB Carabas is considered as a reference system of today*
  - To be complemented with FOLDOUT results in order to deliver a common solution for border authorities



(* Source EDA, Gerlof de Wilde, Head of Unit Innovative Research, 01-2016)

MOTIVATION

- **Increase of irregular migration** no longer manageable with existing systems
- Improved methods for **border surveillance** are to ensure an effective and efficient EU border management
- **Support Border guards** to be able to
  - follow peoples moving into forests or other harsh and unstructured environments.
  - **deploy rapid intervention** troops and/or Border Police Teams at the scene

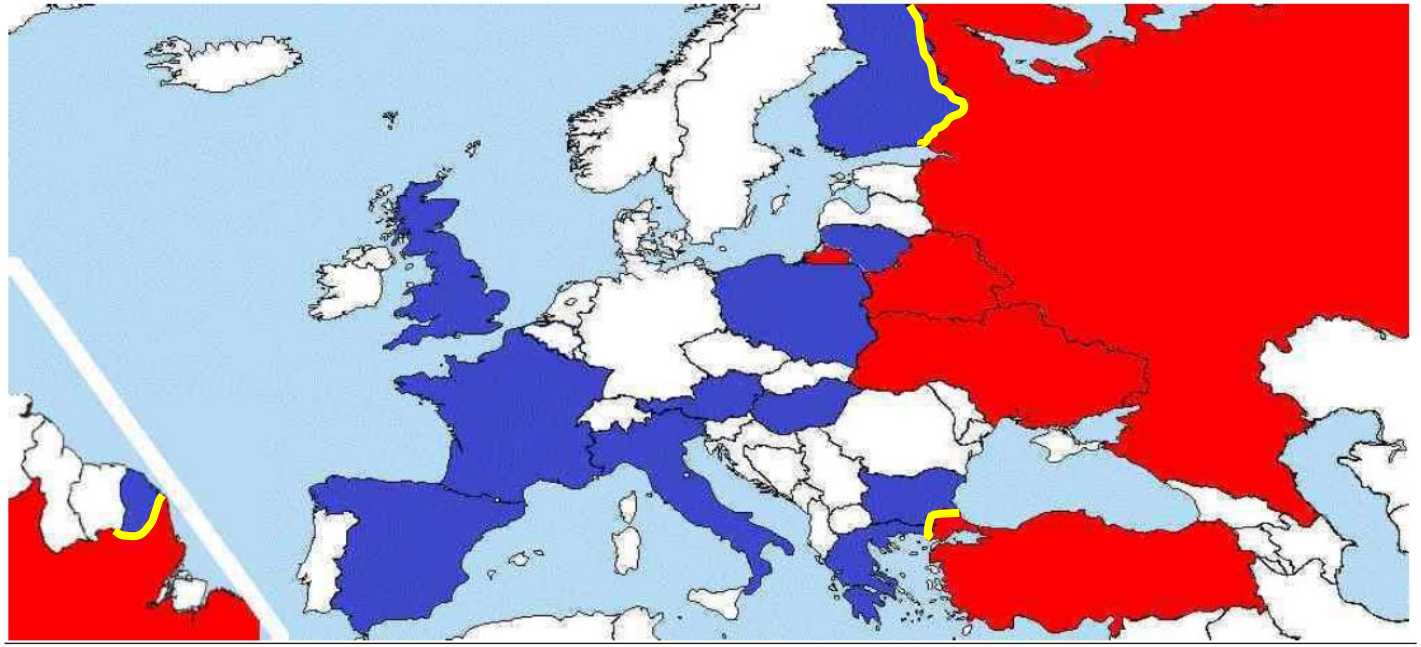
  as a key to an effective border security
- **No off the shelf solution enabling** a consistent and unified solution
- Border Surveillance needs
  - **Robustness/Reliability**: resistance in all climates; combination of the best sensors and technologies; intelligent fusion and self learning system
  - **Effectiveness:** situational awareness results with the help of simple/interactive management in effective operations

APPROACH

- Integrate data (vehicle traffic), from **outside the border area** for pre-alarming
- Integration of state-of-the-art solutions
- Enhance existing detection systems (sensor, algorithms) for foliage penetration
- **Combines various sensors** and detection technologies and **intelligently fuse** them into an effective and robust intelligent detection platform.
- Simple decision making interface with suggested reaction scenarios to allow **a complete situation threat assessment**
- **A two year pilot in Bulgaria** and demonstrators in Greece, Finland and French Guiana FOLDOUT will provide fundamental enhancements
- To achieve improvements to the current situation of border surveillance FOLDOUT investigates in the following scenarios:
  - Scenario 1: Detection of **irregular border crossings** in forest terrain
  - Scenario 2: Persons & vehicles in a **search & rescue** scenario in forest;
  - Scenario 3: **Detection of illegal transport and entry of goods** (human trafficking, goldmines) in temperate broadleaf forest and mixed terrain
- **Ground truth data production**: reference for the developments and tests

