SESAR Showcase

A Conference & Exhibition of SESAR 1 Results

Amsterdam, 14-16 June 2016

SESAR JOINT UNDERTAKING

NU 2016

SESAR Virtual Centres

Towards ATM 2.0

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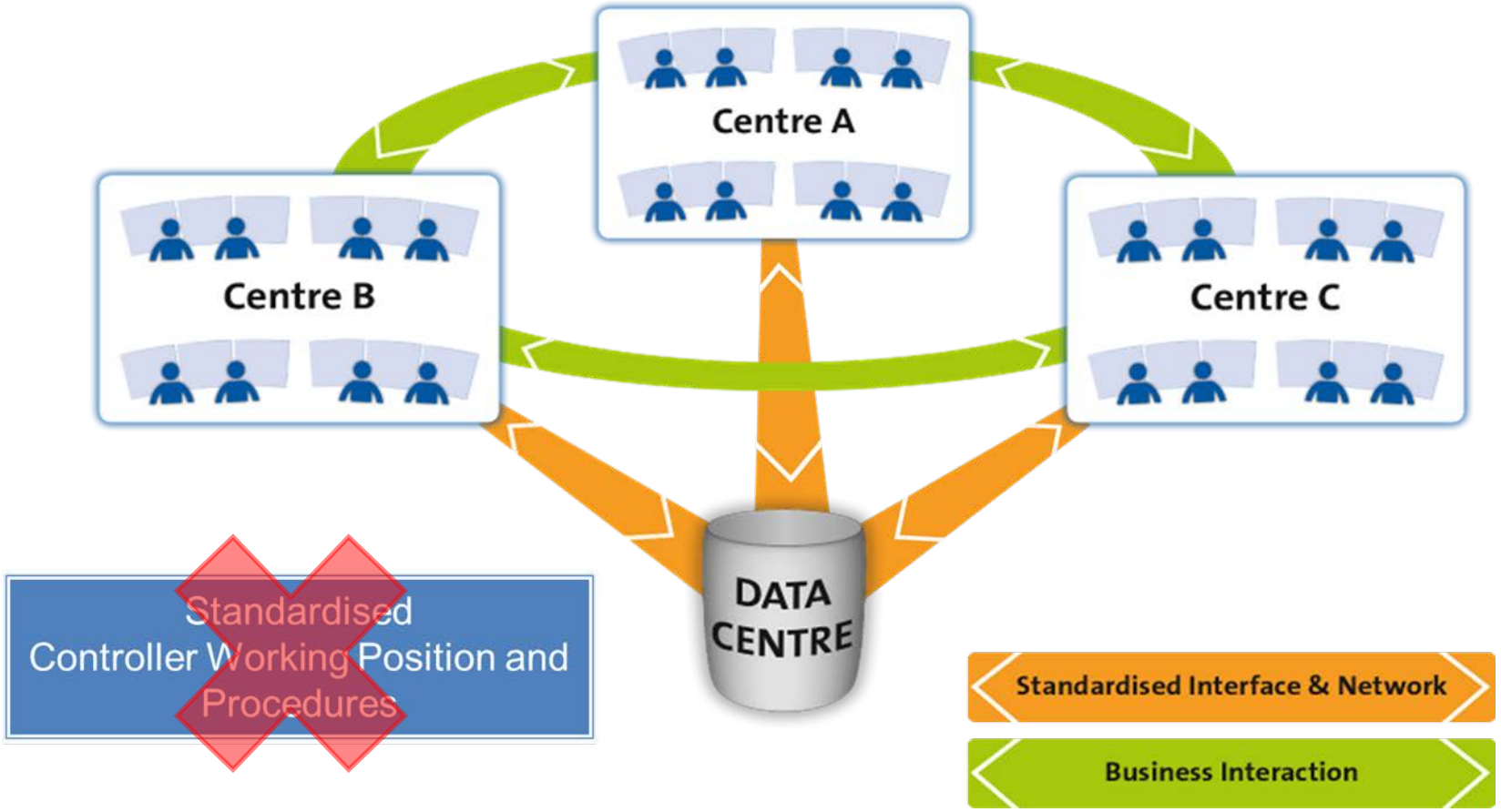
SESAR Showcase
Amsterdam, 14-16 June 2016

Why Virtual Centre Concept ?

- European ATM defragmentation
- Operational flexibility & resilience
- Technical enablers makes ATM 2.0 possible
  - SWIM
  - Remote towers
  - … Virtual centres ?

