CENTRALISED SERVICE 4
ADVANCED FLEXIBLE USE of AIRSPACE

CONCEPT OF OPERATIONS

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More than 11000 Military Aircraft are stationed in Europe
The airspace should not be designated as either permanent civil or military airspace, but rather be considered as a continuum in which all user’s requirements have to be accommodated to the extent possible.
Collaborative dynamic Airspace Management (ASM) …and Civil-Military Coordination

**Strategic Level: ASM Level 1**
Definition and review of national airspace policy and organization (Establishment of pre-determined airspace structures)

**Pre-tactical Level: ASM Level 2**
Day-to-day airspace allocation according to user requirements

**Tactical Level: ASM Level 3**
Real-time use of airspace allowing a safe separation between civil and military aircraft
Using flexible Airspace Structures…

- **Conditional Route (CDR)**
  Non-permanent ATS route or portion thereof which can be planned and used under specified conditions

- **Temporary Reserved/Segregated Area (TRA/TSA)**
  Airspace temporary reserved or segregated

- **Cross-Border Area (CBA)**
  TRAs or TSAs established over international boundaries

- **Prior/Reduced Coordination Airspace (P-RCA)**
  Specified portion of airspace within which GAT is permitted “off-route” with or without requiring prior co-ordination.
NM CDM Process with European Airspace Stakeholders

- AIRSPACE & ROUTE AVAILABILITY
- STATES
- MILITARY OPERATORS
- CIVIL OPERATORS
- AIRPORTS
- CIVIL ATS
- MILITARY ATS
- NMOC
- AIR TRAFFIC DEMAND
- AIR TRAFFIC CONTROL CAPACITY
- ASM
  Airspace management
- ATFCM
  Air Traffic Flow & Capacity Management
- ATS
  Air Traffic Services Provision
Why FUA needs to be improved?

In the original FUA Concept, the CDM process shows clearly areas for improvement. In particular for,

- the integration of ASM, ATFCM and ATS and availability of real time data
- the utilisation of civil/military airspace structures
- adequate supporting systems (to be extensively deployed)
- performance evaluation (to be complete and systematic)
- the harmonisation of the ASM processes

As reflected in Performance Review Report 2012

« Making the latent capacity and route options available in a predictable manner » (4.4.7)
« With a number of States using the airspace less than 50% of the time when it was reserved for military needs there is clearly a scope for improvement » (4.4.9)
« The closer coordination between civil and military partners enables to fine tune military activities in line with the demands of civil traffic » (4.4.10)
« New flight profiles, coordination procedures and off-load scenarios …/… new direct routes such as the Free Route …/… » (4.4.11)
« This implies that a significant number of aircraft are able to benefit from opportunities in capacity or route options that are notified tactically, on the day of operations. » (4.4.17)
ADVANCED FLEXIBLE USE OF AIRSPACE CONCEPT

To further enhance the FUA components while introducing new elements in line with the SESAR project for a better performance of ASM and ATM
AFUA Concept components

- Airspace Configuration
- BETTER PERFORMANCE MEASUREMENT
- System Support
- CDM Processes
- Cross-border operations
- Ad-hoc, modular structures
- Rolling Processes
A-FUA Concept
Airspace configurations

“A pre-defined and coordinated organisation of routes and their associated airspace structures, temporary airspace reservations and ATC sectorisation”

Management of:
- ATS Routes
- Available Routes
- Weekend Routes
- Night Routes
- Direct Routes
- Free Route Airspace
- Civ/Mil Airspace Structures
- Conditional Routes (CDRs)
- Air-to-Air Refuelling Routes
- Transit corridors
A-FUA Concept: Integrated CDM & rolling process

- all ASM data updated and available in real time
- common reference database
- common situation awareness
- interoperable supporting systems

- ASM data complemented by ATFCM data
- harmonised CDM procedures
- proactive CDM
- data stored available for analysis
A-FUA Concept
Modular areas
A-FUA Concept

Modular areas

Figure: DMA 3
CBO Operations

Design may be larger, and... MODULAR

CDR2 (1)

CDR2 (2)

AD
CBO Operations
CBO Operations

Design may be larger, but...