→ **Main goal: to develop, test and demonstrate a solution to locate people and vehicles operating under foliage over large areas.**

PARTNER'S COUNTRIES & PROBLEMATIC EU NEIGHBOURS

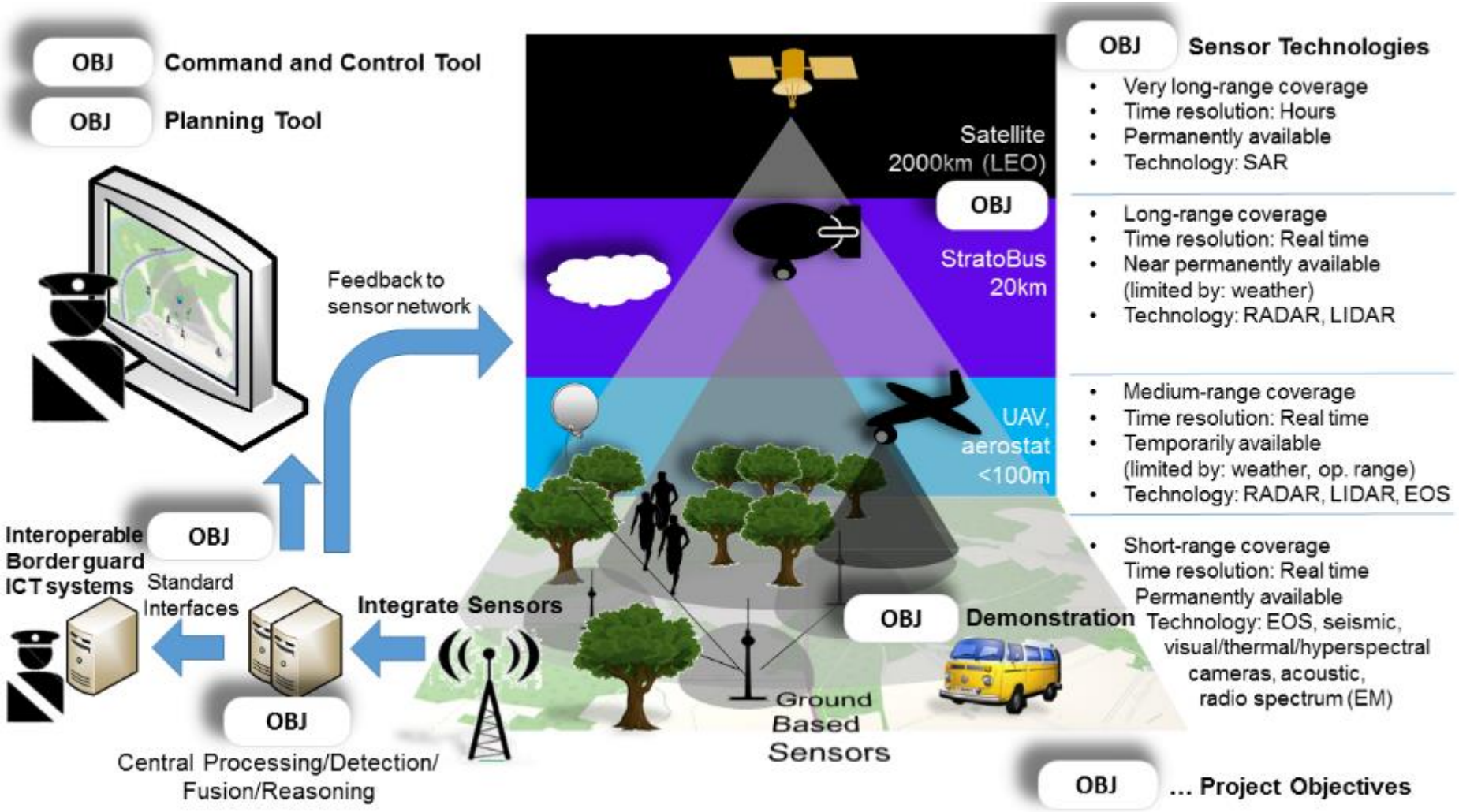


French Guiana – Brazil

Europe

- Red countries are EU neighbour countries named in the call text
- Blue countries are the project partners
- FOLDOUT practitioners in all relevant countries
- Demo borders are marked yellow