Initial Virtual Centre Concept



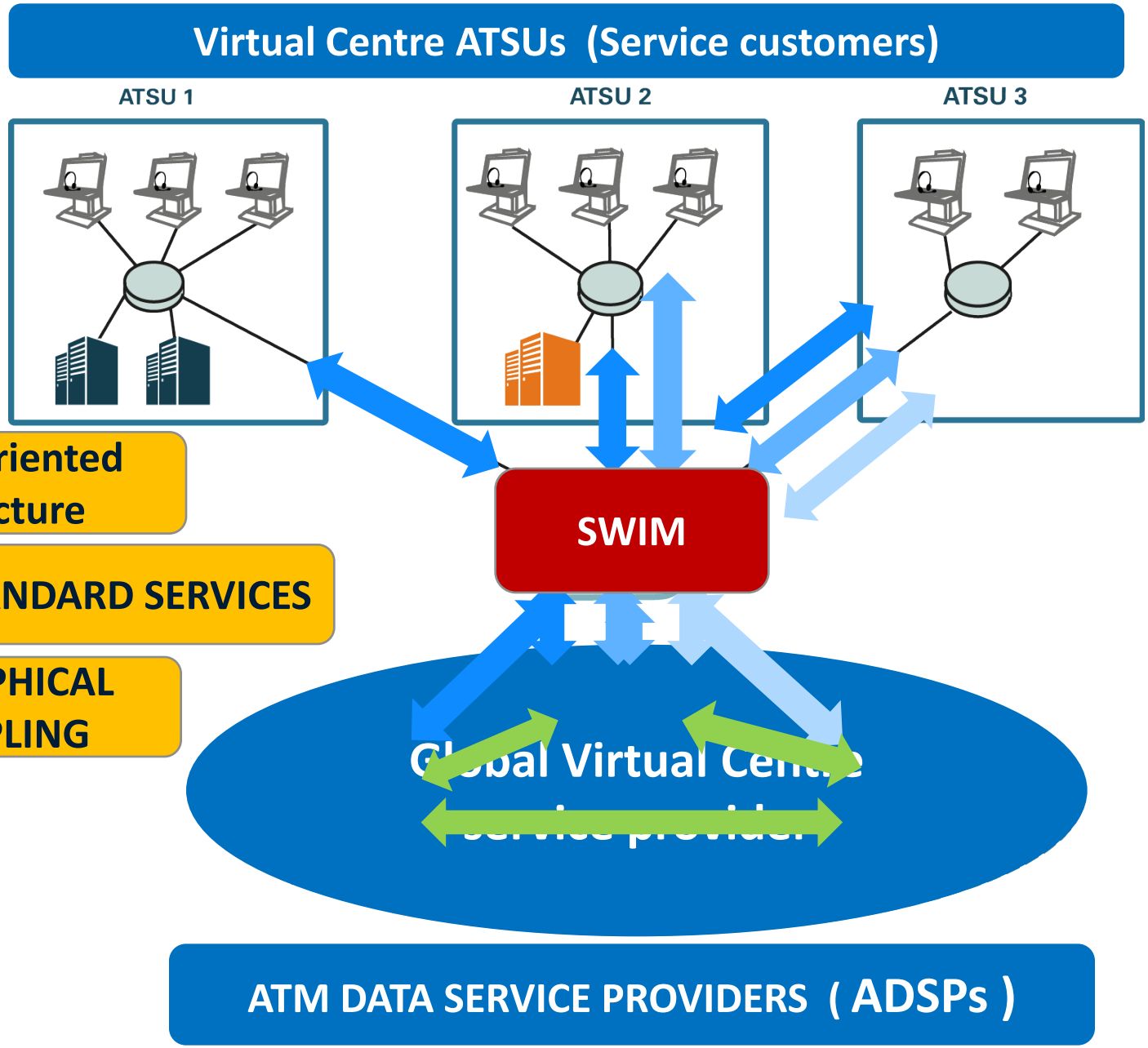
Expected benefits

- **Technical optimisation**
  - Defragmentation of ATM systems
    - Standardised services
    - Shared service providers
  - Harmonised ATM functionalities
  - Agility and cost efficiency

- **Operational efficiency**
  - Dynamic airspace allocation between ATSUs
    - Peak hours
    - Night closure of ATSUs
  - Seamless cross-border for airspace users

- **Contingency scenarios between ATSUs**
  - Operational hazards
  - Technical hazards

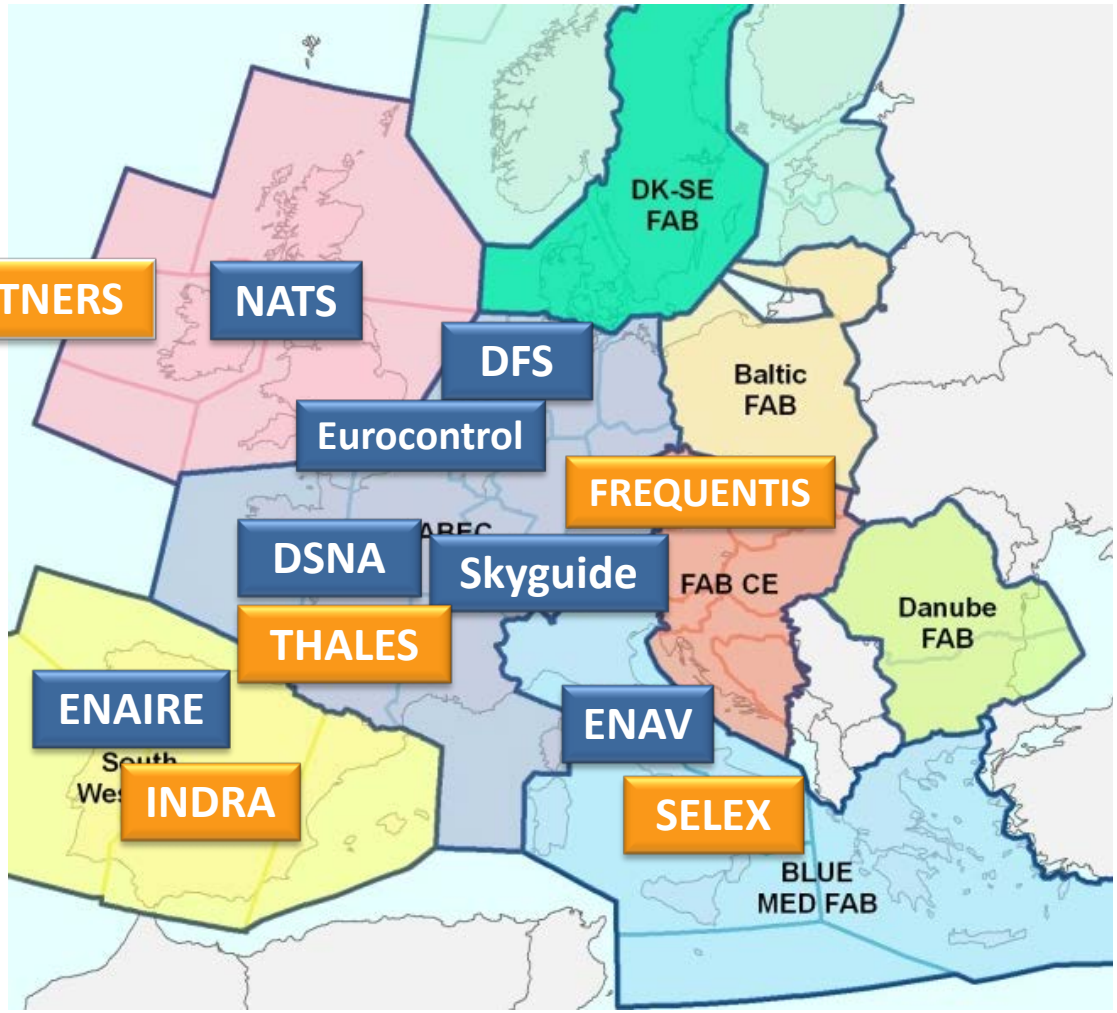
SESAR Virtual Centre Concept - Principles



