SESAR RPAS R&D ROADMAP DEVELOPMENT

Integration of RPAS into European ATM System
R&D Definition Phase

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INTRODUCTION & SETTING THE SCENE

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INTRODUCTION & SETTING THE SCENE

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- **Aim**: Integrate RPAS in the aviation system
- In line with the EU Roadmap for RPAS integration
- Identify what are the essential R&D activities
- Funded under Horizon 2020
R&D effort identified to RPAS Operations

- Detect & avoid
- Airspace and Airports access
- C2 communications
- Human factors
- Contingency
- Security
- SESAR compliance

IFR/VFR

500 ft.

- Detect & avoid - replicate the human ability to see & avoid
- C2 communications
- Human factors - including mixed fleet compatibility
- Contingency
- Security
- SESAR compliance

VLL

500 ft.

B-VLOS below 500ft is completely new to aviation
Emergence of a new service sector

Limited by flight authorisations

Need to develop a regulatory framework and to coordinate on-going R&D initiatives

Enhance coordination between regulatory, R&D and others

Gradual and subsequently alleviated integration linked to regulation, technology and societal acceptance progress
Integration must be linked to the EU ATM Master Plan and the ICAO Global Plan/ASBU timeline

RPAS has to fit into the ATM system with adaptations to enable a safe integration

RPAS has to prove to be as safe as current manned vehicle operations and their behavior to be equivalent to manned aviation
Technical outcomes of the RPAS Definition Phase

- EU RPAS roadmap is the foundation for the Definition Phase, further reduced to 6+1 activities (IFR/VFR and B-VLOS)
- Link with the SESAR solutions and related OIs/ENs based on technical information or on best judgment
- Further work require to provide the connection with the ATM Master Plan structure and to the so-called “Essentials”
- Relationship with SESAR 2020 projects has been identified
Requirements to cover the RPAS integration

- **Full Civil RPAS integration**
  - As defined in the EU RPAS roadmap
  - Ensure efficient and safe integration
  - Remove the obstacles to operate in airspace either as IFR or VFR
  - VLL operations like B-VLOS could be considered in various ATM and airspace environments
  - Synergies with Military and GA/Rotary operations and enabling technology

- **IFR and partial B-VLOS and pre-industrial maturity target**
  - First developments as identified in the EU RPAS roadmap
  - IFR integration in airspace class A-C and partial B-VLOS integration
  - Dependency on other non-specific RPAS technology (e.g. CNS) are essential
  - Enables full maturity level but on a limited range of RPAS operations

- **Initial & partial integration and low level of maturity target**
  - Focus on IFR in class A-C airspace
  - Low level of maturity target (case study, basic prototyping)
  - No “system of systems approach”, limiting SESAR / RPAS synergies on CNS
Wherefore an RPAS Market View

- Complement the work being performed in the Definition Phase
- Establish the market, the industry approach and the needs in terms of institutional framework
- Develop an in-depth understanding of the RPAS value chain
- Provide a systemic view of safety, economic efficiency, capacity, human performance, security, environmental impact
Thanks for your attention
VISION FOR RPAS INTEGRATION

Frédéric Claus

DG MOVE, European Commission

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REGULATORY CONSIDERATIONS

Luc Tytgat

EASA
RPAS- EASA update

Luc Tytgat

WAC Update
Background and Objectives


“An enabling legal framework would not only provide the rules to manufacture the aircraft, but also, even more importantly, gradually allow operations, starting from simple operations and growing in operational complexity. This would put operators in a position to gain valuable practical expertise and progressively develop their businesses”

“The regulatory framework should reflect the wide variety of aircraft and operations, keep rules proportionate to the potential risk and contain the administrative burden for industry and for the supervisory authorities”
Background and Objectives

Commission communication

- Performance based approach
- Use of JARUS
- Role of EASA
Background and Objectives

Market growth

Safety

- Current aviation culture
- Current aviation rules
- Lack of harmonization

Allow operations
Gain experience
A balancing act...

Market growth

- Allow operations
- Gain experience

Safety

- Rules proportionate to risk
- Individual risk assessments
RPAS Regulatory System

Where the magic happens

Your Comfort Zone

RPAS
The RPAS challenge...

RPAS are challenging our very own nature!
A change in culture, from atomistic...
.. to holistic!

