

Protection of European Seas and borders
through the intelligent use of surveillance

Agenda



- ☐ Overview
- ☐ Partners
- ☐ Involving Users
- ☐ Main results
- ☐ Major milestones

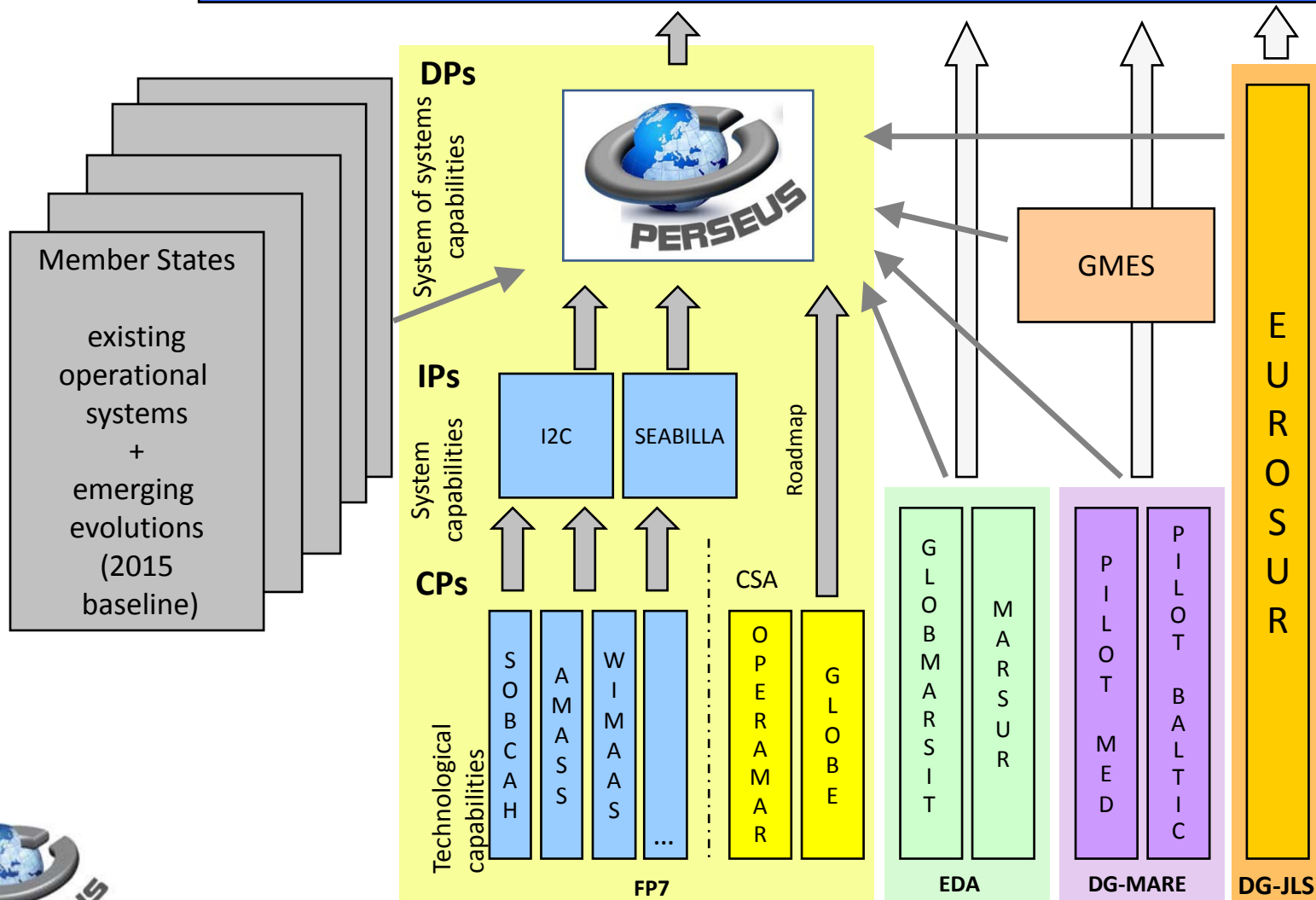
What is PERSEUS?