SESAR Virtual Centre Concept - involved partners

7 ANSPs

4 INDUSTRY PARTNERS

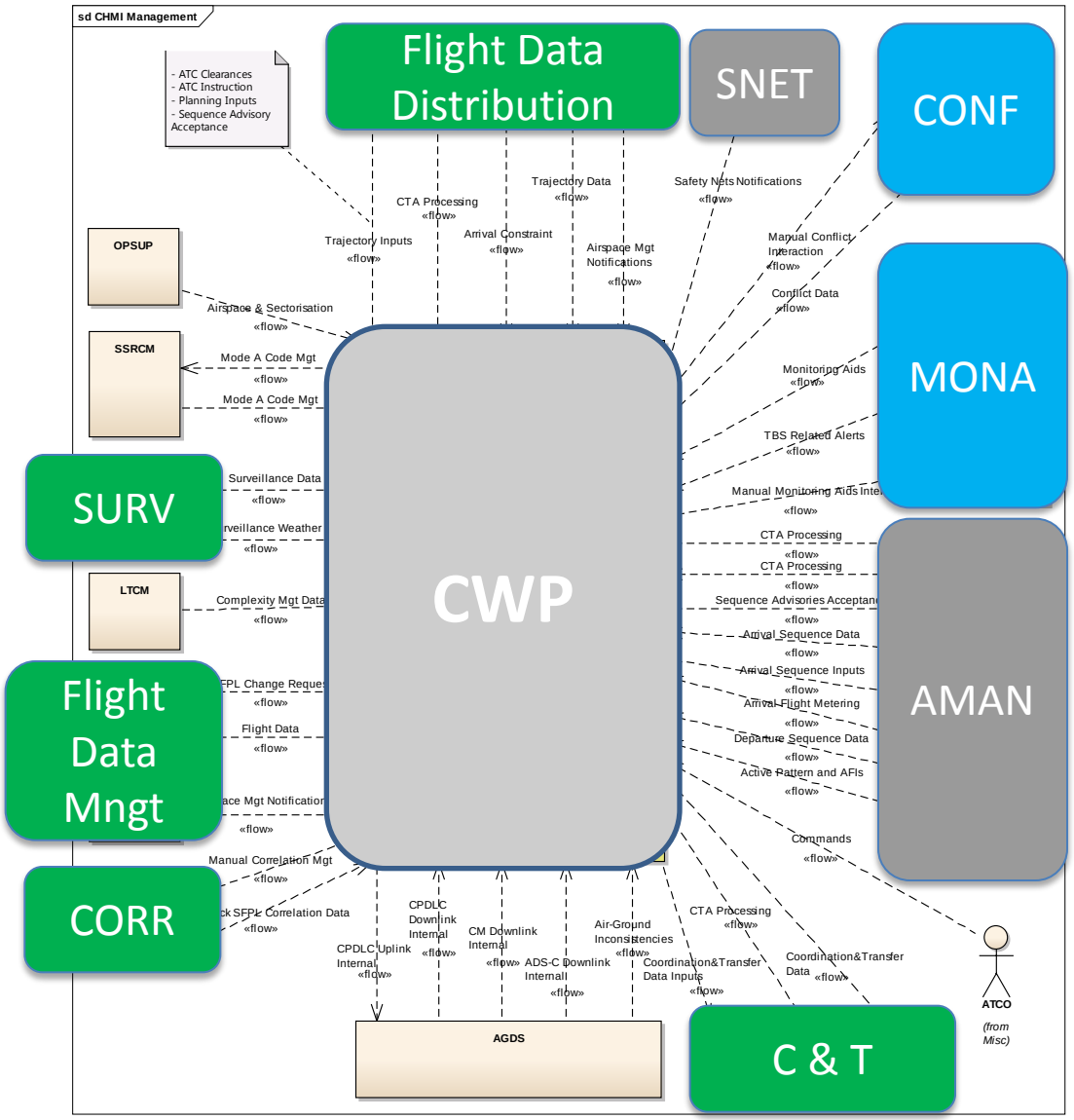


Service design: covered scope

Primary Services

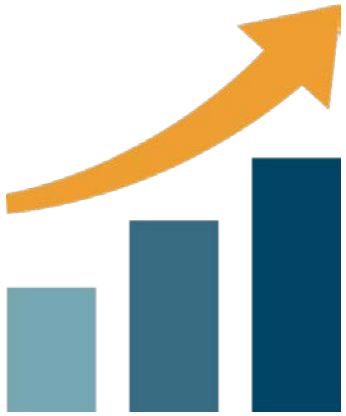
Secondary Services

90 % of the scope covered



CWP Service Design - major results

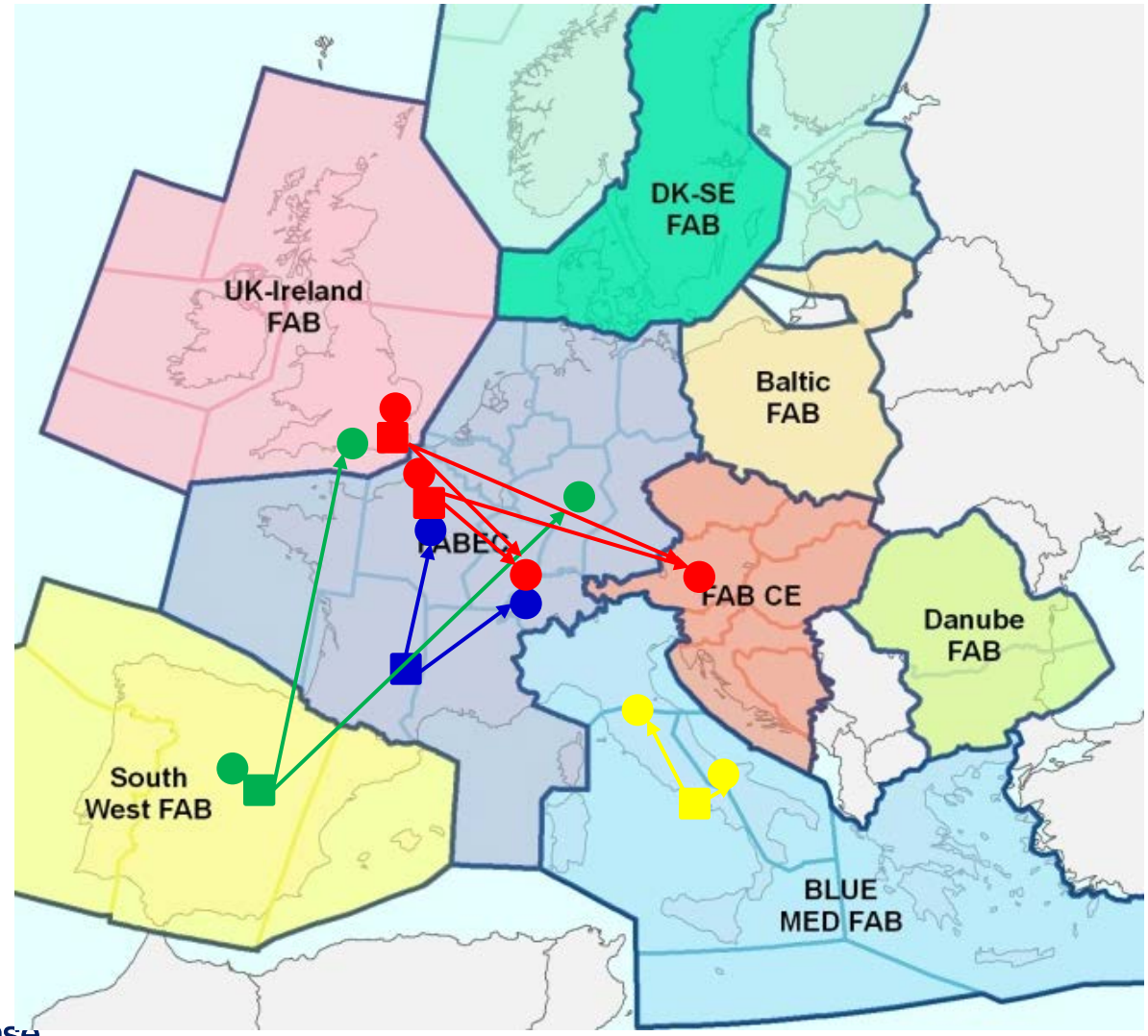
Scope limited to ATM services for CWPs – EATMA framework



- **Common service architecture**
- **Common Service interfaces & operations**
- **Agreement on Core Data**
- **Identification of specific partner's Data**

