



UAS Forum Sweden – Att öppna Europas och Sverige luftrum för UAS



Gunnar Frisk, Saab AB
19 Maj 2015

Open the airspace... or?



DRÖNARE inblandade i allt fler incidenter

I början av december tvingades Bromma stoppa all trafik under cirka en timma. Orsaken var ett obemannat luftfartyg, en så kallad drönare, som uppmärksammades i närheten av Karolinska universitetssjukhuset.

– Vi kunde snart gripa den person som flyttade drönaren, säger polisen presstalesman Lars Eriksson. Den gripne hävdade att han gjorde flygningen på uppdrag av en kund.

I den fortsatta utredningen identifierades två personer som är tvivelsutan inblandade.

– Anledningen till att vi kunde gripa de två är att de hade flyttat drönaren till ett område som är tillgängligt för polisen i Bromma. Den gripne har varit polisen i det försvarsliga området. Det gjorde att vi blev startklar på intervjuer.

Den tekniska utredningen har inte avslutats än eftersom i samband med incidenten.

– Det är ett ganska alltså bra, säger Michael Sjöberg. Vädret är så bra att inget annat än teknisk utredning kan leda till några konstateranden.

Globalt problem

Sensitivt område för flyg och utredning av flygincidenter. Den 22 juli föregående år var en Airbus A320 under flygning på Heathrow i London, när piloterna upptäckte ett stort flygobjekt som passerade bara några meter över den västra vingens landningsgård och sedan smög. Detta var incidenten som resulterade i att flygningen stannade och drönaren identifierades som en obemannad drönare.

I USA uppges problemet vara ännu större. Enligt tidningen The Guardian rapporterar ett flygplan

flygplan. Flygplan som var ett flygplan från US Airways ska ha kolliderat med en obemannad flygplan i Tallahassee i mars.

– Det kan bli ett av drönare som är ett passagerarfartyg som är väldigt uppenbart, säger för William och de Federal Aviation Administration utredning för obemannad luftfart. Resultatet skulle vara konstnärligt.

För en dialog

Bromma flygplats avdröjar just nu resultat av polisen utredningen samtidigt som man för en dialog med Transportstyrelsen.

– Flygplatsen har varit en förhinder till åtgärder för flygplan som till exempel, säger vicechefen för Flygplan. Flygplanen har varit på den här typen av obemannad luftfart, vilket naturligtvis är ett risk för flygplan. Vi kommer att påbörja ett arbete med att förhindra åtgärder flygplanen genom att flygplan som gäller. Vi är inte så mycket arbete med denna typen, tillsammans med LSS och Transportstyrelsen.

– En annan del är att flygplanen flygplan som person som flygplan drönare?

– Det är ett flygplan som är ett flygplan som flygplanen, säger Patrick Perd.

Drönare stoppade sex flyg från Bromma

Lor 9 Maj, 2015 - 12:08



Bromma flygplats tvingades stoppa trafiken under en halvtimme när en drönare flög i närheten av

SvD NYHETER

NYHETER NÄRINGSLEV KULTUR OPINION SPORT RESOR TRÄNINGAR
SVERIGE VÄRLDEN BORS WEBB-TV IDAGSDAG MAT & VIN VÄDER LÄS!

Drönare över franska kärnkraftverk

Obemannade drönare har flugit över franska kärnkraftverk flera gånger den senaste månaden. En utredning har inletts men det är oklart vem som ligger bakom flygningarna som väckt en debatt kring säkerheten vid anläggningarna.

1 november 2014 kl 10:01, uppdaterat 1 november 2014 kl 10:07



Drönare flygets största hot

Open the airspace for small and large RPAS...

- Opening the airspace by **integrating** (larger) suitable equipped RPAS into the Air Traffic Management system (ATM), i.e. existing regulated non-segregated airspace (class A-G)

- Existing aviation rules and regulation - ATM (well-defined – ICAO,EASA,NSA etc.)
- Pilot in command (from remote)
- Addition of technology w.r.t. remote piloting (e.g. Sense & Avoid)

→ “Business as usual”, with pilot on gnd



- Opening specific lower airspace enabling new (commercial and private) operations using small RPAS and at the same time ensuring not to interfere with existing air traffic/ATM (**segregating**).

- New proportionate, risk-based rules
- Operator rather than licensed pilots
- Can't carry heavy, costly technologies

→ In particular BVLOS VLL (<500ft) “completely new to aviation”; calls for new concept of operations, new regulations (not ATM)



Opening the airspace is not one homogeneous exercise...