OVERVIEW


OBJ Command and Control Tool
OBJ Planning Tool
Feedback to sensor network
Satellite 2000km (LEO)
OBJ
StratoBus 20km
UAV, aerostat <100m
OBJ Sensor Technologies
• Very long-range coverage
• Time resolution: Hours
• Permanently available
• Technology: SAR
• Long-range coverage
• Time resolution: Real time
• Near permanently available (limited by: weather)
• Technology: RADAR, LIDAR
• Medium-range coverage
• Time resolution: Real time
• Temporarily available (limited by: weather, op. range)
• Technology: RADAR, LIDAR, EOS
• Short-range coverage
Time resolution: Real time
Permanently available
Technology: EOS, seismic, visual/thermal/hyperspectral cameras, acoustic, radio spectrum (EM)
Interoperable Border guard ICT systems
OBJ
Standard Interfaces
Integrate Sensors
OBJ Demonstration
OBJ
Central Processing/Detection/ Fusion/Reasoning
Ground Based Sensors
OBJ … Project Objectives

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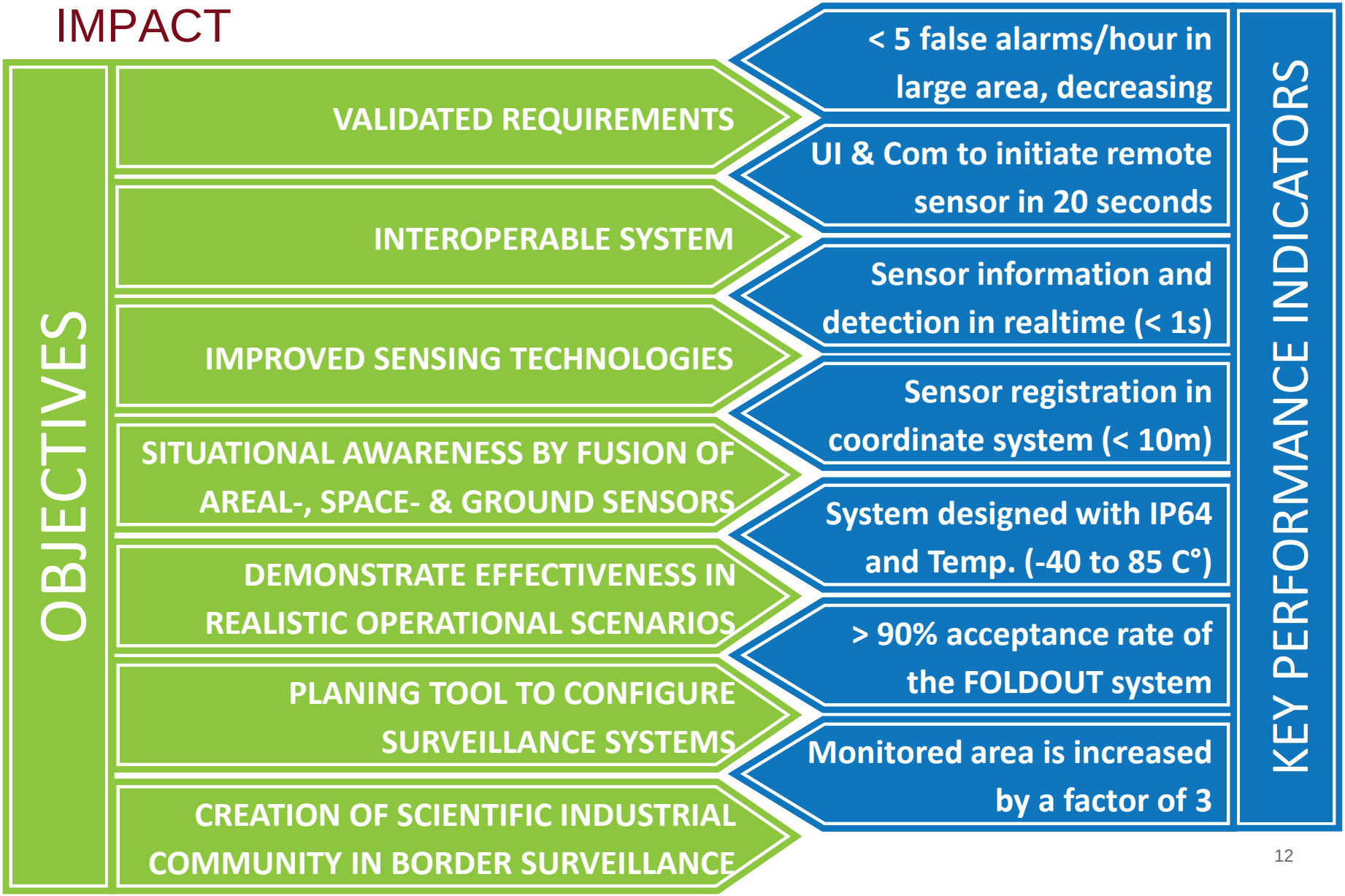
IMPACT



