



FROM INNOVATION TO SOLUTION

## SESAR's work on RPAS

Taller para la Comunidad Española de RPAS – 28/01/2014

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SESAR JU



founding members



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# The SJU is a Public Private Partnership (PPT)



EUR 2.1 bio

15 other members

13 associate partners = 110 companies in total

20+ countries

3000 people working on SESAR

300+ projects



# Background

- Almost 1,000 civil RPAS operators legally flying RPAS in the EU MS.... But fragmented activity
- RPAS need to adapt to ATM to avoid segregation - Not the other way around – Just another airspace user
- Integrate operational improvements addressing RPAS operations into the ATM Master Plan and its roadmaps



# Rationale

- Safe **integration** of RPAS operations into the European civil airspace system from 2016
- Non-segregated ATM environments
- SES/SESAR Compliant – Likely to become an integrated part of the current SESAR Programme (by 2015) and SESAR 2020



# R&D Gap Analysis

**Identification of gaps in the operational and technical domains led to the following topics:**

- DAA (Detect & Avoid)
- Human factors
- C2 (Command & Control)
- SESAR compliance
- Contingency
- Security

# Interdependency

## R&D and REG are interdependent:

- Most of the requirements for RPAS integration, in short terms, are regulatory requirements:
  - ✓ On safety (airworthiness, C2/C3, ...)
  - ✓ On interoperability
- There are also potential new requirements on insurance, liability and privacy protection (cf. SESAR RPAS Definition Phase)



# SESAR On-going work

- 9 RPAS Demonstration Projects – live trials using existing technology/procedures
- Liaison with FAA and ICAO
- WPE Projects
- SESAR RPAS Definition Phase:
  - *Launch of a call for a RPAS Definition Phase Study (end of Jan. 2014)*
  - *Beginning of the Study in May*
  - *Last deliverable in March 2015*
  - *See more SESAR public web site – Procurement*
  - *[http://www.sesarju.eu/sites/default/files/documents/procurements/Ex-ante\\_information\\_-\\_Definition\\_Phase\\_study\\_RPAS.pdf](http://www.sesarju.eu/sites/default/files/documents/procurements/Ex-ante_information_-_Definition_Phase_study_RPAS.pdf)*





# RPAS Demonstration Projects

Nine “RPAS Demonstration Projects”, which include integrated pre-operational flight trials activities, have been selected



**Integrated Demonstration Project**



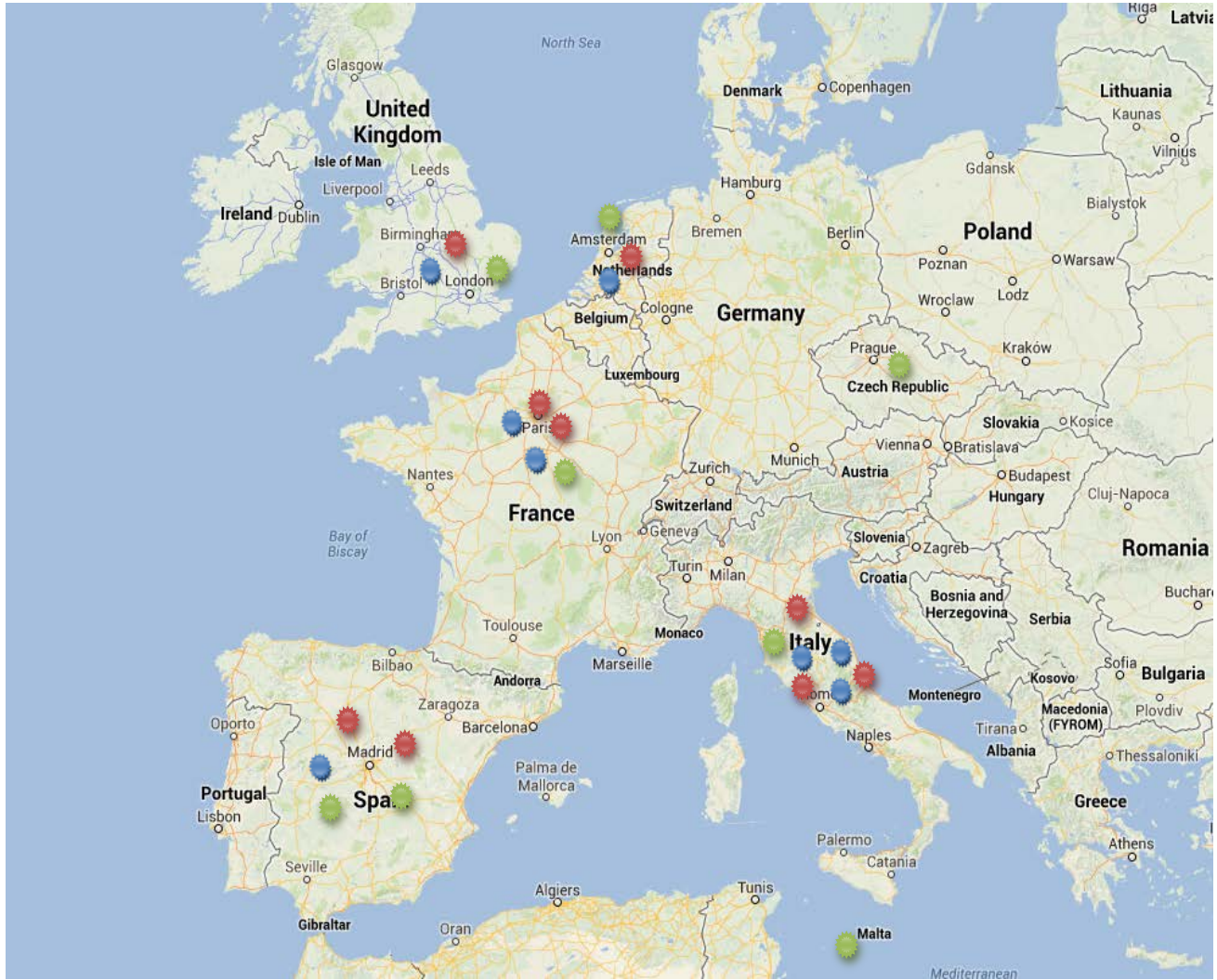
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# Projects' Objectives