Integration work at European level



European Roadmap for integration of RPAS into EU ATM (June 2013)

- Regulatory Roadmap (Annex 1)
- R&D Roadmap (Annex 2)
- Societal Impact (Annex 3)



Policy/Institutional level

- EC Directive to SESAR for RPAS R&D, EASA regulation (several 2013+)
- EC communication, e.g. COM207 “A new era for aviation” (April 2014)
- EC Riga declaration: High-Level Principles (March 2015)



Regulatory level

- Launch of EASA rulemaking activity, RPAS in basic regulation update, and involvement in JARUS
- Concept of operations - risk-based approach to RPAS regulation (2015)



Standardization

- EUROCAE WG-73 “UAV Systems” (MOPS, CONOP, OSED)
- Input from e.g. MIDCAS (Sense & Avoid)



European R&D Programs

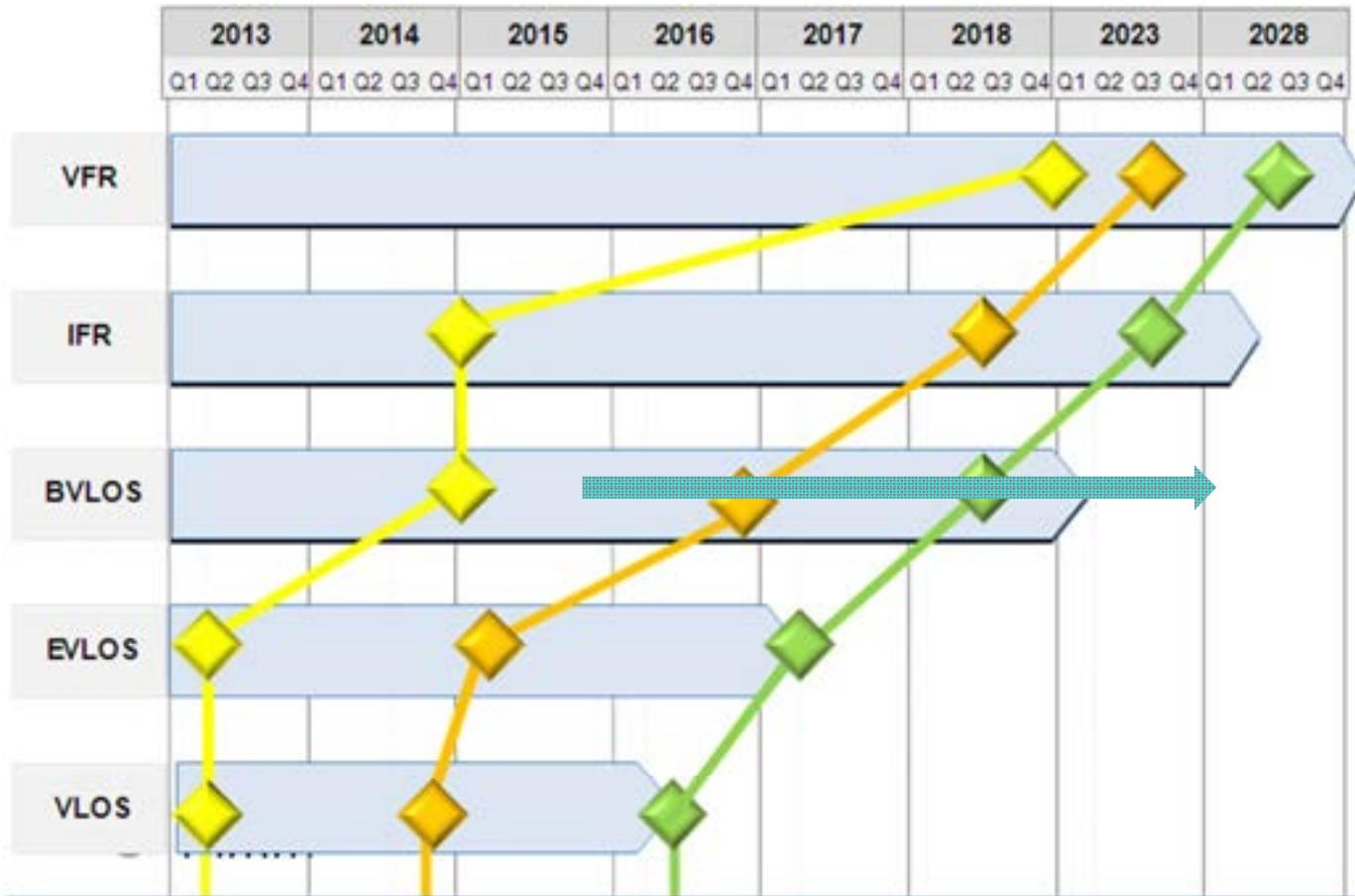
- EDA Air4All in 2008 and 2009, SIGAT (C2) → initial ideas for a roadmap
- EDA RPAS JIP - MIDCAS, DESRIE, ERA (2009+)
- SESAR/Horizon 2020 (2015+)



At lot has been done, a lot is ongoing, pressure is high... and a lot remains to be done.