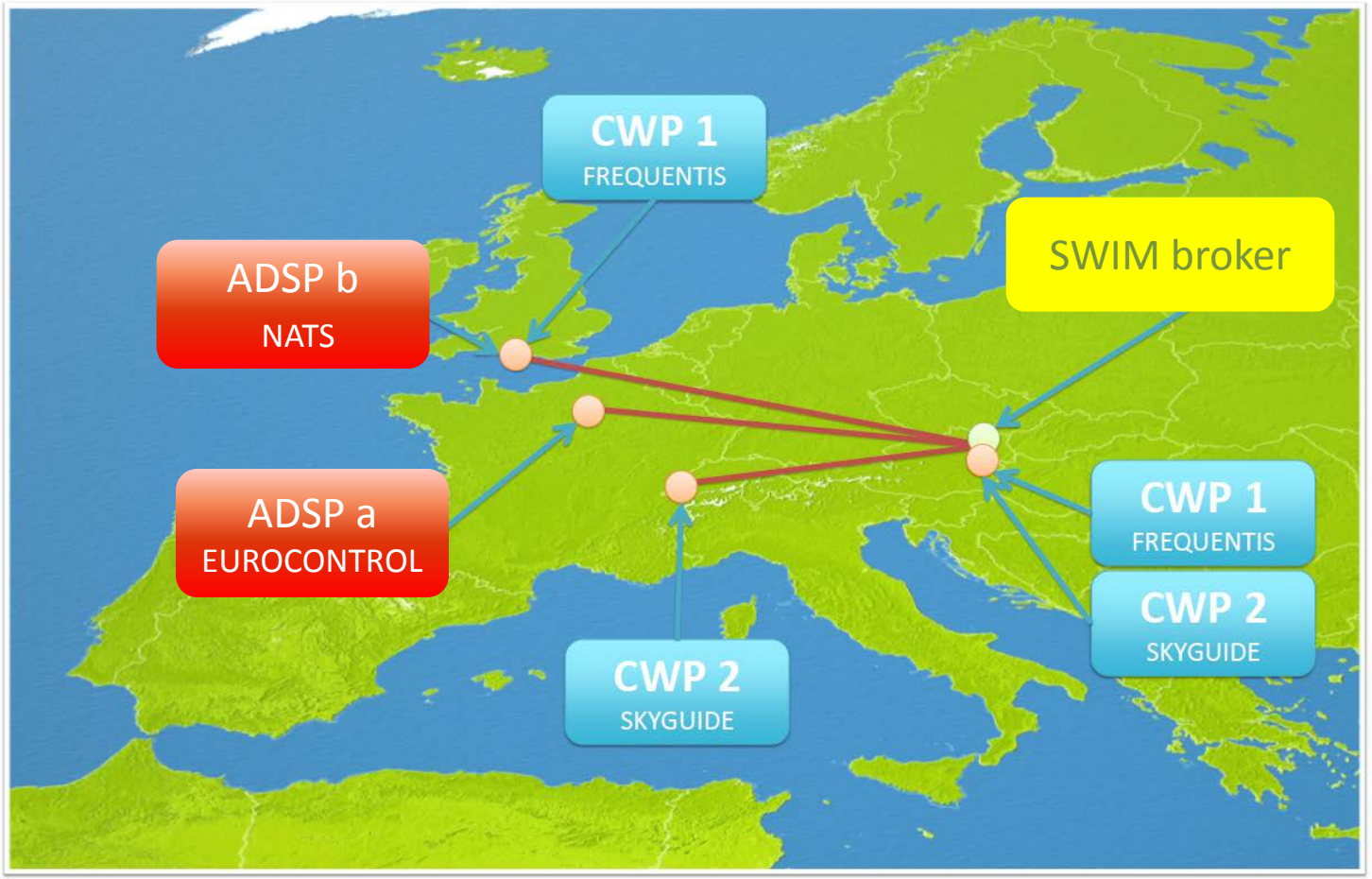
- 90% of CWP functional service interfaces designed
- 50 to 80% of common agreed data

Demonstration set-up: 4 Demo platforms



- 5 Service Providers
- 6 CWPs

Demo #7 geographical decoupling



Demonstration outcomes

Remote Usage	Service Orientation	Multi-vendors	Service provider independence	CWP provider independence

Top results:

- CWPs Services meet the expectations
- Feasibility assessment of the concept is green

Conclusion: achievements

➢ Main Principles for SESAR Virtual Centre Concept verified

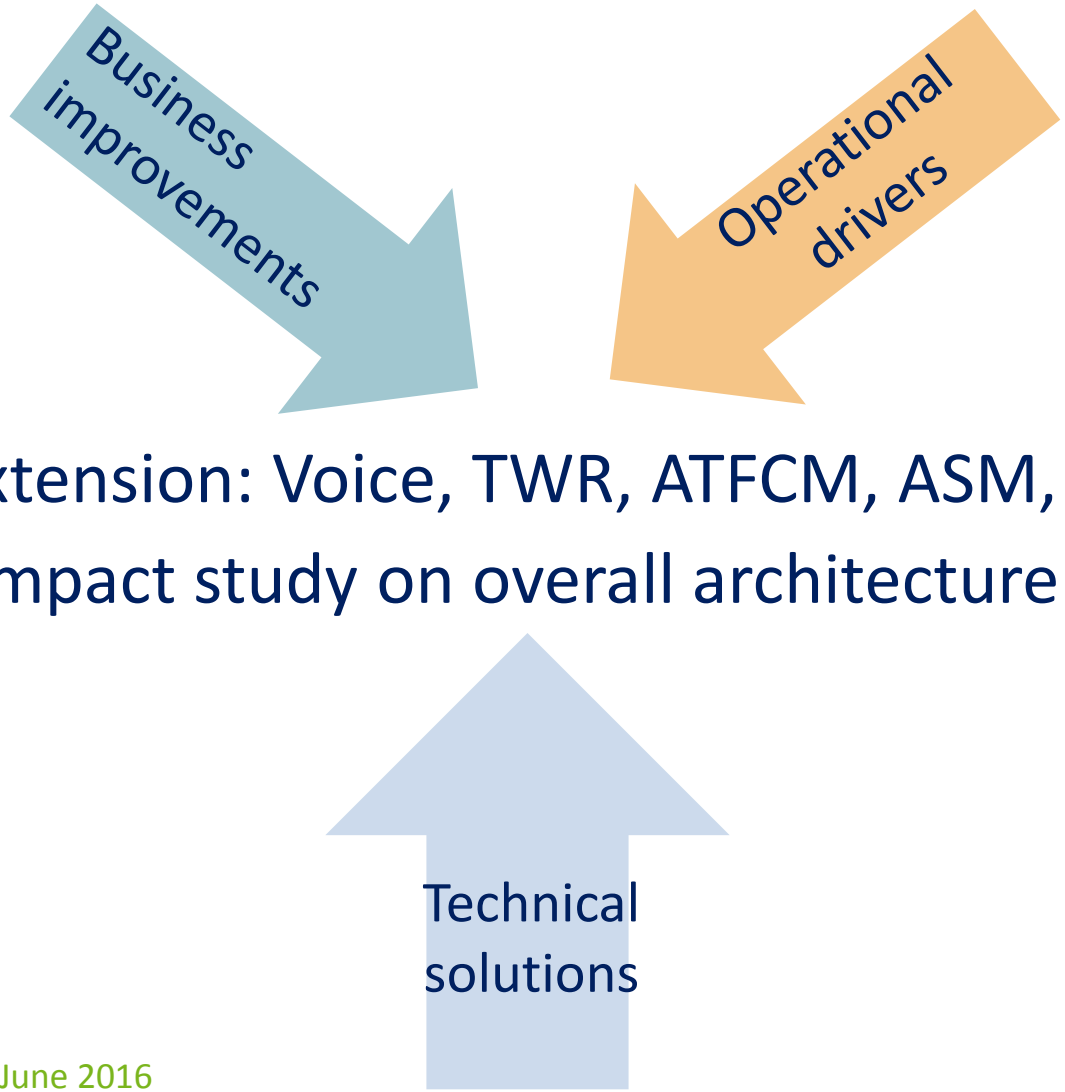
- Geographical decoupling
- Service Oriented Architecture
- Standardisable services
- Integration in SESAR framework
- Successful demonstrations with

