

CENTRALISED SERVICE 4 ADVANCED FLEXIBLE USE of AIRSPACE

CONCEPT OF OPERATIONS



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European airspace is complex



**More than 11000 Military Aircraft
are stationed in Europe**

FLEXIBLE USE OF AIRSPACE

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)

High-Level
Civil / Military
Airspace Policy
Body

Pre-tactical Level: ASM Level 2

Day-to day airspace allocation according to user requirements

Joint
Civil / Military
Cell (AMC)

Tactical Level: ASM Level 3

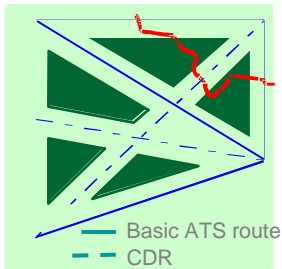
Real-time use of airspace allowing a safe separation between civil and military aircraft

Appropriate
Civil / Military
ATS Units

Using flexible Airspace Structures...

- **Conditional Route (CDR)**

Non-permanent ATS route or portion thereof which can be planned and used under specified conditions

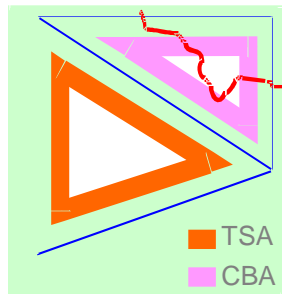


- **Temporary Reserved/Segregated Area (TRA/TSA)**

Airspace temporary reserved or segregated

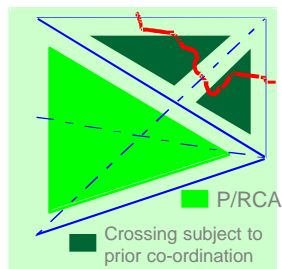
- **Cross-Border Area (CBA)**

TRAs or TSAs established over international boundaries

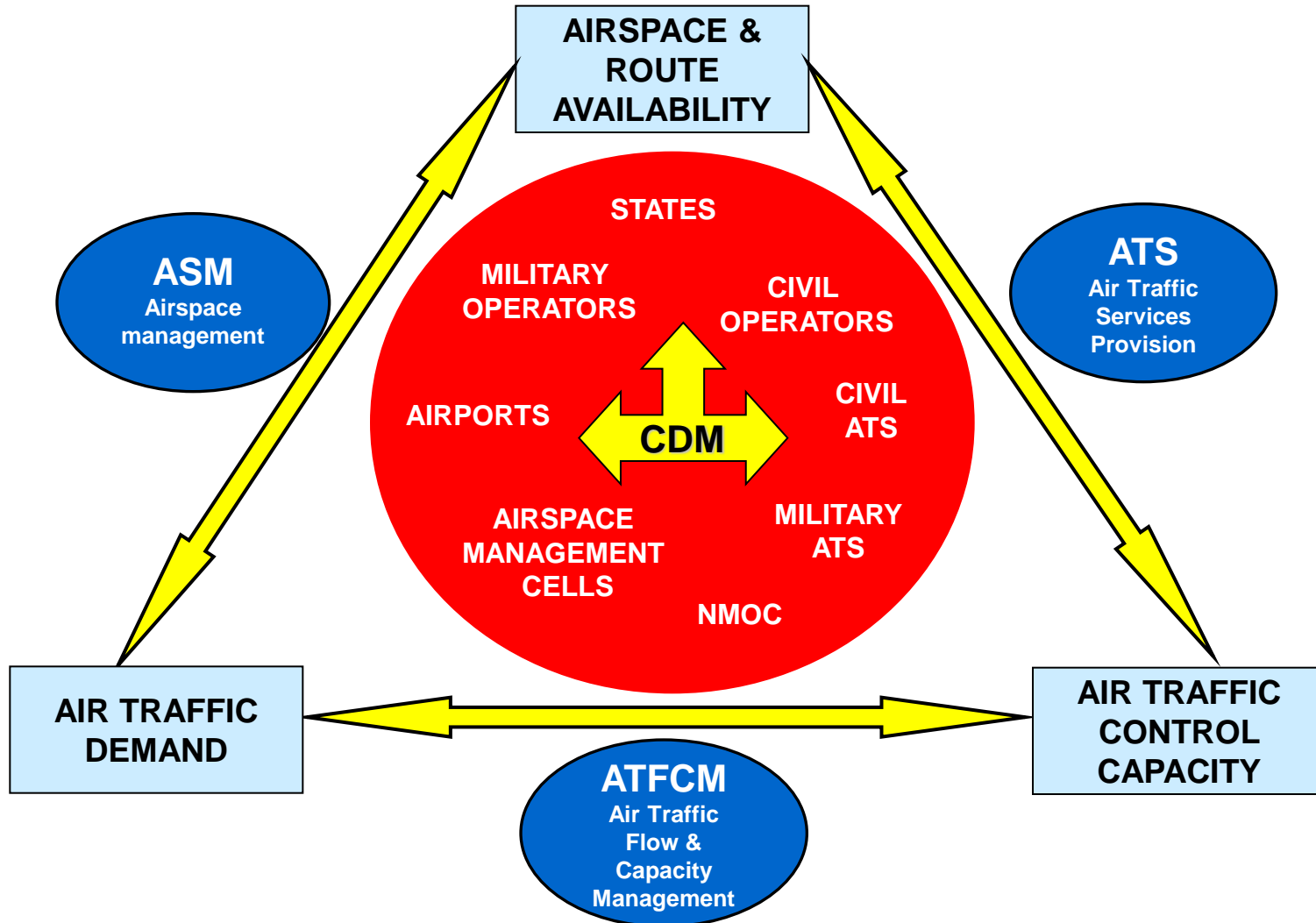


- **Prior/Reduced Coordination Airspace (P-RCA)**

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



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)

