

Supporting
European
Aviation



Interoperability in the Civil-Military cooperation context and cooperation support tools

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DECMA/CMC/ATM

9 December 2019



NETWORK
MANAGER



Content

- Civil-Military CNS Interoperability
- Civil-Military cooperation support tools
 - CIAM
 - LARA
 - CIMACT
 - PRISMIL
- Demonstration of LARA and CIMACT

New Aviation Concepts are introduced due to safety, capacity, environment



Trajectory Operations

New Separation Modes

Integrated Airport Systems and Automated ATC Systems

System Wide Information Management (SWIM)

Network Management



Concepts supported by Technology Evolution!



Satellite Technologies

- GNSS
- SATCOM



Advanced NAV and SUR

- PBN, A-PNT, MON
- 4D NAV
- ADS-B
- ACAS



Aircraft Centric

- Modular Avionics
- Integrated CNS



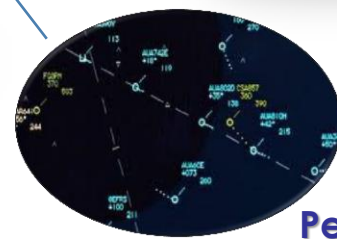
Air-Ground Data Link

- CPDLC
- 4DT/ADS-C



ATC Automation and Connectivity

- SWIM
- IP Backbone



Performance-Based Remote/Virtual Services Security

Military are Vulnerable to Aviation Infrastructure Evolution

Around 200.000 State aircraft
flights/year as GAT

Military operations need
civil infrastructure support

Exemptions incompatible with
high connectivity/automation

Interoperability solutions not
(yet) available



Military Constraints when facing ATM Modernisation



Huge Military Fleets

Designed to be Weapon Systems

Technical Constraints

Lengthy Procurement

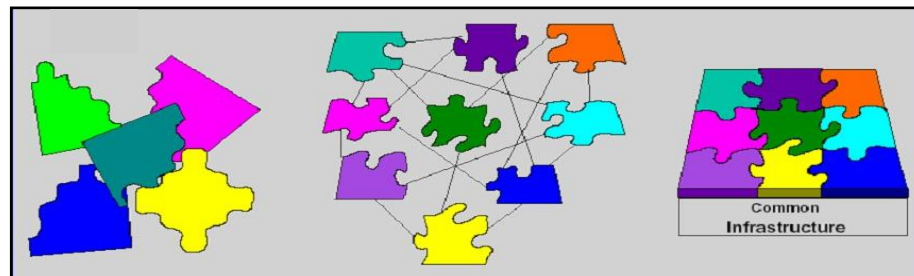
Lack of Recognized Certification

Budget Constraints

Exemptions !

Civil-Military CNS Interoperability:

a key enabler for facilitation of military operations



FRAGMENTATION

INTEROPERABILITY

INTEGRATION

PERFORMANCE-BASED
OPERATION



MINIMISE
EXEMPTIONS
AND
DEROGATIONS

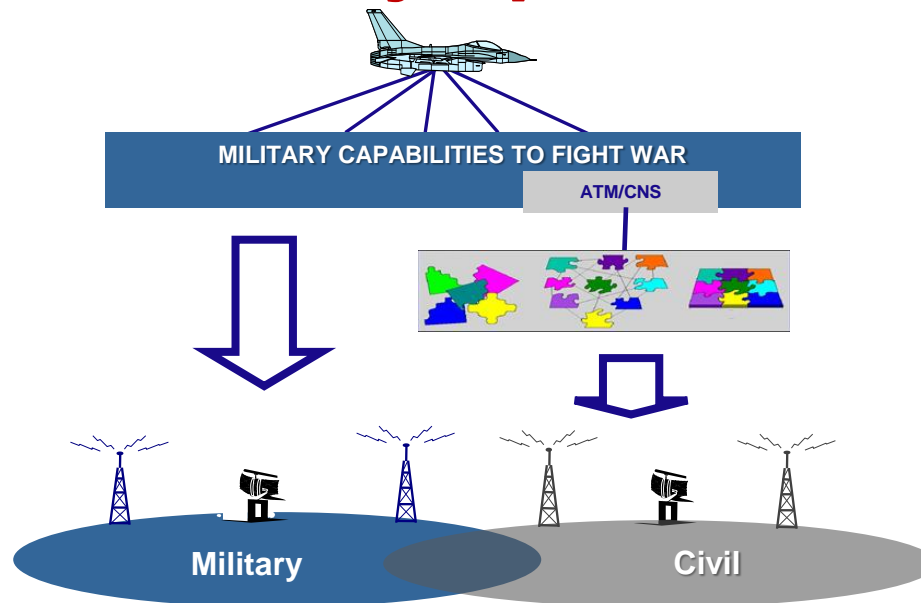
CONVERGE
TECHNOLOGIES

Dual Use CNS Approach

Decouple technology from performance. Reutilize available military capabilities.