  - 5 service providers

  - 6 CWPs

Feasibility of Virtual Centre Concept positively assessed

What's next before implementation ?



Activities from 2016/2017

Business improvements

ANSPs needs Business Oriented modelling

Operational drivers

New operational scenarios dedicate to VC
Required performance
Identification of main challenges

Technical solutions

Global design including SWIM technology
Services roadmap
Continuity of services modelling

Thank you for your attention

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Project CLAIRE

CiviL Airspace Integration of RPAS in Europe

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Mark Watson (NATS)

SESAR Showcase
Amsterdam, 14-16 June 2016

RPAS Airspace Integration
SESAR Demonstration Programme

Objectives

- To operate RPAS* in non-segregated civil airspace & demonstrate appropriate ATM procedures
- To undertake flights using a certified unmanned platform operating within existing airways structure
- Develop a Safety Case for the RPAS platform, as well as occupancy of airway, approved by the regulator

Validation approach

- Simulation exercises used to identify best practice, validate procedures & de-risk RPAS flight trials

**RPAS – Remotely Piloted Air System*

Methodology & key events

Simulation Exercise 1a - Amsterdam NL

RPAS Ground Operations & Controlled Local / Terminal Airspace (Normal/Contingency)

Simulation Exercise 1b – Amsterdam NL

Increased fidelity & introduction of IFR traffic in Terminal Manoeuvring Area*

Simulation Exercise 2 – Whiteley UK

ATM Procedures for RPAS Operations in Controlled Airspace & Contingency Mgt.

RPAS flight Exercise - West Wales Airport

Validation flight exercises in existing airways structure using RPAS & ATC Sector Ctrl.

THALES Coordinator

nlr

NATS

SESAR JOINT UNDERTAKING

Regulator & Stakeholder Workshops

Final Demonstration Report

*IFR – Instrument Flight Rules

Platform & trials location

Watchkeeper

- Certified Platform
- Release to Service (RtS) 2014

Flight Performance

- Endurance: 16-20 hours
- Ceiling: 16,000ft
- Typical Transit Speed: 60-70kts
- Weight: circa 450kg

West Wales Airport

- Danger Area & Airway

*MFTP – Military Flight Test Permit

Exercise 1 – Airport & TMA operations

Demonstrate RPAS operations in an airport and terminal airspace environment with mixed traffic

- Mid-sized airport, single runway, light/medium traffic

Scenarios including

- IFR & VFR operations
- Descent into TMA and guidance towards final approach
- Take-off and departure
- Missed approach
- Loss of datalinks; comms; transponder
- Emergencies

Exercise 2 – En-route operations

Simulate RPAS flight in non-segregated airspace

Purpose: Verify ATM procedures and identify unexpected behaviours

Normal & Contingency Ops

- Loss of link
- Comms failure
- SSR Transponder failure
- Engine failure
- Control problems
- Weather/traffic related issues