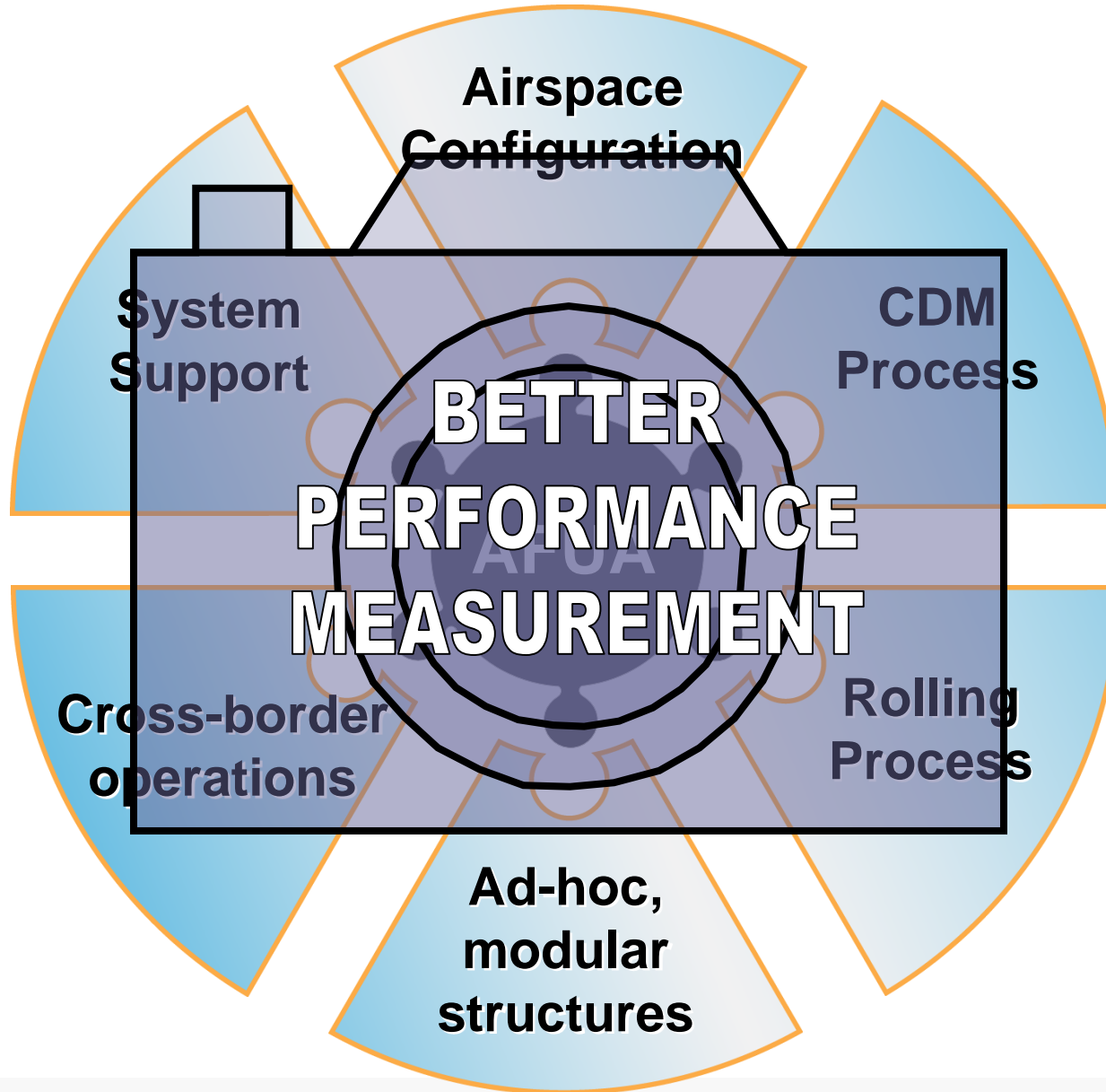
« New flight profiles, coordination procedures and off-load scenarios .../...new direct routes such as the Free Route .../... » (4.4.11)

« 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



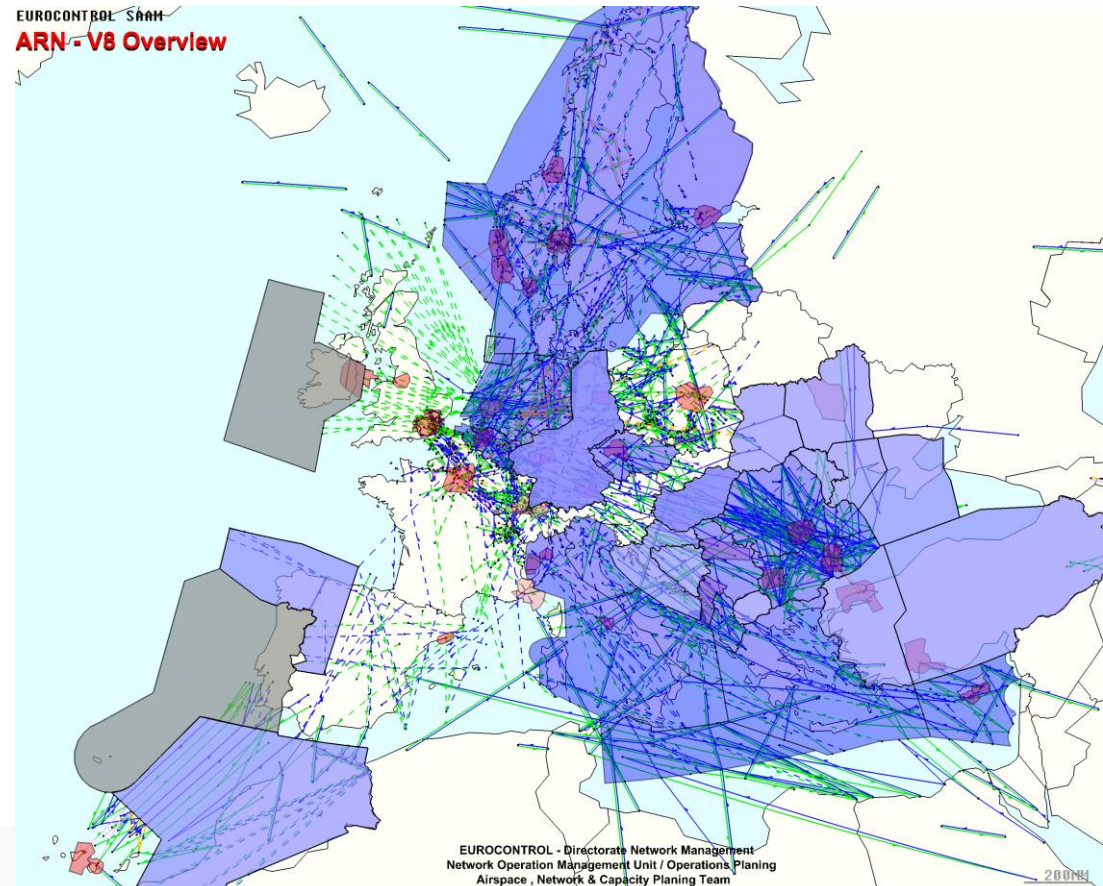
A-FUA Concept

Airspace configurations

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

Management of:

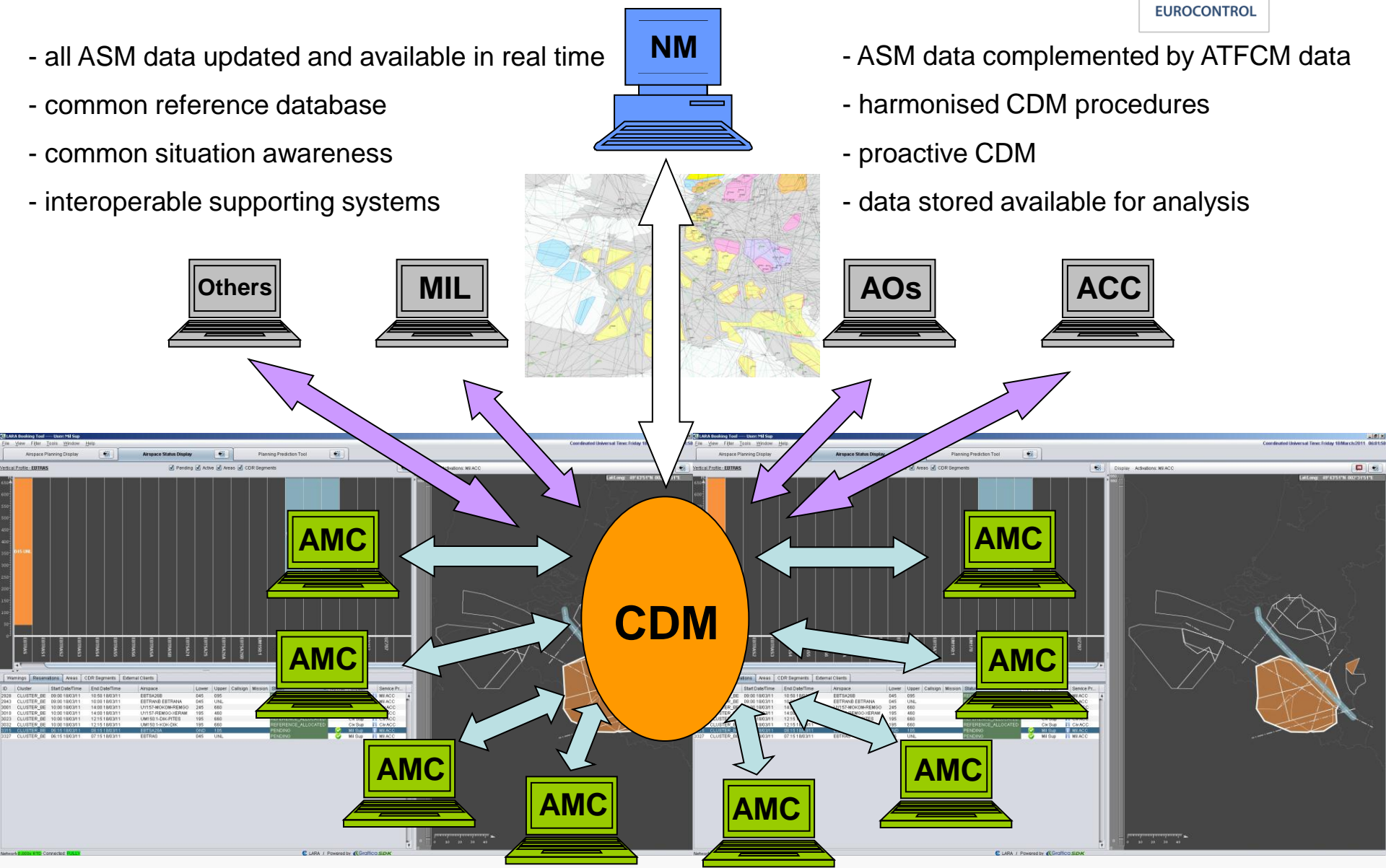
- ATS Routes
- Available Routes
- Weekend Routes
- Night Routes,
- Direct Routes
- Free Route Airspace
- Civ/Mil Airspace Structures
- Conditional Routes (CDRs)
- Air-to-Air Refuelling Routes
- Transit corridors



A-FUA Concept: Integrated CDM & rolling process

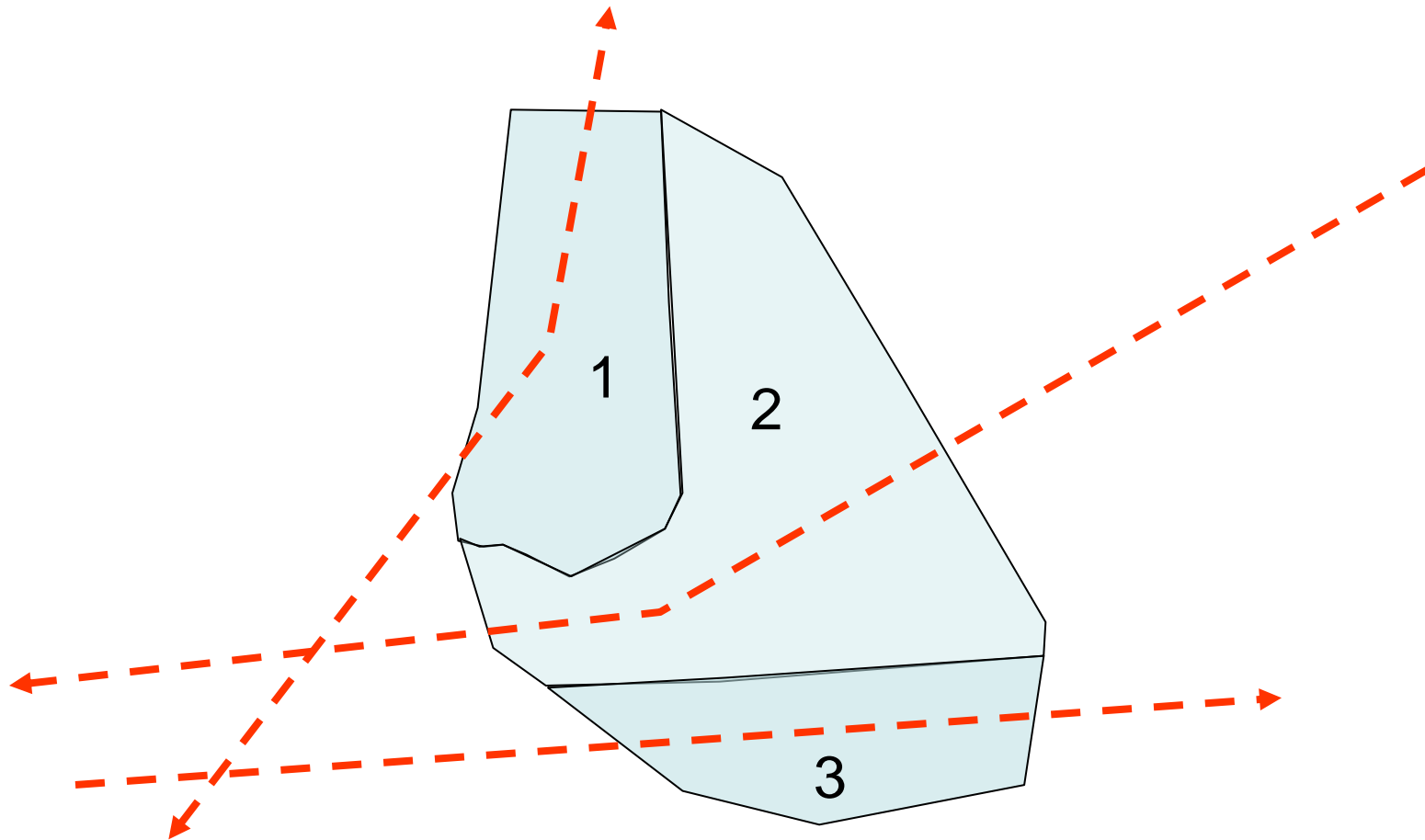
- all ASM data updated and available in real time
- common reference database
- common situation awareness
- interoperable supporting systems