VERTICALLY MODULAR
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<td>AUP, UUP, eAMI,…..</td>
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A-FUA Concept

Better and continuous performance evaluation

Average flights per day: 29675

Flights on at least a CDR: 10754

Flights missing an available CDR: 1691
CENTRALISED AFUA SERVICE

The AFUA concept includes the extensive deployment of ASM supporting tools. This can be done even more efficiently with a centralised AFUA supporting service connected to a common database.
The AFUAS concept is based on the introduction of a centralised database for network wide ASM and consists in the establishment of a service allowing the central collection, integration and provision of ASM data in support of continuous collaborative network processes related to airspace needs, constraints, booking and actual use in Europe.
AFUA Support Service
Common awareness and harmonisation of ASM/ATFCM and ATS data for proactive CDM

Strategic planning

- Several years to D-7
- Information related to airspace reservations /military exercises known long time in advance:
  - New/temporary airspace reservations
  - Ad-hoc airspace reservations adaptations
  - Introduction of new ASM concepts

Pre-tactical

- D-7 to day of operations
- Information related to the planning of airspace for the following day/days, comprising:
  - National or FAB AUPs
  - National or FAB UUPs
  - EAUP and EUUP
  - All related updates supporting the rolling process when fully operational
  - Expected availability of CDRs/airspace reservations on the day of operations

Tactical

- On the day of operations
- Information related to the short term planning and actual utilisation of airspace in real time:
  - Airspace status (available, booked, used, released)
  - Actual shape and location of considered portions of airspace
  - Real time availability of CDRs/airspace reservations

Post-ops

- After the day of operations
- Information related to the booking and actual utilisation of airspace achieved:
  - Airspace really booked, available, used, released
  - Availability of the information related to the actual status and utilisation of airspace
Advanced Flexible Use of Airspace Service

Connecting to CS4 with interoperable ASM supporting systems

To define and manage structures in a continuous process of negotiation

Facilitating civil-military cooperation, supporting common situation awareness
CS#4 AFUAS Main Data Flows

AFUA
Automated collection and exchange of ASM data

AFUAS receives the UUP and distributes the updated EUUP

Pre-tactical ASM planning data

Tactical ASM data

Post-ops ASM data

NM is validating and publishing the EUUP

NM ensures CDM with AMC and FMP

NM is validating and publishing the EUUP

EAUP
EUUP
ASM data

EAU
EUU
ASM data

Aerospace availability changes

A military unit is requesting a shift of two hours of an area reservation due to Met

The AMC decides to initiate a local CDM before sending a UUP

The AMC sends the UUP

CS#4

Airspace structure

Strategic planning

Airspace availability

Real-time data

Post-ops data

EAIMS

ATFCM data

Others

Aircraft

AUP/UUP... Relevant ATFCM data

Post-ops ASM data

Post-ops ASM data

Relevant ATFCM data

Relevant ATFCM data

Airspace availability changes

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CS#4

Aircraft

A military unit is requesting a shift of two hours of an area reservation due to Met

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CS#4

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CS#4

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The AMC sends the UUP

CS#4

A military unit is requesting a shift of two hours of an area reservation due to Met

The AMC decides to initiate a local CDM before sending a UUP

The AMC sends the UUP

CS#4
A military unit is requesting a shift of two hours of an area reservation due to Met.

The AMC decides to initiate a local CDM before sending a UUP.

AFUAS receives the UUP and transmits it to NM after quality control.

AFUAS receives and distributes the updated EUUP.

NM is validating and publishing the EUUP.

EAUP/EAU... real time update of a/s status...

AFUAS receives and distributes the updated EUUP.

NM triggers FPL re-validation.

AUP/UUP... Relevant ATFCM data.

Relevant ATFCM data.

Options for improvement are sent to AOs.

Invalidated Flight plans are suspended.
Benefits of AFUAS (1/2)

- AFUAS will create the conditions for optimizing the use of available airspace both locally and at network level, across border, delivering increased flight efficiency, resulting in more performing flights.

- Permanent updates of airspace data will be available to all players with a single source of reference (link CS#4 and CS#5).

- AFUAS will allow systematic application of cooperative mechanisms among all civil and military partners, at local, sub regional and network level through interactive ASM/ATFCM/ATS management at all three levels in order to:

  - Optimise airspace resources versus airspace demand;
  - Enable better information sharing and more efficient CDM in case of cross-border and/or regional operations;
  - Minimise adverse effects on network operations caused by national borders and/or sub-regional (FAB) interfaces, and by uncoordinated local decisions on airspace status, through the application of continuous impact assessment of airspace planning and status;
Benefits of AFUAS (2/2)

- AFUAS will allow a seamless and synchronised transition from one operational environment to another (airspace configurations, e.g. between FRA and standard ATS routes);

- It will provide the conditions for enhancement of demand/capacity balancing (DCB/dDCB) through cooperative, continuous, seamless and reiterative airspace planning and operational deployment, including proactive management of all airspace structures, activation and shifting air traffic flows as appropriate;

- It will also contribute to the achievement of the performance targets in safety, capacity, environment and flight efficiency/mission effectiveness set-up at European, sub-regional or national levels.
In conclusion, AFUAS will deliver early benefits by providing an organised service:

- Enhancing synergies in the CDM for a more efficient application of FUA, increasing the ASM contribution to the overall network performance

- Raising significantly the level of harmonisation of ASM processes in Europe to optimize airspace availability and its utilisation

- Providing the frame for the gradual implementation of the AFUA Concept and future SESAR operational improvements when mature and validated