Exercise 2 – ATM safety assurance of demonstration flights

Temporary Operating Instructions to supplement standard ATC procedures

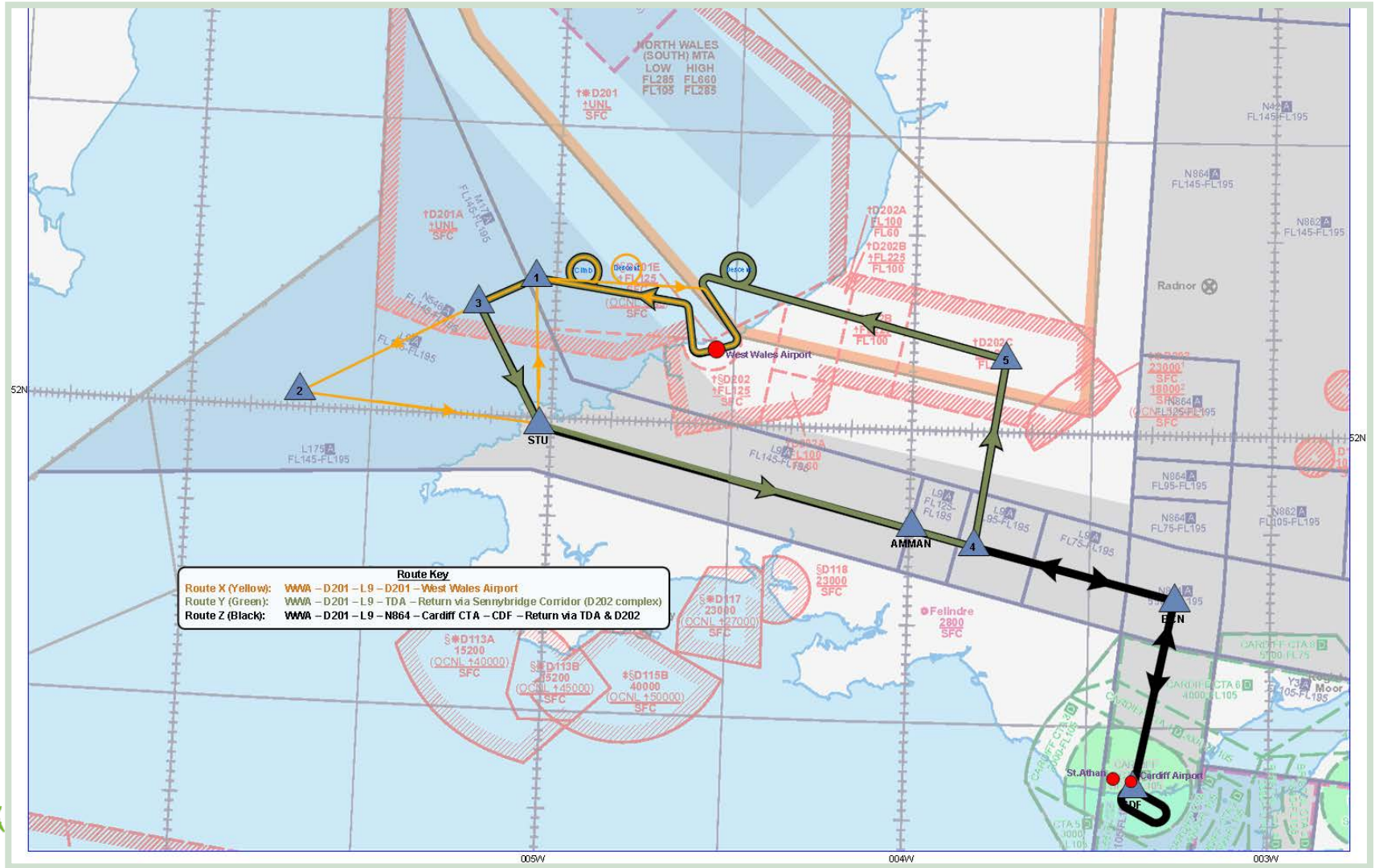
Informed by

- RPAS performance & contingency behaviour
  - Comms back-up by telephone
  - Lost Link Routes & Emergency Recovery Locations
- Non-compliance with Rules of the Air