- 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

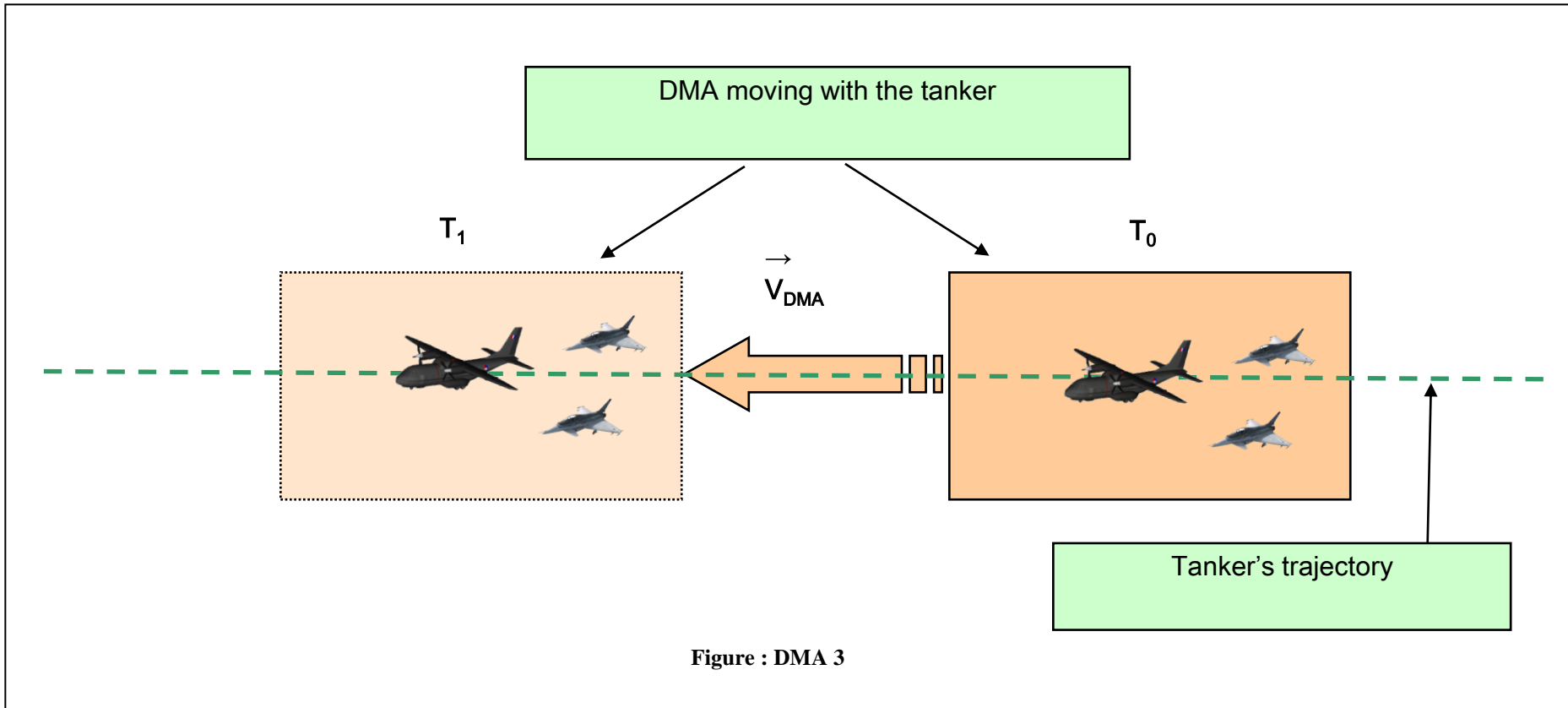
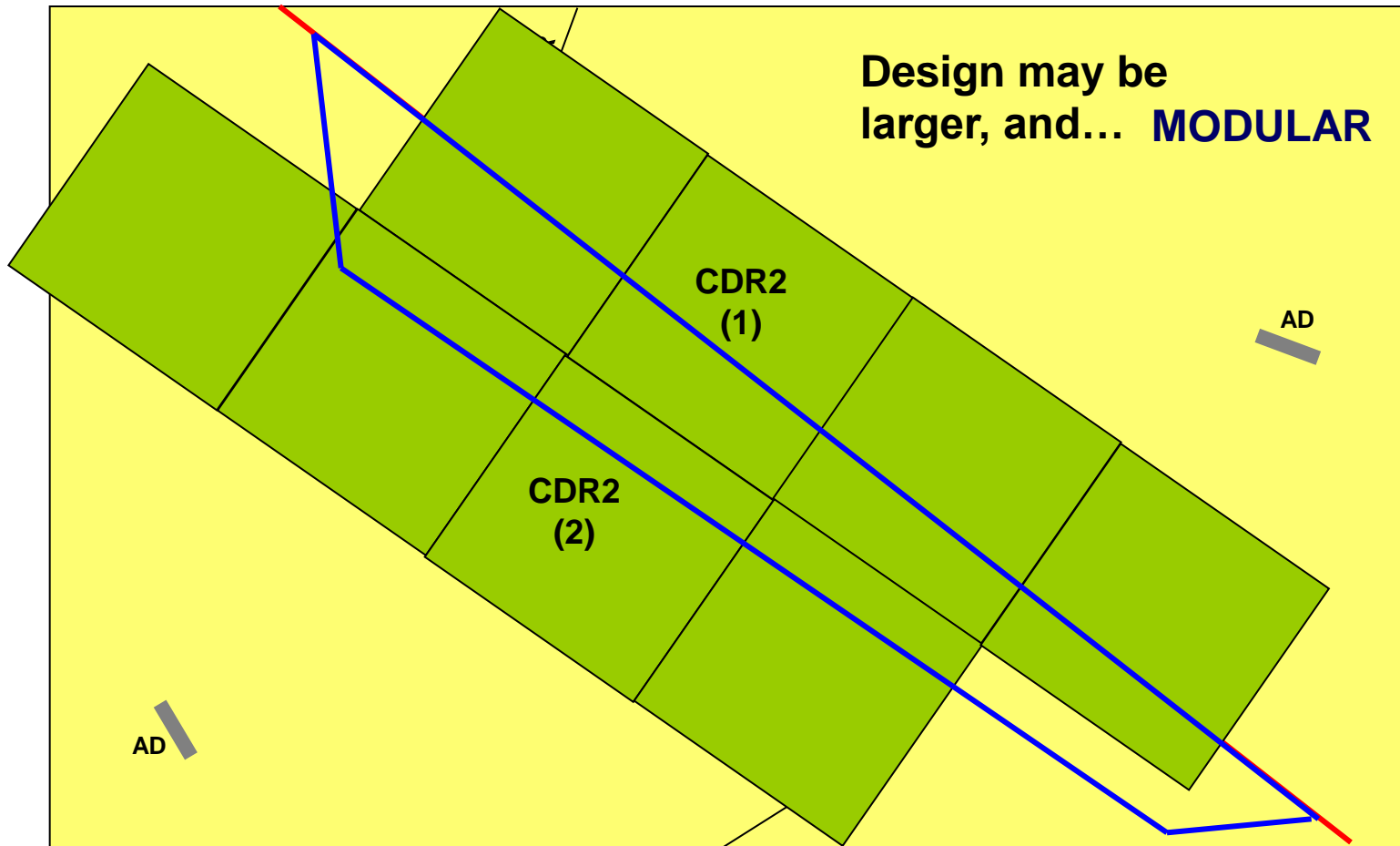
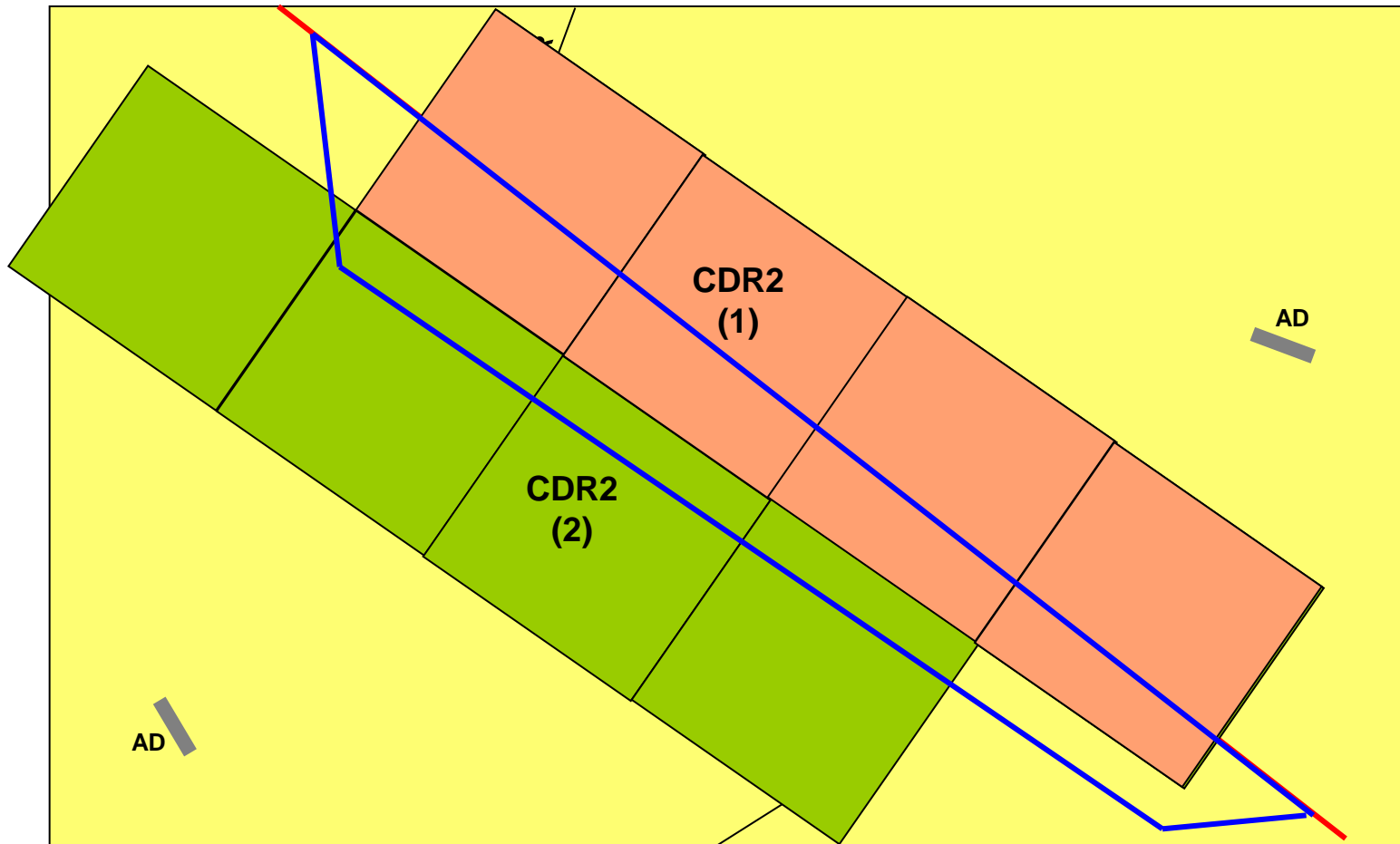