- Operations
- Remote crew
- Airspace
- RPAS
- Operator

Risk assessment
RPAS Operational risk Categorisation

- **Open Category (A)**
  - Within direct visual contact (VLOS)
  - Not within a certain distance of crowds
  - Not within a certain distance of airports or aerodromes
  - Below a certain altitude
  
  **RPAS CAN BE OPERATED WITHOUT ANY PRIOR AUTHORISATION**

- **Specific Category (B)**
  
  **CASE BY CASE RISK ASSESSMENT**

- **Regulated Category (C)**

  **HIGH RISK OPERATIONS**

  Traditional:
  - Type Certificate
  - Pilot license
  - Approvals
  - ...Continued

  Plus:
  - Approved detect and avoid
  - Approved command and control

3/11/2015  EASA RPAS Update  24
Operator at the Centre

Operator

NAA Risk Assessment

Operator Risk Assessment

Qualification according ConOPS Categorisation

Operator Authorisation with specific limitations

Manufacturer

EASA Certification

EASA TC or Approval

Simplest Operation

Operation w/o specific Authorisation

EASA RPAS Update

3/11/2015
EASA preparing for certification

- One RPAS section

- 2 applications - 4 in the pipeline

- Are be used to better define the optimal approach airworthiness certification of these machines
Challenges

- Resource JARUS
- Industry participation in JARUS
- Need to obtain buy in from all involved parties
- Strong expectations from stakeholders and applicants
- New problems like privacy, cyber-security, enforcement, need to be addressed ...

3/11/2015
Short term action plan

Define a concept of operation and RPAS principles
- Proper RPAS regulatory segmentation
- Establish a corresponding regulatory structure

EASA proposals for regulatory framework for the Riga Conference (March 2015)

First European wide consultation of the new regulatory approach and concrete rules for low risk operation Q2/15

Publish the results of the consultation in the shape of a regulatory project Q4:2015.

Start of the codecision process for the amendment of the EASA founding regulation including provisions for RPAS reflecting the regulatory project
Thank You for your attention
Thanks for your attention
RPAS IN THE EUROPEAN NETWORK

Mike Lissone

Eurcontrol

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• 10 countries have regulation (not harmonised)
• 9 countries are developing
  – 6 allow operations under strict conditions
• 3000+ civil approved commercial companies and growing
• Most operators and manufacturers have no aviation background
• Economic potential estimated at several billions before end 2020
• Pragmatic European approach........
COMPARISON Manned vs. Unmanned

**Manned world:**
- Conservative
- Evolutionary
- Organised
- Safety culture

**Unmanned world:**
- Innovative
- Revolutionary
- Organised?
- Safety culture?

What? Without a pilot?
TYPES OF OPERATIONS

Instrument Flight Rules (IFR)

Visual Flight Rules (VFR)

500 ft

Very Low Level Operations

• Visual Line of sight (VLOS)
• Extended- Visual line of sight (E-VLOS)
• Beyond visual line of sight (B-VLOS)
WHAT is happening below 500ft?

500ft agl
WHAT ARE THE ISSUES?

• Safety perception
• See and avoid
• Rules of the air
• Lack of organisation
• Mix of airspace users
• Impact ATM/CNS
• New operators/airspace users
INTEGRATION CHALLENGES (1)
INTEGRATION CHALLENGES (2)

- DATA LINK requirements
- SPECTRUM
INTEGRATION CHALLENGES (3)

DETECT & AVOID
Rules of the AIR
WHAT IS BEING DONE?

- Strong push from EC
- R&D in SESAR 2020
- Regulation through JARUS and EASA
- ICAO launches RPAS manual
- No IFR applications yet....
- Single cockpit operations?
- Accommodation for MIL (for now)

RPAS REVOLUTIONISES AVATION
RPAS – 7 R&D ACTIVITIES TO BE PERFORMED

- The SJU received a request from the EC to perform an "RPAS definition phase"
- This activity is now completed and the following main activities are identified:
  - Detect & Avoid
  - Comms C2 data link
  - Airspace Access and Airport Operations
  - Contingency
  - Human Factors
  - Security
  - Demonstrations & validation activities
WORK TOGETHER!