Procedures tested in NATS simulators

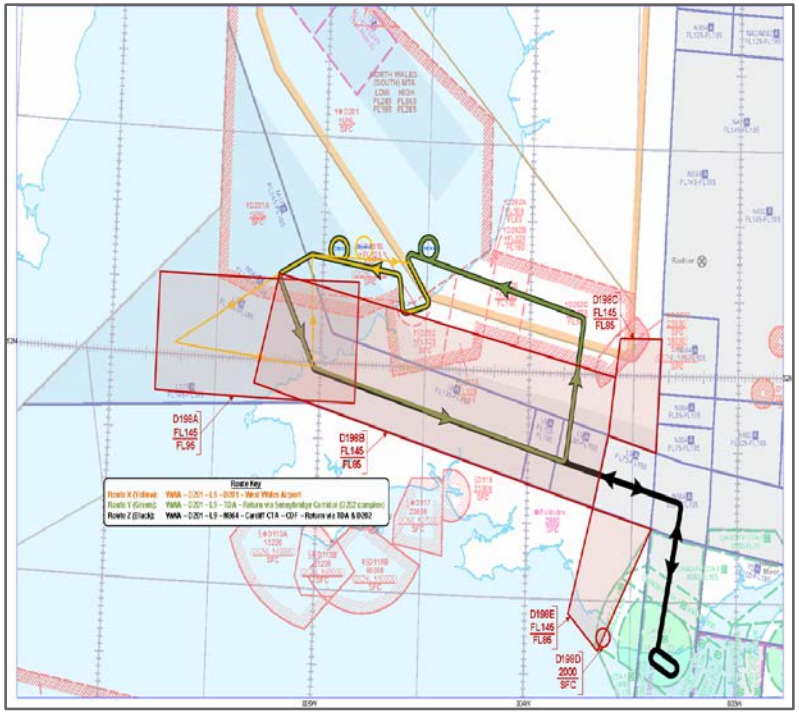
Approved after formal safety assessment

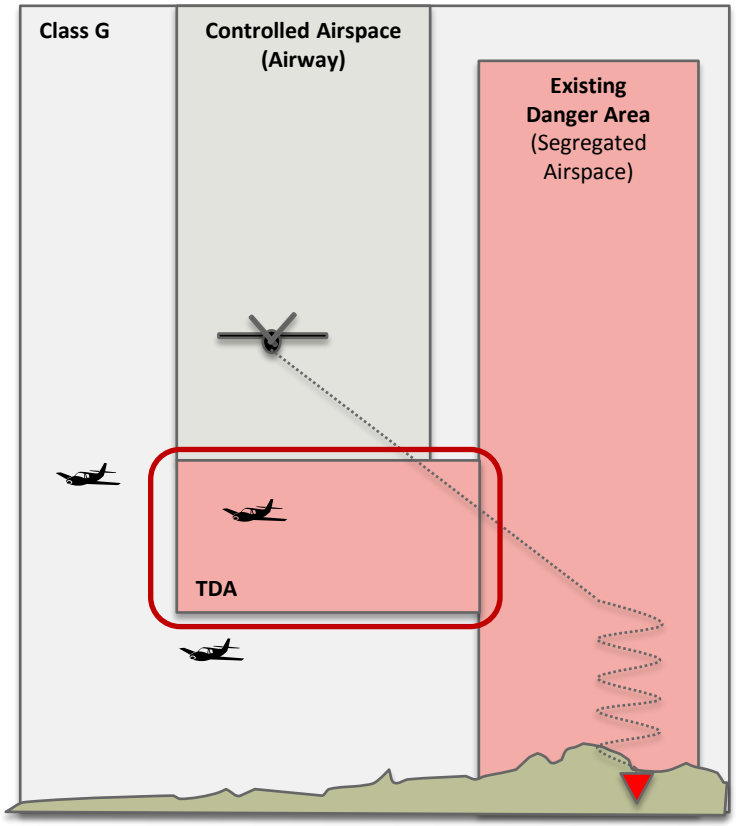
Exercise Scenarios – Routes X;Y & Z



Temporary Danger Areas

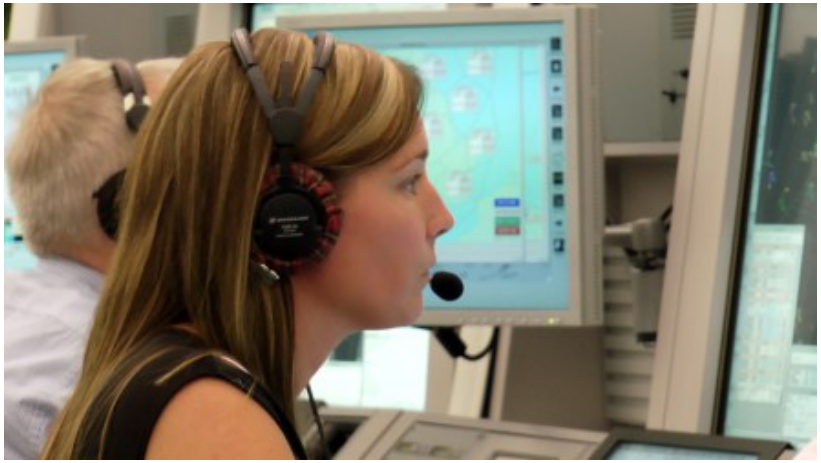
- No RPAS flight allowed in non-segregated Class G airspace due to lack of certified detect & avoid capability
- TDAs created below airway e.g. in the event of an engine failure





Live flight trial

- Route X, 30th September 2015
- Handover at FL150
- Time in non-segregated airspace: 77 mins
- Normal ATC procedures throughout



Flight exercise results

Safety

- Existing ATM procedures applied
- Nil impact on safety
- Contingency Management procedures – e.g. lost link CONOPS and emergency route management

Capacity & human factors

- Live flights introduced minimal impact on ATC workload or pilot operations
- Other than speed, minimal difference compared with manned aviation
- Capacity depends on factors including complexity of airspace and RPAS performance and flight plan

Project conclusions