- PERSEUS is a **demonstration project**
- Uniting **29 partners** from **12 countries**
- Integrating the maritime surveillance systems around the **Mediterranean**
- In the context of the **European surveillance** of (maritime) borders - EUROSUR
- Started on 1/1/2011
- Operating for 4 years



Set in a pre-existing environment

European-wide Integrated Maritime Border Control System



What is PERSEUS?



- Funded by the European Commission and by the partners
- Within the Security programme
 - FP7-SEC-2010-1
 - Activity – Intelligence surveillance and enhancing border Security
 - Topic – European-wide integrated maritime border control system (Phase II)
- 42 M€
 - 27 M€ - European Commission
 - 15 M€ - PERSEUS partners



- Control of European borders
 - 1792 EU external border crossing points, including 665 air borders, 246 land borders, 871 sea borders
- Sea front addressed through the European border surveillance system – EUROSUR

- **demonstrate and validate** recommendations for the European wide integrated maritime border control system
- **in line with** the EUROSUR objectives
- **across all aspects** (collaborative, regulatory, technological, trans-national)

Scope (1/3) – Deploy & Validate

- **Deploy a novel environment**
 - Integrating **existing legacy systems** and **innovation**
 - within a trans-national network of Member States
 - leading to **innovative surveillance tools**
 - enabling a collaborative, uniform and high level surveillance and control of EU borders
 - while **maintaining national prerogatives**



Scope (2/3) – Deploy & validate

- **Validate** this environment through
 - advanced and realistic surveillance scenarios in the Mediterranean
 - Including complex security missions (irregular migration and drug trafficking)
- Addressing mainly the first two missions of the European Integrated Maritime Policy for the EU (DG-MARE – 2007)
 - Mission 1 crime and illegal trafficking
 - Mission 2 border control and irregular immigration



Scope (3/3) – Deploy & validate

- Validate this environment with an **operational involvement** of
 - Users from all involved Member States
 - European agencies - Frontex, EMSA etc
 - European institutions - DG-ENTR, DG-HOME, DG-MARE, DG-INFOS

PERSEUS “system of systems” (1/2)

- Integrating existing and upcoming national maritime surveillance systems
- Linking existing and upcoming National and Regional Control Centres (NCCs and RCCs)
- Supported by ground, aerial and sea platforms (Maritime Patrol Aircrafts, Unmanned Air Vehicles, Maritime Patrol Boats, Mobile Sensor Stations etc)
- Enabled by an upgraded, easy to deploy and low-cost communication network based on secured, protected and extendable Virtual Private Network (VPN)



PERSEUS “system of systems” (2/2)

Existing and upcoming systems

- Spain – SIVE
- France – Spationav
- Italy – SIA and NCC
- Portugal - SIVICC
- Greece –radars, MPAs, MSAs
- National Control Centres (NCCs)
- Regional Control Centres (RCCs)
- Airborne support (Maritime Patrol Avionics – MPAs etc)
- Etc



PERSEUS – vision and implementation

TARGET VISION

- Defining and refining the target architecture
- Delivering validated recommendations
- Contributing to standards

IMPLEMENTATION

- Deploying the architecture
- Validating through concrete exercises
- Creating a user and provider community