- EC
- SESAR
- EASA
- EUROCONTROL
- RPAS COMMUNITY
- Airline associations
- ESA
- ANSP
- JARUS
- ICAO

WE NEED A GLOBAL HARMONISED AND SAFE APPROACH!
World ATM Congress 2015
10 March 2015, Madrid
Integration of RPAS into EU-ATM system: R&D Definition Phase

Fredrik Nordstroem

On behalf of: The AeroSpace and Defence Industries Association of Europe
The AeroSpace and Defence Industries Association of Europe (ASD) represents the Aeronautics, Space, Defence and Security Industries in Europe.

ASD's membership is composed of 15 major European Aerospace & Defence companies and 27 member associations in 20 countries.

In 2013, the 3000+ ASD Companies:
- employed more than 777,000 people:
- generated a turnover of €197.3 billion:
- counting on more than 80 000 suppliers.
For most of them, to fly outside segregated airspace is a pre-condition to operate
Applications that need to access the airspace...
- with no impact on existing safety
- without reducing airspace capacity
ASD’s view on RPAS

Two enablers:

- Funding for technology R&D
- Regulations for insertion into civil airspace

Enormous economic potential

Large RPAS Market
Civil/State/Mil.

This is only the first step, let’s not fall beyond the timeline!
Examples of spin-offs in the long term

FlightPath 2050: pilotless, autonomous and manned aircraft seamlessly integrated
Progress to date:

**European Defence Agency (EDA)**
- Air4All in 2008 and 2009 → initial ideas for a roadmap
- MIDCAS, SIGAT, DESIRE (EDA/ESA)...etc

**European Commission**
- RPAS workshops in 2013 → European RPAS roadmap & EU communication on RPAS

**SESAR JU**
- Strong industry involvement in the RPAS Def. Phase
- Good identification of the required R&D activities

**European Aviation Safety Agency (EASA)**
- Launch of EASA rulemaking activity
- The full EASA involvement in JARUS

**ICAO**
- Establishment of the ICAO UAS Study Group, later RPAS panel
- RPAS included in the Global Air Navigation Plan (GANP)
ASD stresses the importance of:

- All categories
- Civil or State (including Mil.)

- Regulatory actions
- R&D efforts
- Standardization initiatives

- Regulations
- Demonstrations & Testing!

ASD industries represent 778,000 people; generate a turnover of €197.3 billion counting over 80,000 suppliers.

Others are not waiting for Europe, actions are needed now!
- The RPAS definition phase deliverables (7 DOW’s)
- SESAR as a critical program to close remaining R&D gaps
- The launch of an “SESAR RPAS Market Study”
- The process to adequately integrate RPAS R&D into ATM Master Plan and SESAR 2020
- Further EDA initiatives such as ERA (Enhanced RPAS Automation).
ASD supports (2/2):

- The recent establishment of an RPAS steering/coordination group composed of all the relevant RPAS actors.
- The full EASA involvement into JARUS.
- The ICAO RPAS Panel,
- EUROCAE Working Group,
- And more.....
The challenges

On the regulatory side:

EU has the leading role in allowing the deployment of RPAS

EU needs to progress with an industry expertise, in all regulation initiatives

Industry would welcome a risk-based Regulation.
To ensure R&D deployment

Mature the R&D implies real demos in test facilities

Clear regulation requirements

The challenges on the R&D side:

Sufficient funding is necessary

Cover the identified critical technological gaps

Convergence and Synchronization

R&D and regulation are precompetitive activities

Industry is fully committed

More resources on SESAR are needed in order not to distract existing SESAR projects

High technology readiness level is required

Technologies developed by industry are to be recognized by Legislator

Convergence and Synchronization
– RPAS is a unique opportunity for Europe

– Insertion in the ATM System is the key-enabler.

– European Industry is a key-player, investing substantially

RPAS will be an important part of future aviation contributing to employment (150,000 direct jobs in 2050), innovation, growth in Europe
Conclusion

Regulation need to progress with an active industry participation

Sufficient funding must be added, not diverted from existing developments

The coordination Steering group under EC leadership with EASA, SESAR and EDA and Industry fully involved must continue in order to:

Control, monitor and manage insertion of RPAS into the Air Traffic
Thank you for your attention

10 March 2015, Madrid

Fredrik Nordstroem

On behalf of: The AeroSpace and Defence Industries Association of Europe
QUESTIONS??

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