METHOD/AMBITION

- ***Establish and validate requirements of European border guard organisations (Objective 1)***
  - Strong involvement of the border authorities and related practitioners for operational requirements agility of the development approach with several modification/validation cycles.
  - Strong involvement of the technology providers for developing system requirements derived from the operation need
  - Strong involvement of the border authorities and related practitioners for validation of system results according to the specified requirements

- ***Develop an interoperable system that allows integration with European border surveillance systems (Obj 2)***
  - Harmonized data interface for border surveillance
  - Wireless Communication

METHOD/AMBITION

- ***Improve selected sensors and detection technologies adapted to through foliage detection scenarios, deployed on different sensor platforms and development of and generic machine learning based person/vehicle/object detection and tracking. (Objective 3, Objective 4, Objective 5)***

  - Active Hyperspectral Sensor (AHS) for Target Identification
  - 3D Lidar/Laser for Under-Canopy Terrain Scanning
  - Passive Multi- and Hyperspectral IR Cameras for Unmanned Aerial Platforms
  - Radar fence demonstrator
  - Acoustic/seismic Sensor Detectors for Activity Detection in Dense Foliage
  - Radio Spectrum Analyser for Early Warning on EM activities
  - EO sensor set adaptation for wide area monitoring
  - Detection, identification and tracking

METHOD/AMBITION

- ***Improve situational awareness through fusion of advanced aerial and space-based sensor platforms into one surveillance solution (Objective5, Objective 6)***
  - Fixed or Rotary Wing UAV multi sensor platforms
  - Stratobus as a high rise sensor platform
  - Satellite SAR for wide area early warning
- ***Decision making support tool using fusion of aerial/space- and ground based sensor data and user interface for border guards to operate the system fulfilling the European requirements (Objective 1, Objective 6 Objective 7)***
  - Data Presentation and Border Guard Interface
  - Decision support through fusion of aerial-, space- and ground based sensor data into one surveillance solution
- ***Provide a planning tool for decision makers to configure a surveillance system for the specific requirements of a target deployment area. (Objective 9)***
- ***Creation of scientific/industrial development community in the domain of border surveillance (Objective 10)***
- ***FOLDOUT delivers technical solutions that are in-line with regulations at the EU and the member states level. (Objective 11)***

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WORK/TIME PLAN

Field Trials & Evaluation, Ethical Legal Societal Impact, Management, Dissemination

Reqs & Scenario Plang

Sys. of Sys. Architeture Def.