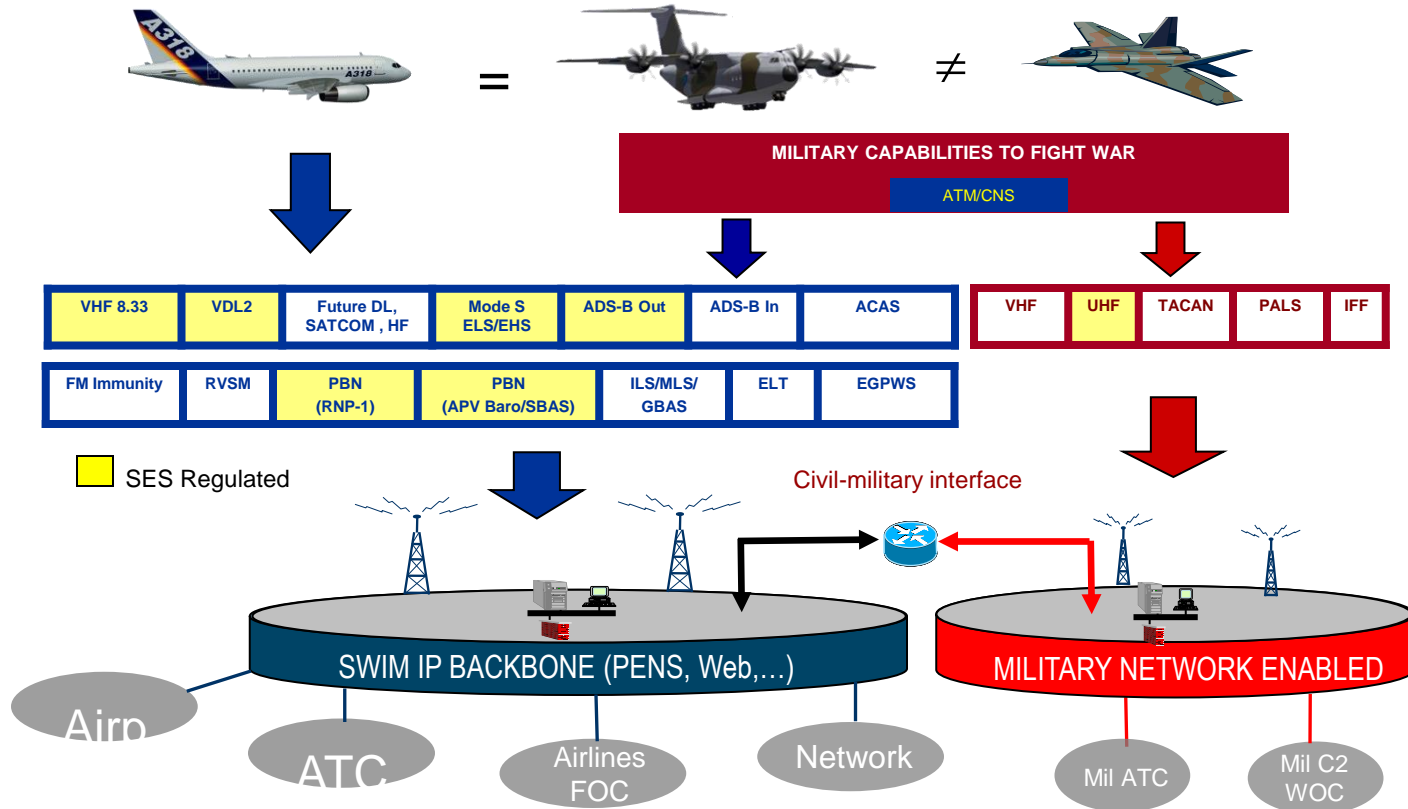
- Performance-based approaches are needed
- Different approach for transport and fighters



- Obsolescence management
- Alternative certification approaches
- Supplementary ground support.

Optimized equipage, rationalized infrastructure, seamless accommodation, limited technical impact and cost

Civil-Military ATM/CNS Integration: The Full Picture



Capability re-use, optimized equipage, multi-mode avx, equivalent certification

Military Operational Requirements for the Use of Airspace

- ✓ Adequate volumes for the missions
- ✓ Possibility to have airspace in proximity of the air bases or ground installations
- ✓ Flexibility of planning and timing
- ✓ Required level of service
- ✓ Most efficient use of airborne time