**Advancing the EUROSUR roadmap and
the European maritime surveillance evolution**



PERSEUS Roadmap

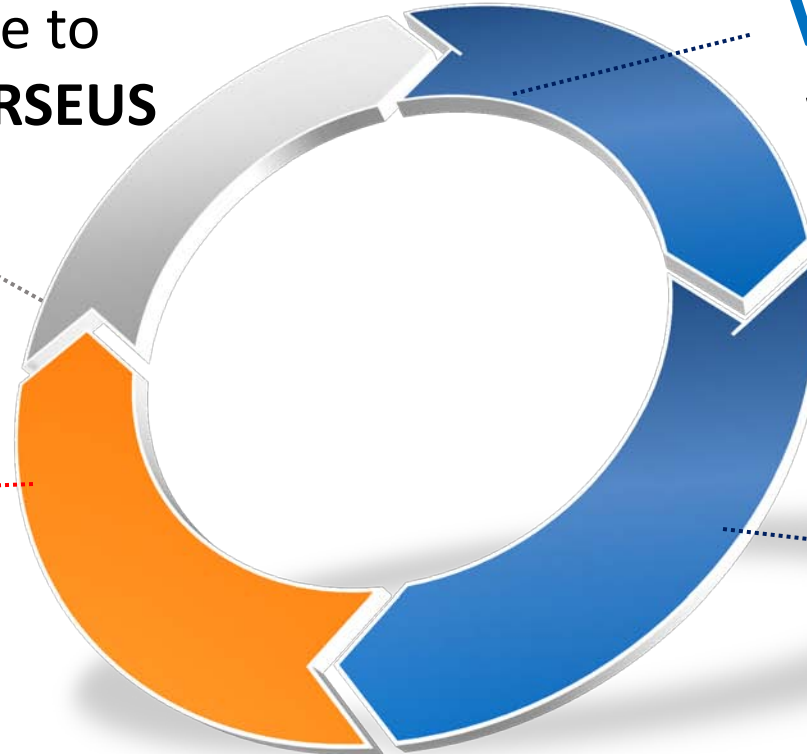
Step 0 - Define & Deploy

2011 Design phase to elaborate the **PERSEUS** target vision.

Step 1 – 2013

Validate

Western Campaign Demonstration



Step 3 – 2014

Contribute

Set-up and propose a European "standard" for Maritime Surveillance Systems for 2015/2020