Figure : DMA 3

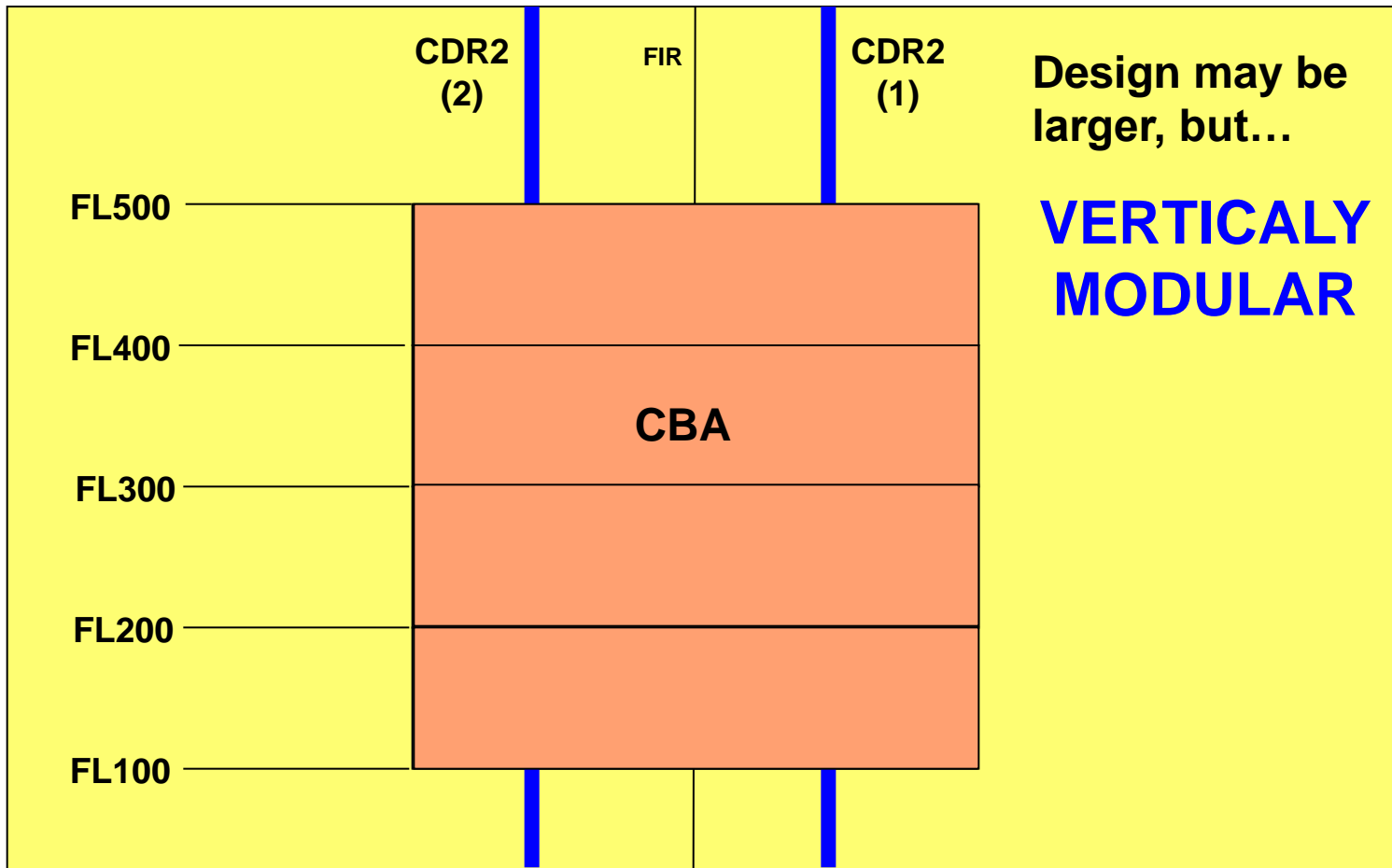
CBO Operations



CBO Operations



CBO Operations



FUA

**From
to**

AFUA



Levels 1,2 & 3 fixed in time

Levels 1,2 & 3 interactive

Independent national ASM

Consolidated Network mngt

Fixed ATS Route System

Dynamic User Preferred Routings

Fixed Scenarios

Active Airspace Configurations

Time constrained snapshots

Rolling process

AMC & FMP separated

Integrated ASM/ATFCM/ATS Activity

Fixed sectors

Proactive sector management

Static TRA/TSAAs

Variable Areas

CDRs

Conditional Structures (CDS)