Multi Environment Com

Ground Sensor Solutions, C2 Plattform Development & System Integration

Airborne Space Sensors, Sit. Awareness & Alarming

FP1 FP2 FP3

2018 2019 2020 2021 2022

M9 Early Demonstrator, Bulgaria

M16 FOLDOUT Prototype, Bulgaria

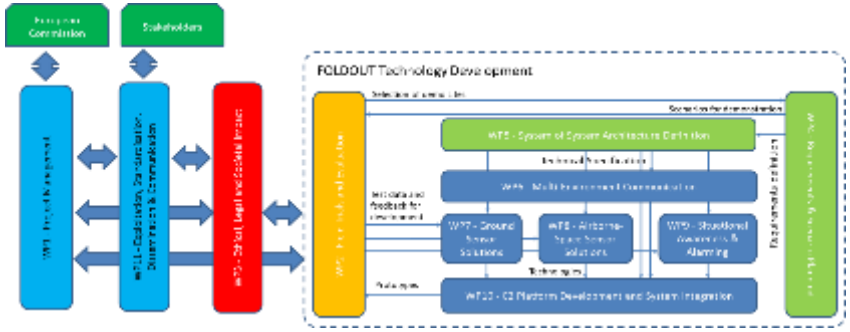
M28 FOLDOUT System, Demo Bulgaria

M30 FOLDOUT System, Demo Finland

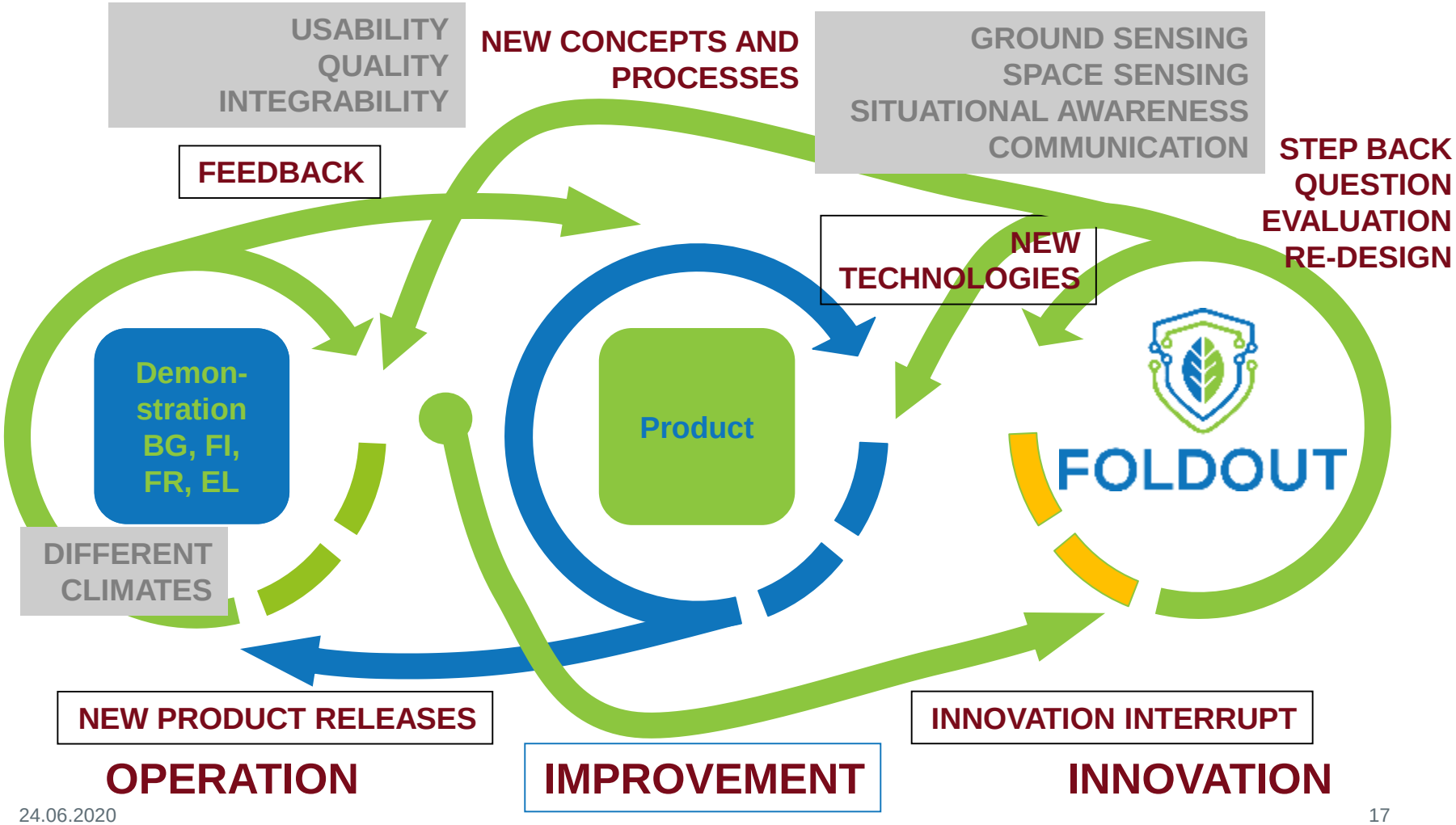
M32 FOLDOUT System, Demo French Guiana

M36 FOLDOUT System, Demo Greece

M42 Joint Evaluation & Recommendations Report



SCIENCE TO SOLUTION – EXPECTED OUTCOME



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Thank You!

Contact information

www.foldout.eu

[personal data, Art 4(1)(b) of Regulation (EC) No 1049/2001]