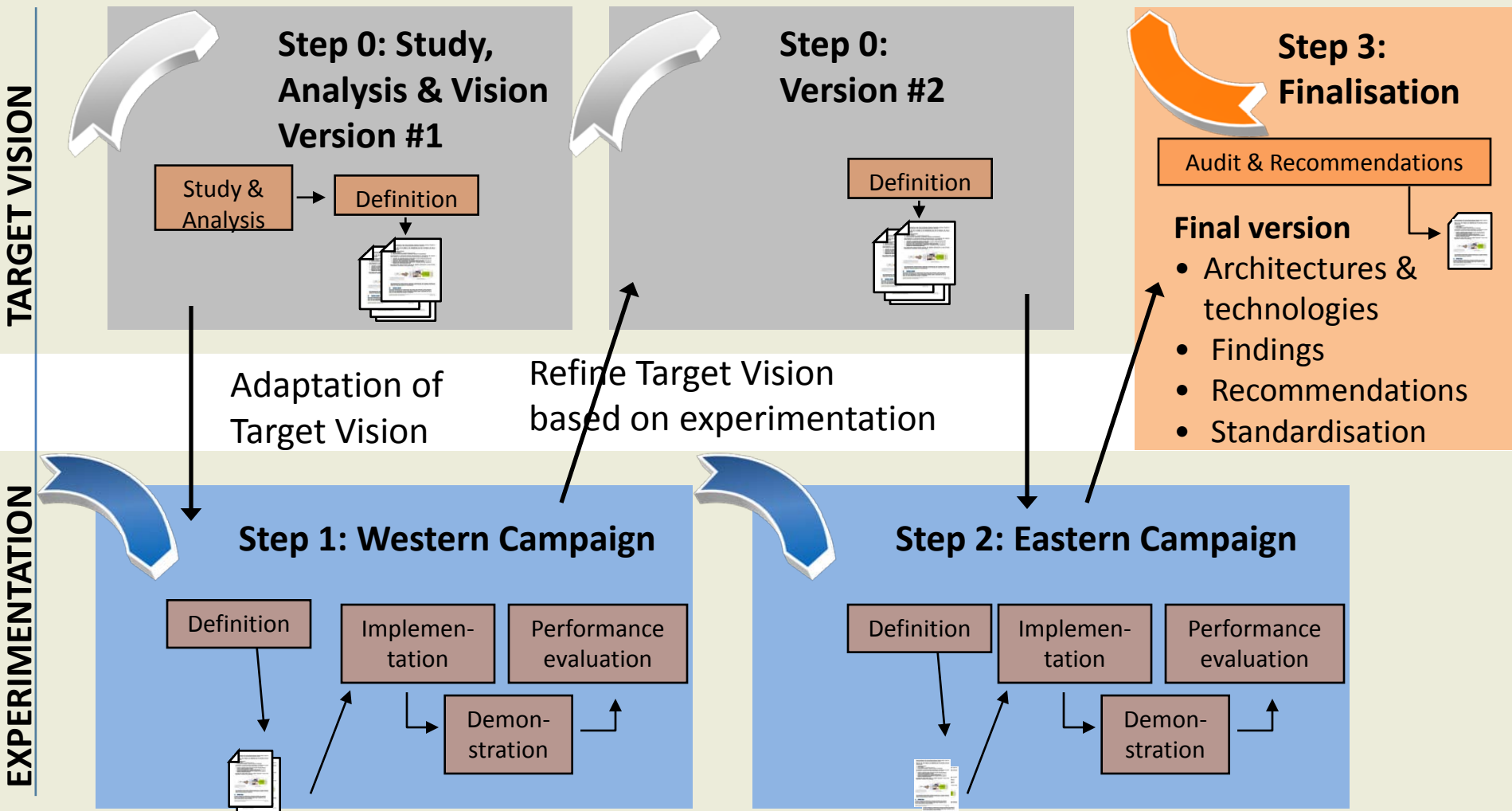
Step 2 – 2014

Validate

Eastern Campaign Demonstration



Delivering a validated target vision



PERSEUS – extensive coverage



- | | |
|--|---|
|  Spanish Radar |  Italian AIS + Radar |
|  Spanish AIS |  French I2C/ Spationav Radar |
|  Portuguese Radar |  French I2C/ Spationav AIS |

PERSEUS roadmap



Campaign 1: 2013

Campaign 2: 2014

Western Campaign – exercise 1

Building and evaluating the European Common Situational Information Picture



Seas: Atlantic approaches to Italy, including North Western Africa

(! same exercise deployed for Eastern Campaign)



Users: exploiting and evaluating the networking of the operational systems



Duration - 6 months

Western Campaign – exercise 1

Building and evaluating the European Common Situational Information Picture



Seas: Atlantic approach
Western Africa



Users: exploiting a
the operational system



Duration - 6 months

Innovations

- Set up and delivery of the System of Systems to build up ECSIP
- Integration of new sensors
- Secure network and data exchanges between NCCS, Frontex, EMSA etc
- Automatic fusion of information from external sources
- Abnormal vessel behaviour detection and automatically documented alarms

Western Campaign – exercise 2

Integration and coordination of sensors, platforms and systems by targeting interoperability at 4 levels: technical, syntactical, semantical and organisational



Seas: from the Canary Islands down the west coast of Africa up to Guinea Bissau



Users: experience usefulness and assess cost-effectiveness of extending the surveillance range beyond the coastal limits, while providing continuity in the surveillance given by different assets



Duration - 1 to 2 weeks



Western Campaign – exercise 2

Integration and coordination of sensors, platforms and systems by targeting vulnerability at levels: technical, syntactical, organisational



Seas: from the
of Africa up to



Users: exper
effectiveness
beyond the
in the surv



Duration

Innovations

- Integration of land, maritime, aerial and space borne platforms.
- Integration of new sensors
- Optimized and cost effective use of platforms for maritime surveillance, tackling the threats from their origins (pre-frontier) thanks to intelligence mission planning capabilities, coordinated actions and the effective sharing of real time information.
- Flag management capabilities in order to create and share flags containing storyboards of suspicious behaviour of targets (early alerts)
- New processing algorithms



Western Campaign – exercise 3

Detecting, identifying and tracking small (<10m) suspicious vessels and low flying aircrafts



Seas:

South-eastern coast of Spain and the Alboran Sea



Users: establish cooperation between Spain and African countries



Duration - 1 to 2 weeks



Western Campaign – exercise 3

Detecting, identifying and tracking small ($\leq 10\text{m}$) suspicious vessels and aircrafts



Seas:
South-eastern



Users: establish
African countries



Duration:

Innovations

- Integration and coordination of land, maritime, aerial and space borne platforms.
- Optimum integration of Unmanned Aerial Platforms in the surveillance system.
- Integration of new radar sensors
- Integration of new processing modules and intelligent
- Implementation of secure tactical communications (land-based and satellite) for the interconnection of assets, systems and Coordination Centres.