- Future RPAS operations may be safely integrated into non-segregated airspace using existing ATC processes
- Lower performance RPAS could result in an increase in ATC workload
- A Mode S transponder is essential to avoid surveillance issues & facilitate integration
- For routine access to non-segregated airspace, a detect & avoid capability is required
- RPAS considered predictable in emergencies
- Instrument Rating not fully applicable to RPAS

Proposals for future research

Development of lost-comms procedures

Contingency management information to be standardised

- Determine how and when information is shared with ATC
- Emergency Recovery Points & Lost Link Routes

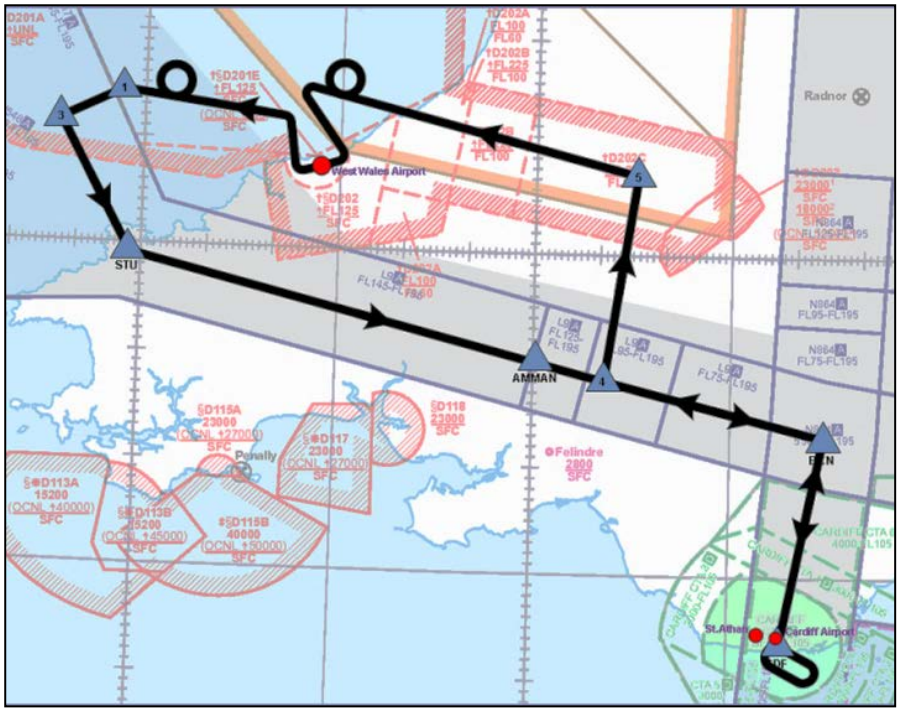
Operating characteristics compatible with those of the aerodrome, investigate

- High performance RPAS integrated into busier airports
- Lower performance RPAS flown from smaller aerodromes

Pilot licencing & qualification requirements

Route Zulu

- TMA operations
- Multi-agency handover



Thank you for your attention

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