EU Roadmap Timeline



Initial Operation → National regulation & harmonization; limited operations (IFR in ATC-airspace first)

Integration → Pan-European regulation supported by the results of R&D activities.

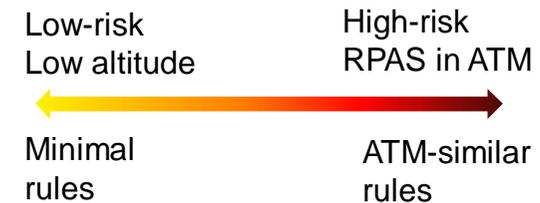
Evolution → All requirements for full integration are in place

	Integration timeline		Critical path initial operations		Critical path integration		Critical path evolution		Initial operations		Integration		Evolution
Operational Capability: VFR - Visual Flight Rules IFR - Instrumental Flight Rule BVLOS – Beyond Visual Line of Sight EVLOS – Extended Visual Line of Sight VLOS - Visual Line of Sight													

Riga Declaration and EASA (April 2015)

▶ Riga-declaration “RPAS from 2016 onwards”

- Proportionate rules
- EU rulemaking now
- Technology and standards (SESAR + other e.g. EDA)
- Public acceptance (integrity, noise etc.)
- Operator is responsible



▶ EASA risk-based approach to RPAS regulation

- Three levels of certification
 - Open Category
 - Specific Operations Category
 - Certified Category
- Rulemaking timeline
 - Inclusion in EASA Basic Regulation in June 2016 (consultation ongoing)
 - Implementing Rules (IR) for 2016-2021)



Address two main goals simultaneously:
Safe integration & acceptance; Foster RPAS business (industries, employment)



EASA ConOps – risk-based certification categories



OPEN:

Very low risk operations
No involvement of Aviation Authorities, No airworthiness approval
Limitations: VLOS (500m), below 150m altitude, outside certain areas (e.g. airport & sensitive areas), no overflying of crowds
Industry standards (not for toys <500g)

SPECIFIC

Increased risk
Safety risk assessment required
Approved by Aviation Authorities required
Airworthiness and staff competence – case-by-case

CERTIFIED

Comparable to manned aviation
Limit between specific and certified not yet defined
Pending criteria is defined, EASA accept application MTOW 150kg
C2 and Detect & Avoid can receive an independent approval

R&D: Key Technologies for RPAS integration

➤ Sense/Detect & Avoid

- Replicating the human ability to see and avoid – aviation cornerstones “rules of the air”
- The RPAS must be capable of detecting and avoiding cooperative and non-cooperative traffic and performing avoidance manoeuvres.
- Avoidance manoeuvres can either be Collision avoidance (CA) and Traffic Avoidance (TrA, also referred to as Self-Separation).
- Note: CA is usually fully automatic and TrA advisories to ensure separation when ATC not present



"See & Avoid"



"Sense & Avoid"
"Detect & Avoid"

➤ Contingency/Emergency Recovery

- E.g. Link-loss, Flight termination

➤ Communication - Command & Control (C2)