Western Campaign – exercise 4

- Surveillance of goods smuggling through *enhanced* vessel tracks *exchanged to create continuous vessel surveillance processes* across Member States / creation of rule based automatic alerts



Seas: West Mediterranean Basin, from Atlantic Gibraltar Approaches to Italy



Users: from Portugal, Spain, France and Italy and North Western Africa – experience the benefits of the increased outreach and automated alerts



Duration - 2 weeks



Western Campaign – exercise 4

- Surveillance of goods smuggling through enhanced vessel tracks exchange and state continuous vessel surveillance processes

creation of



Seas: West M
Gibraltar Apr



Users: from
North Wes
the increa

Duration:



Innovations

- Integration of land, maritime, aerial and space borne platforms.
- Integration of new sensors
- Optimized and cost effective use of platforms for maritime surveillance, tackling the threats from their origins (pre-frontier) thanks to intelligence mission planning capabilities, coordinated actions and the effective sharing of real time information.
- Flag management capabilities in order to create and share flags containing storyboards of suspicious behaviour of targets (early alerts)
- New processing algorithms

Eastern Campaign – exercise 5

- Surveillance of irregular migration / Establishment of improved common situational picture between Hellenic Armed Forces, Navy, Coast Guard and between Hellenic NCC and Frontex



Seas : Aegean Sea; SAMOS Island channel



Users: experience the increased level of integration between available coastal and regional systems



Duration - 2 weeks



Eastern Campaign – exercise 5

- Surveillance of irregular migration / Establishment of improved communication between Hellenic Armed Forces and Frontex between Aegean and Eastern Mediterranean



Seas : Aegean

Users: ex
between



Duration - 2 weeks

Innovations

- First alarm on suspicious vessel forwarded by a ferry detecting small boat departure
- Continuously tracking, by a network of C2 stations, of suspicious small boat departure from the Great Minor Asia coast and routing to SAMOS Island
- Testing collaborative reporting and notifications on event between Hellenic C2s and C2s to NCC.
- Estimating the suspicious boat route to position the Navy and Coast Guard patrolling ships.
- Hellenic NCC report to Frontex CC (at the departure, at the identification of threat and at interception).

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29 partners from 12 countries



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SPAIN

Indra

Isdefe

Airbus Military

Boeing Research &
Technology Europe

Meteosim

Guardia Civil



FRANCE

Cassidian

DCNS

Intuilab

Sofresud

Ministry of Interior



ITALY

Engineering

Ingegneria Informatica

Nato Underwater Research
Centre - NURC



GREECE

Demokritos

Satways

Hellenic Coast Guard

Hellenic Ministry of Defense



PORTUGAL

INESC

Força Aerea Portugal (FAP)

29 partners from 12 countries



IRELAND

Skytek

National Maritime
College Ireland (NMCI)



NORWAY

PRIO



SWEDEN

SAAB



FINLAND

Ajeco Oy

Laurea



NETHERLANDS

Ecorys



LUXEMBOURG

Luxspace

SES Astra



SWITZERLAND

Data Fusion Research Centre
(DFRC)

Partners

- PERSEUS unites
 - **Technology partners** – building on deployed solutions and systems
 - **Services partners** – providing information, supporting training, analysing the legal and policy context
 - **Users** – as partners and as committed participants



Technology partners

Maritime Solutions & Systems

Cassidian

DCNS

Engineering Ingegneria Informatica

Indra

Isdefe

Saab

Additional technologies

Demokritos

Data Fusion Research Centre

Intuilab

Laurea

Satways

Sofresud



Services partners

Service Providers (satellite and weather information)