CBO only between neighbours

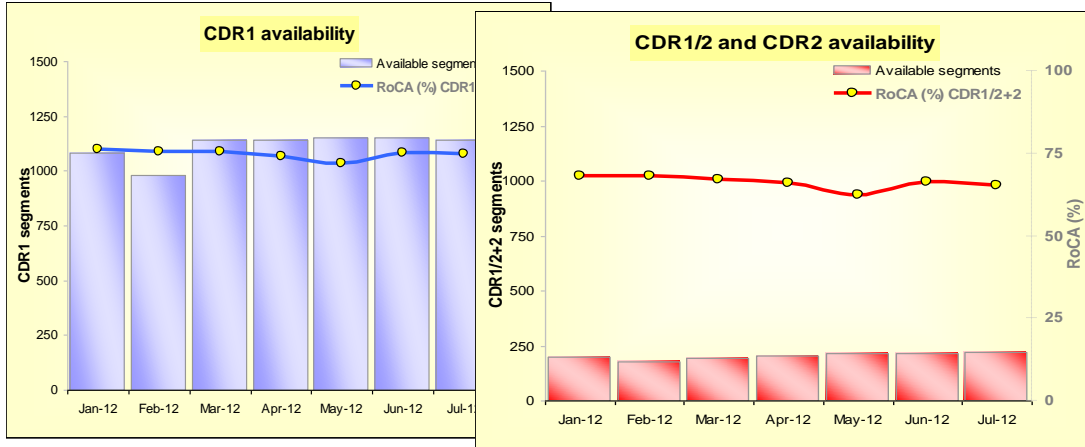
Europe-wide CBO sharing

AUP, UUP, eAMI,.....

AFUA SERVICE & NOP

A-FUA Concept

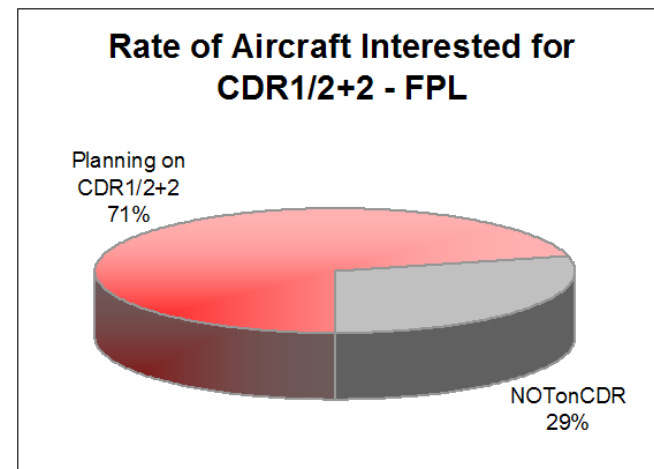
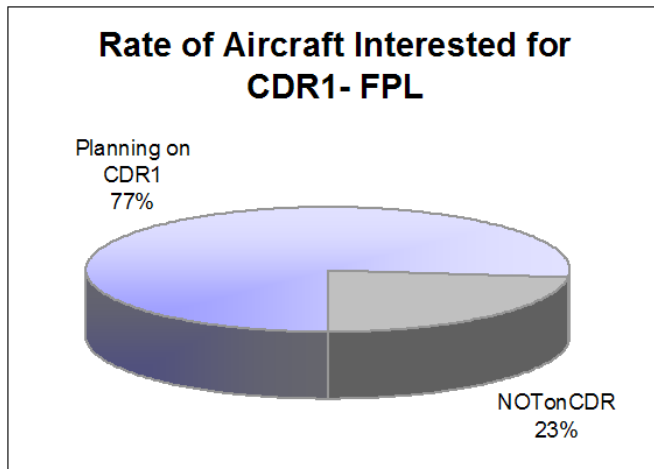
Better and continuous performance evaluation



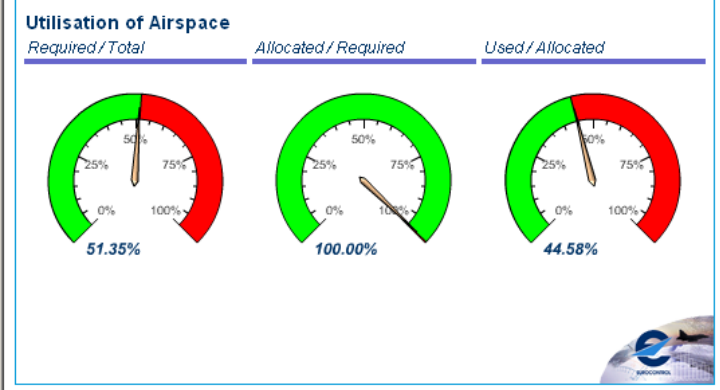
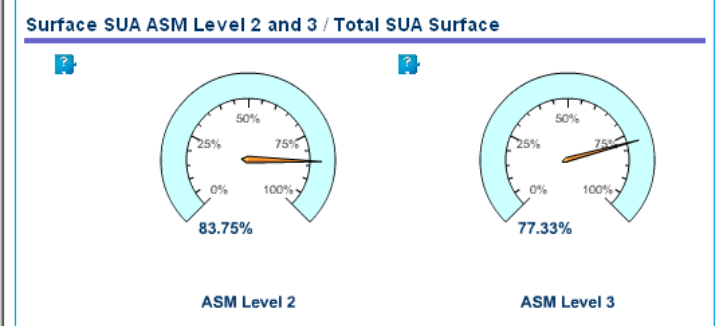
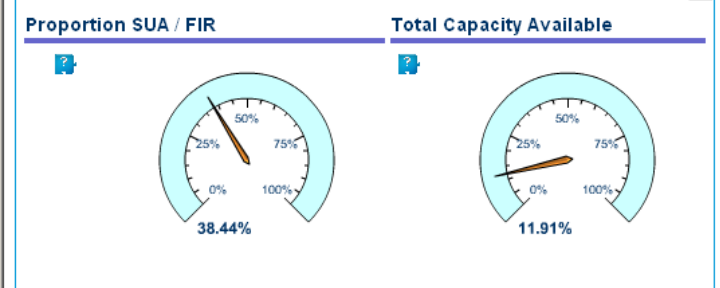
Average flights per day: 29675

Flights on at least a CDR: 10754

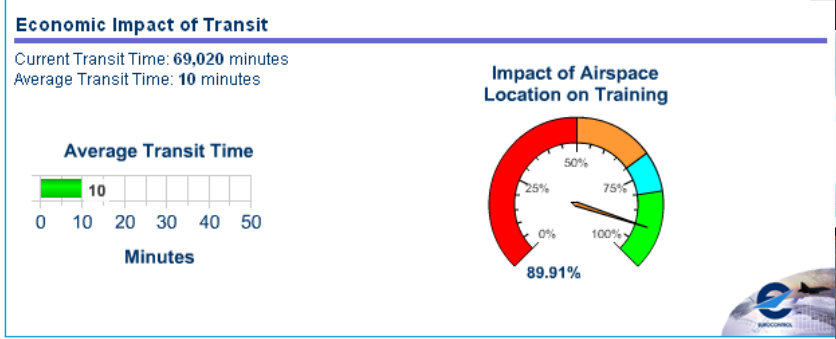
Flights missing an available CDR: **1691**