Technologies in some case goes beyond current manned equivalents



R&D: SESAR

SINGLE EUROPEAN SKY ATM RESEARCH

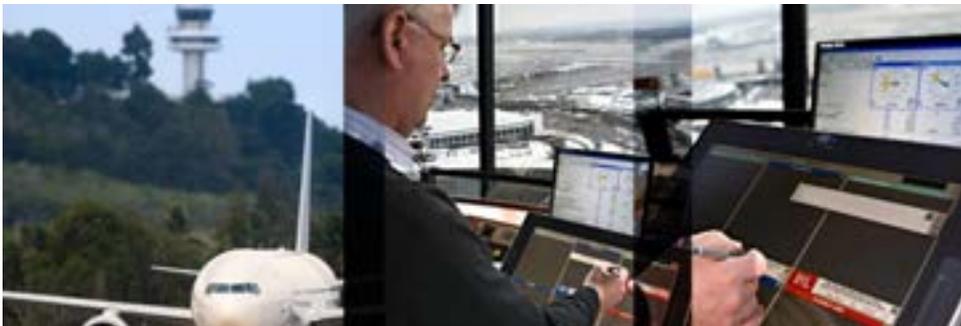


SESAR in a nutshell

- Development of the next generation European ATM, in order to achieve the Single European Sky (legislation)
- Together with CleanSky, the EU main aviation programmes
 - SESAR 1: 2100M€ (2008-2016)
 - SESAR 2020: 1600M€ (2015-2021)
- “All” stakeholders, one program
- Objectives include
 - Enabling EU skies to handle 3 times more traffic
 - Improving safety by a factor of 10
 - Cutting ATM costs by 50%
 - Reducing the environmental impact per flight by 10%

RPAS in SESAR

- Objective to implement European RPAS Roadmap, *remaining* R&D (technology, operations)
- RPAS Definition Phase 2014
 - Defined the remaining R&D work, based on RPAS Roadmap
 - Saab lead Sense/Detect & Avoid
- SESAR 2020
 - Including RPAS in the program from 2016 onwards (to 2021)
 - Initial funding 40M€ for RPAS integration R&D
- Swedish participation by LFV, Saab, (Swedavia not in RPAS work)
- Starting points:
 - EU RPAS integration Roadmap (and link to ICAO ASBU)
 - SESAR RPAS Definition Phase
 - Build on existing work (e.g. MIDCAS)
- Initial focus (TBC)
 - IFR airspace class A-C
 - Initial studies of partial B-VLOS integration (TBC)



Huge programme. Stakeholder acceptance. Drive European & Global standardization.



R&D: European Defense Agency (EDA)



- ▶ EDA have been proactive in RPAS integration R&D for many years (Air4All, SIGAT...)
- ▶ Three main programs ongoing



- MIDCAS – Mid-air Coliission Avoidace System (50M€, 2009-15)

- Sense/Detect & Avoid (Saab lead, LFV participation)

- ERA – Enhance RPAS Automation (32M€, 2015-18)

- Automatic take-off and landing
- Contingency/Emergency Recovery (Saab lead)



- DESIRE – Demonstration of Satellite Enabling the Insertion of RPAS in Europe (2012-2013; 2014+)

- SATCOM datalink demonstrations (no SE involvement)

MIDCAS demonstrates progress for RPAS integration into civil airspace



The MIDCAS (Mid-Air Collision Avoidance System) developed together with the European Defence Agency (EDA) achieved the demonstration of advanced flight test and operational integration conducted as part of the MIDCAS project. Major milestones included the successful demonstration of a Secondary Traffic Avoidance System (STAS) using a 3D-ATIS (3D Air Traffic Information System) and a 3D-ATIS (3D Air Traffic Information System) in a 3D-ATIS (3D Air Traffic Information System) environment.

Successful completion of flight tests

Flight test activities started in June 2010 under the leadership of the EDA. The first flight test was conducted on 10 October 2010 at the Swedish Air Force Base, Åre. The first flight test was conducted on 10 October 2010 at the Swedish Air Force Base, Åre. The first flight test was conducted on 10 October 2010 at the Swedish Air Force Base, Åre. The first flight test was conducted on 10 October 2010 at the Swedish Air Force Base, Åre.

Operational simulations

The project has achieved significant results in the field of air traffic integration. The project has achieved significant results in the field of air traffic integration. The project has achieved significant results in the field of air traffic integration. The project has achieved significant results in the field of air traffic integration.

MIDCAS in the European Defence & Retail program

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EDA R&D in RPAS integration: 10 years, over 100M€
No difference between civil and military RPAS w.r.t. integration into ATM!



TRAFFIC INSERTION/INTEGRATION

OPEN UP THE AIRSPACE FOR UNMANNED SYSTEMS - SUMMARY



- ▶ Opening the airspace for RPAS integration is a heterogeneous exercise.
- ▶ Europe has done a lot, the roadmap is clear, the pressure is on, time to deliver!
- ▶ Sweden has the history, knowledge, innovation spirit, suitable operating environment, engaged stakeholders (users, industry, authorities, universities...) to become a leader in the RPAS field.
- ▶ Remote Technologies goes beyond RPAS –
“Be where you want, act where you needed”

youtube.com/watch?v=qQy6cXYx43M



SAAB

SAABGROUP.COM

Worlds first rPAS/rTWR integrated demonstration

Joint LFV-Saab program

Flights October 2014

[youtube.com/watch?v=qQy6cXYx43M](https://www.youtube.com/watch?v=qQy6cXYx43M)