Ajecco

LuxSpace

Meteosim

SES Astra

Training support

NMCI

Skytek

Policy & legal context

PRIO

AirBorne support

Airbus Military

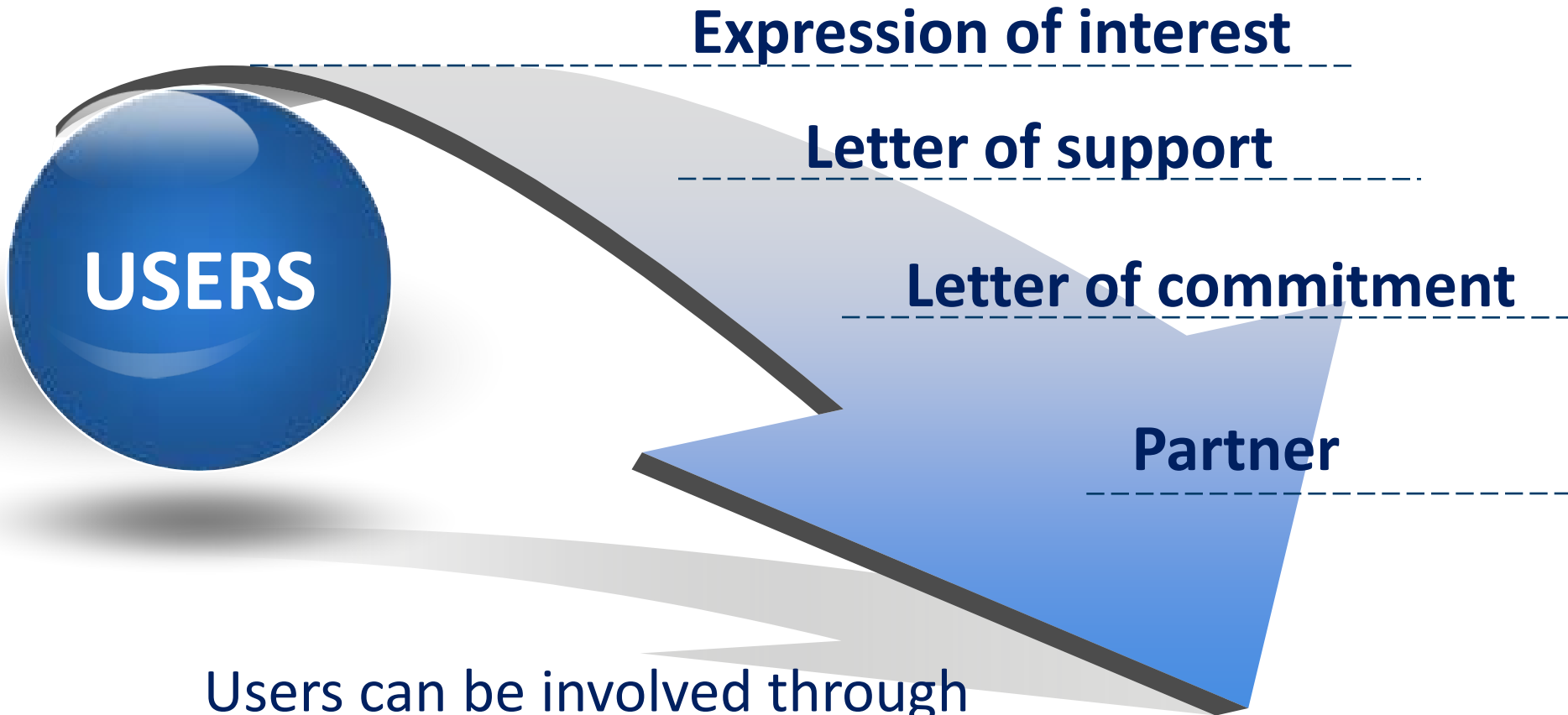
Força Aerea Portugal



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Involving users



Users can be involved through 4 different levels of participation and are organised in a User Steering Committee