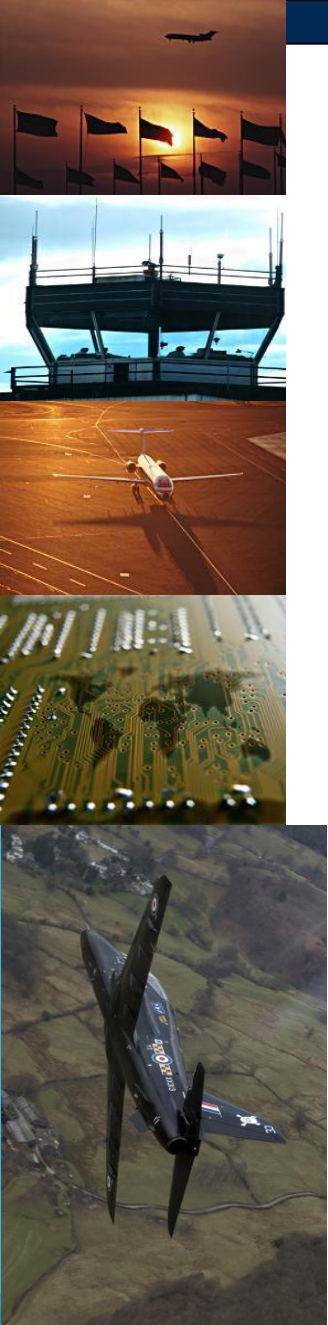
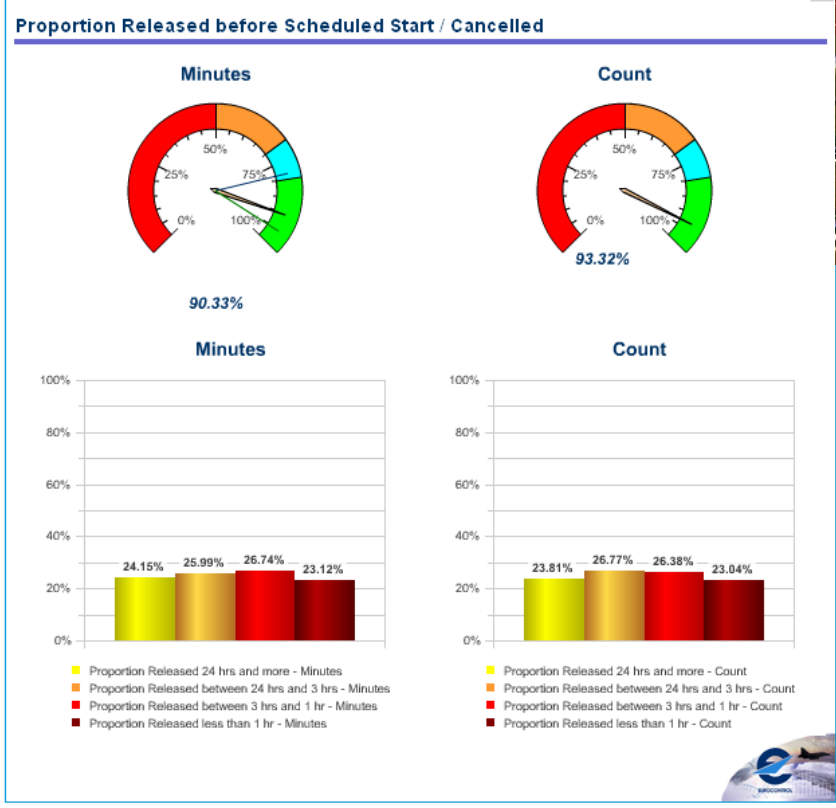
Airspace Efficiency



Mission Effectiveness



Flexibility



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

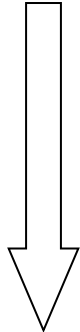
The AFUAS concept is based on the introduction of a centralised database for network wide ASM and consists in the establishment of a service allowing the central collection, integration and provision of ASM data in support of continuous collaborative network processes related to airspace needs, constraints, booking and actual use in Europe



AFUA Support Service

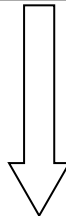
Common awareness and harmonisation of ASM/ATFCM and ATS data for proactive CDM

Strategic planning



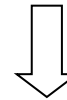
- Several years to D-7
- Information related to airspace reservations /military exercises known long time in advance:
 - New/temporary airspace reservations
 - Ad-hoc airspace reservations adaptations
 - Introduction of new ASM concepts

Pre-tactical



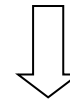
- D-7 to day of operations
- Information related to the planning of airspace for the following day/days, comprising:
 - national or FAB AUPs
 - national or FAB UUPs
 - EAUP and EUUP
 - All related updates supporting the rolling process when fully operational
 - Expected availability of CDRs/airspace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

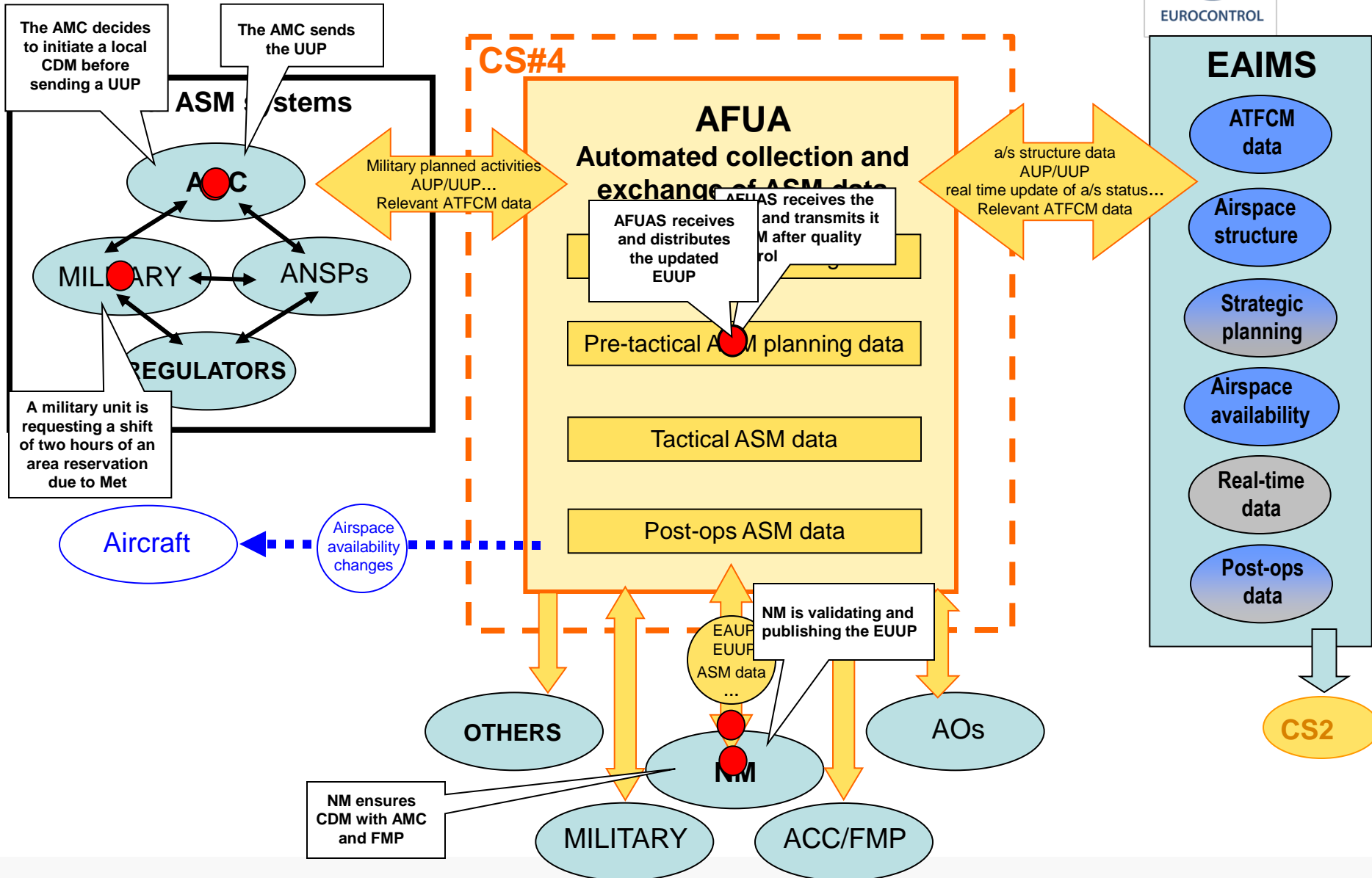
To define and manage structures in a continuous process of negotiation