- Demonstrate how to integrate RPAS into nonsegregated airspace in a multi-aircraft flight environment, with the purpose of exploring the feasibility of integration within the wider aviation community by 2016;
- Focus on concrete results filling the operational and technical gaps identified for RPAS integration into non-segregated airspace; and
- Capitalise on the SESAR delivery approach by providing synergies, risk and opportunities, with the overall SESAR programme.



# Stakeholders in key location in Europe



-  **Coordinator**
-  **Air Operator**
-  **ANSP**

# SESAR Integrated RPAS Demo Projects (1/3)

## RPAS.01 - DEMORPAS

*Demonstration Activities for  
Integration of rPAS in SESAR*

### Project description

- In-flight exercises in mixed ATM environment, airport landing and take-off procedures and also in En route phase of flight.
- Emergency procedures tests
- Procedures for RPAS flying in the mixed ATM, the airport landing and take-off procedures, impact on human operators, technical evaluation of the communications in order to establish if feasible to be used in mixed airspace

### Coordinator

ISDEFE (SP)

### Partners

AENA (SP)  
INTA (SP)  
CRIDA (SP)  
FADA-CATEC (SP)

## RPAS.02 - INSURE

*Integration into non-segregated  
ATM*

- Flight trials and technology based on CPDLC, ADS-B and TCAS
- Strong implication of the ANSP
- Close coordination between the RPAS operator and Air traffic Control services.
- Extensive demonstration activities through two campaigns (simulation and in-flight)

IDS SpA (IT)

Sistemi Dinamici S.p.A.  
(IT)  
Air Navigation Services of  
the Czech Republic (CZ)

## RPAS.03 - RAID

*RPAS ATM Integration  
Demonstration*

- Maturity, compatibility and limitations of tested D&A and C2L technologies together with
- Human Factors impact of RPAS flights in non-segregated airspace on the RPAS pilot and ATCOs
- Distributed simulation flight trails undertaken between Italy and Malta and a range of live flight trials in Maltese airspace
- Recommendations and guidelines to fill technology and operational gaps

CIRA (IT)

DEEP BLUE (IT)  
NEXTANT (IT)  
NIMBUS (IT)  
UNIVERSITY OF MALTA  
MATS (MT)



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# SESAR Integrated RPAS Demo Projects (2/3)

## RPAS.04 - MedALE

*Mediterranean ATM Live Exercise*

### Project description

- Gap analysis between existing RPAS capabilities and those required for RPAS insertion into non-segregated airspace.
- Distributed networked simulation between the ANSP and a range of MALE, Tactical and Light RPAS, leading on to live mixed traffic (RPAS/manned aircraft) campaign utilizing a flexibly configured MALE RPAS to demonstrate cooperative systems from Decimomannu (IT Air Force Base)

### Coordinator

Alenia  
Aermacchi  
(IT)

### Partners

Selex ES (IT)  
ENAV (IT)  
NIMBUS (IT)  
THALES ALENIA (IT)

## RPAS.05 - TEMPAERIS

*Testing Emergency Procedures in Approach and En Route Integration Simulation*

- 8 test scenarios, 5 of which with live flight trials, and 3 real-time simulation trials demonstration scenarios in approach area using adapted RPAS procedures, illustration and quantification of the impact of RPAS traffic on non-segregated areas on controller workload, ATC constraints on RPAS, nominal and degraded situations (radio, command and control loss)
- In-flight demonstrations will take place at Bordeaux-Mérignac airport using the optionally piloted vehicle

DGAC/  
DSNA (FR)

Airbus Prosky (FR)  
Cassidian (FR)  
STERIA (FR)  
ENAC (FR)

## RPAS.06 - ODREA

*Operational Demonstration of RPAS in European Airspace*

- Simulations in an OPV mode or RPA mode.
- Features like optronic and Infra-red sensors will be tested to demonstrate detect and avoid capabilities.
- 2 flight trial campaigns will be performed to demonstrate ATC track accuracy including C2 link loss procedures and on Detect and Avoid concept.