- **Full partner**
 - full participation in all phases and providing access to the centres / assets / systems operated by user
 - (this level was open at proposal time and its current availability will be further discussed in June 2011)
- **Letter of commitment**
 - Participation to initial definition and demonstration phases by providing access to assets / systems operated by user
- **Letter of support**
 - Participation to advisory and validation activities during the complete duration of PERSEUS
- **Expression of interest**
 - Participation to two early validation phases

Involving users



USERS

Users (as PERSEUS partners)

Guardia Civil (Spain)

Ministry of Interior (France)

Ministry of Defence (Greece)

Coast guards (Greece)

NMCI (Ireland)

Força Aerea Portugal

Users (as PERSEUS participants)

Coast Guard (Italy)

Ministry of Interior (Italy)

Mazzara del Vallo fisheries (Italy)

Port of Genoa (Italy)

Border police (Romania)

Port of Algeciras (Spain)

Gardai (Irish National Police)

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PERSEUS Results



An operational and validated solution enabling shared surveillance of maritime borders and collaborative actions

Lessons learnt and recommendations towards collaborative maritime surveillance policy and roadmap

Target vision, architecture and processes contributed to EUROSUR and beyond



Common Information Sharing Environment

- interoperability guidelines at data and process level, ensuring that existing and upcoming systems and sensors integrate seamlessly in the future EUROSUR implementation
- increased correlation capabilities
- integration of online service providers sources such as processed satellite imagery, space born AIS, maritime high-resolution weather forecasts, geographical data etc
- automation of exchanges between the NCCs, the agencies
- proposing preliminary procedures, protocols and operations for trans-national collaborations in combating illegal and criminal activities



CSP – Common Situational Picture

- **higher level of automation** in the generation of the CSPs at national, regional and European levels
- **higher integration** of all assets at trans-national level
- **continuous surveillance coverage**

**Enhanced towards supporting surveillance
CSIP ... Common Situational Information Picture**



- CSIP – Common Situational Information Picture,
enhanced through the incorporation of
- **surveillance mission** planning module
 - interception and decision **support**
 - supporting the sharing, in quasi real time,
between the NCCs, Frontex, EMSA and,
depending on the missions, additional relevant
agencies such as MAOC-N etc
 - linking to **intelligence sources**



Sensors management

- improved data fusion algorithms
- provision of a framework for the incorporation of new sensors through a sensors management module
- incorporating novel sensors allowing for their testing in live exercises



Identification & detection of suspicious vessels

- issuing documented alarms on suspicious vessels in quasi real-time
- confirming the identity of reporting vessels and detection through the cross check between AIS message contents and reliable data bases (Lloyds Register, Trafic 2000, ICCAT, e-spotting, weather forecasts, geographical data etc)
- continuous tracking and classification



Small vessels and low flying aircraft detection

- testing the combination of new radars, high resolution optical camera, high resolution satellite observation imagery and data from deployed instrumented assets (aircrafts, UAVs, vessel patrols)

Roadmap

- validated and tested set of recommendations to go beyond the EUROSUR roadmap, including barriers in different domains, overall architecture and uptake processes and contribution to standards
- clearly identified and validated set of data sources and services contributing to the increased level of information
- procurement schemes, cost effectiveness & cost benefit analysis
- re-use and extensibility of the System of Systems and its interfaces



A user-driven target vision

- building on the *experience* gained within a **consolidated user community** over 4 years

An understanding and **increased expertise** gained within a **providers community** after 4 years of working **together** in building and maintaining the operational reality of a System of Systems

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Milestones

2014

Eastern Campaign exercises
Roadmap and final recommendations

2013

Western Campaign exercises
Eastern Campaign scenarios
SoS deployment validated for Eastern Campaign

2012

Western Campaign scenarios
Training environments
SoS deployment validated for Western Campaign

2011

Inventory of assets	User requirements
Collaboration channels	Communication design
System of Systems (SoS) Architecture	





**Empowering
users through
an integrated
surveillance
picture**

**Extending the
surveillance
outreach of
each country**

**Fostering the
intelligent use
of surveillance**

**Demonstrating
across the
Mediterranean**

**Easing collaboration
between nations
and EU agencies**

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