Facilitating civil-military cooperation, supporting common situation awareness

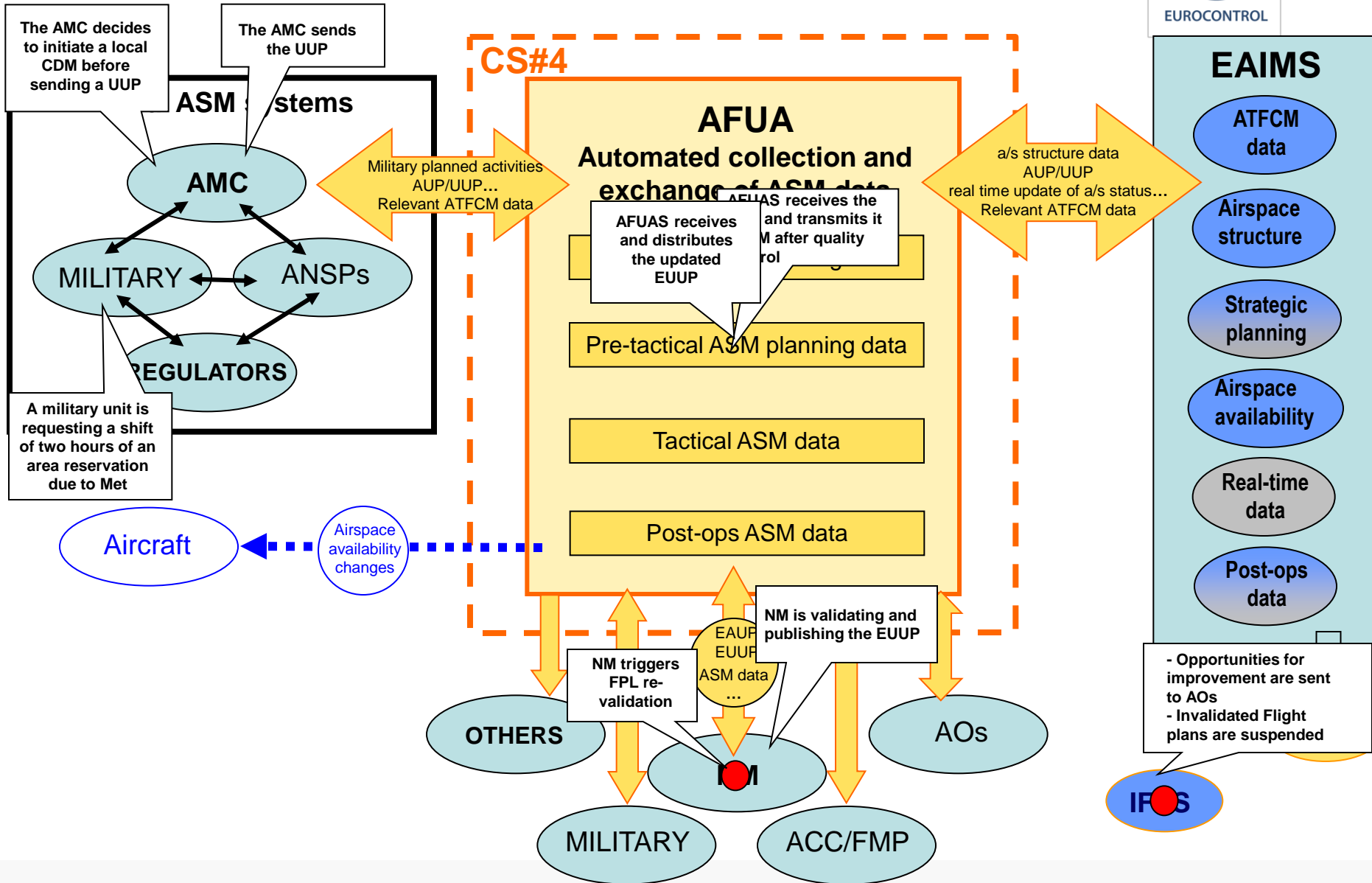
The screenshot displays the 'Airspace Planning Display' interface. At the top, it shows the title 'Airspace Planning Display' and a 'Display' button. Below the title, there are controls for 'Scale: 6 Hours', 'Indicators', 'Mode: Status', 'Conflicts', and 'Charts View'. A timeline at the top shows the date 'dim. 27/mars/2011' and a time range from 10:00 to 15:00. The main area is a table of events with columns for reservation ID, status, and details. The 'EBTRAN1' reservation is highlighted in red. A tooltip for 'EBTRAN1' shows details: '195 FL - UNL', '10:55 - 12:10', and 'c/s'. To the right, a map shows the geographical layout of the airspace with various boundaries and flight paths. The map includes a coordinate display: 'Lat/Long: 50°04'60"N 006°04'28"E'. At the bottom, there are tabs for 'Actions', 'My Reservations', 'Reservations', and 'AUPs/UUPs'. A table below these tabs lists reservation details with columns for 'Reservation ID', 'Creator', 'Deadline', 'Action Type', and 'Action Required'. At the very bottom, it shows 'Network 0,016s RTD Connected: FULLY'.

Reservation ID	Creator	Deadline	Action Type	Action Required
EBD06				
EBD07C				
EBD09				
EBTRAN				
EBTRAN1				
EBTRAN2				
EBTRAN3				
EBTRANA				
EBTRANB				
EBTRAS				

CS#4 AFUAS Main Data Flows



CS#4 AFUAS Main Data Flows



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.

Civil-Military benefits of the AFUAS



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