Rockwell  
Collins  
France (FR)

DGAC/DSNA (FR)  
ENAC (FR)  
SAGEM (FR)



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# SESAR Integrated RPAS Demo Projects (3/3)

## RPAS.07 – CLAIRE

*Civil Airspace Integration of RPAS in Europe*

## RPAS.08 - AIRICA

*ATM Innovative RPAS Integration for Coastguard Applications*

## RPAS.09 - ARIADNA

*Activities on RPAS Integration Assistance and Demonstration for operations in Non-segregated Airspace*

### Project description

- 4-D trajectory information exchange between ATCO and RPAS operator and RPAS air vehicle,
- Effects of the RPAS in mixed traffic environment on the workload of ATCOs
- Defining the effect of flight of multiple and future RPAS on airspace capability & identifying existing limitations on the flight of RPAS in non-segregated airspace,
- Alternative RPAS-specific interoperable surveillance, communications and navigation solutions
- Watchkeeper RPAS usage in the demonstration activities

- A realistic coastguard operation previously completed by manned aircraft involving three different airspace environments (CTR, En-route and low level flight)
- In-flight demonstration performed by a OPV 'FALCON' autogyro RPAS will fly low level BLOS operations in non-segregated airspace over the sea from De Kooy airport, using a D&A system employing Mode S and ADS-B

- Satellite based augmentation systems (SBAS) approach and landing procedures
- A ground based situational awareness system (GBSAS) by using ADS-B technology and "real-time" air traffic information provided by an automated ATC system

### Coordinator

### Partners

THALES UK (UK)	NATS (UK) NLR (NL)
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NLR (NL)	Netherlands Coastguards (NL) Glaesmann System (DE) Royal Netherlands Air Force (NL)
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Indra Sistemas (SP)	AENA (SP) CRIDA (SP) FADA (SP)
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# RPAS0.1 – DERMOPAS - Demonstration Activities for Integration of rPAS in SESAR

**MAIN OBJECTIVE:** Ensure the safe execution of a RPAS flight using a Detect and Avoid system compatible with existing safety nets. Controller situational awareness will be improved by providing the remote pilots with a display presenting the same information the Air Traffic Controllers have in their Controller Working Position. Ultimately the project will demonstrate how to integrate into non-segregated airspace in a multi-aircraft flight environment, in order to explore the feasibility of integration with the wider aviation community by 2016.

**VALIDATION APPROACH:** Three types of exercises with 2 types of short range fully remotely piloted small aircrafts (SIVA, ALO) and 1 optionally piloted: STEMME S15) will be performed.

**TYPE OF RPAS :** Small short range and mid-range RPAS

**LOCATION:** Spain – Logroño Airdrome

**PROJECT ENDS:** October 2015

Kick-off meeting 22.10.2013

## PARTNERS:



**OTHER:** Spanish Safety Agency (AESAs)



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# RPAS0.9 - Activities on RPAS Integration Assistance and Demonstration for operations in Non-segregated Airspace - ARIADNA

**MAIN OBJECTIVE:** Ensure safe execution of a RPAS flight using a D&A system compatible with existing safety nets and operating procedures. Trajectories will be exchanged with ATC taking into consideration the latencies and uncertain trajectory basis for RPAS operations; Satellite-Based Augmentation System (SBAS) based approach & landing of RPAS in aerodrome and Concepts for a RPAS Ground-based situational awareness system (GBSAS) will be used.

**VALIDATION APPROACH:** Flight trials and simulations on a fully unmanned helicopter INDRA Pelicano.

**TYPE OF RPAS:** Rotary wing

**PROJECT ENDS:** October 2015



## PARTNERS:



Aena



FADA  
FUNDACIÓN ANDALUZA PARA EL  
DESARROLLO AEROSPAZIAL



**LOCATION:** Spain

Kick-off meeting 24.10.2013



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# RPAS Definition Phase

- Refine essential R&D activities to enable the integration in the aviation system, as of 2016 and beyond - aligned with SESAR timeframe
- Identify globally interoperable and harmonised ATM requirements and enablers in terms of performance requirements
- A R&D and validation programme outline
- A high level implementation timeline, including costs and priorities
- Identification of the necessary work to support the alignment of the legislative, financial and regulatory frameworks allowing deployment





Thanks for your attention