= Ensure mission effectiveness



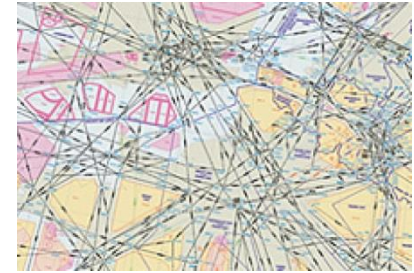
Civil Operational Requirements for the Use of Airspace

- ✓ Highest level of safety
- ✓ Maximum route availability
- ✓ Most direct routes
- ✓ Least fuel consumption possible (CO₂)
- ✓ Stability of the planning and predictability
- ✓ Quality of ATC service

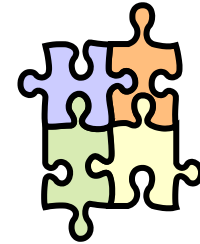


Key for a successful Civil-Military cooperation

✓ **Flexible Use of Airspace**



✓ **Interoperability of Systems**



✓ **Collaborative Decision-making**

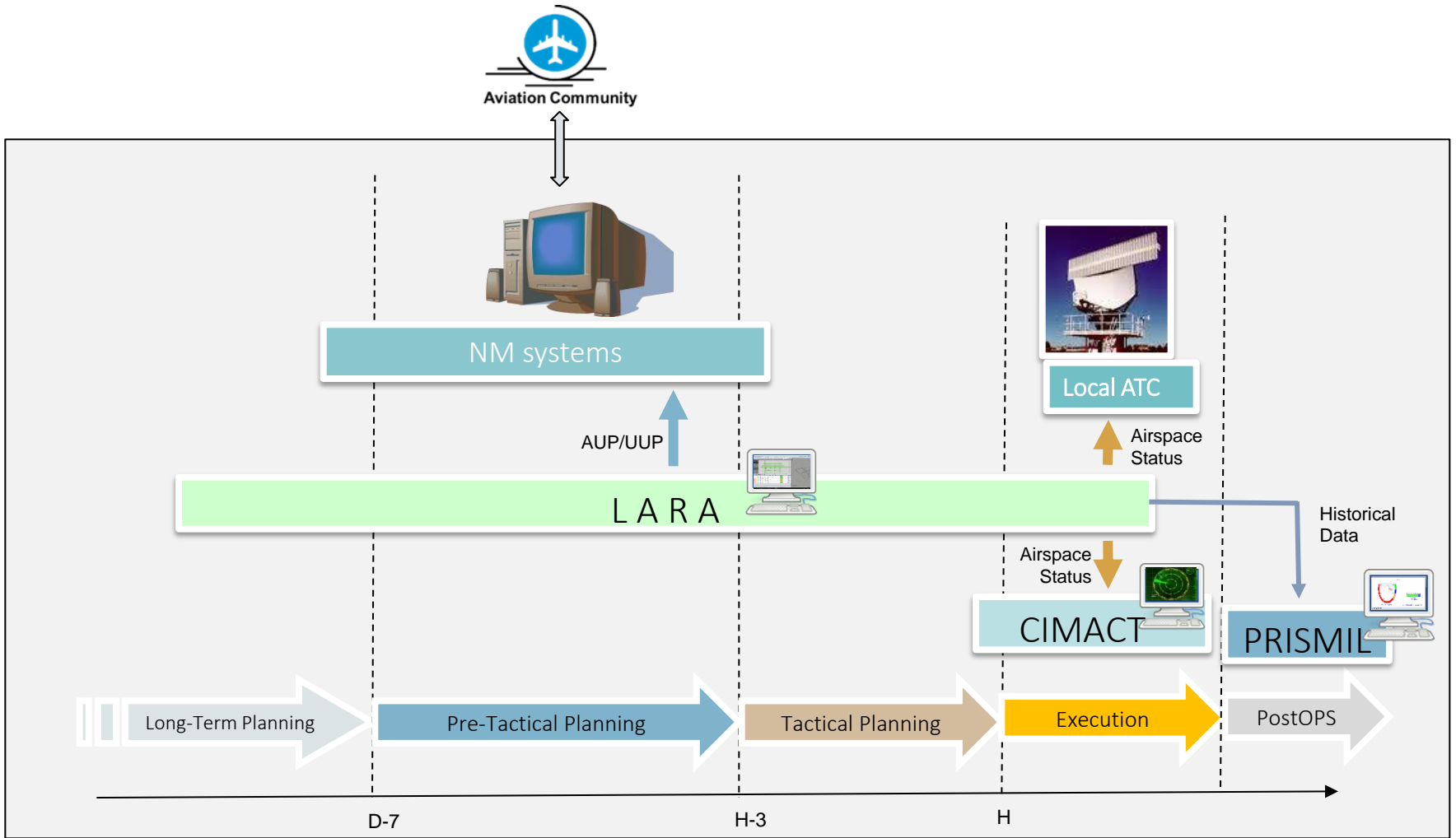


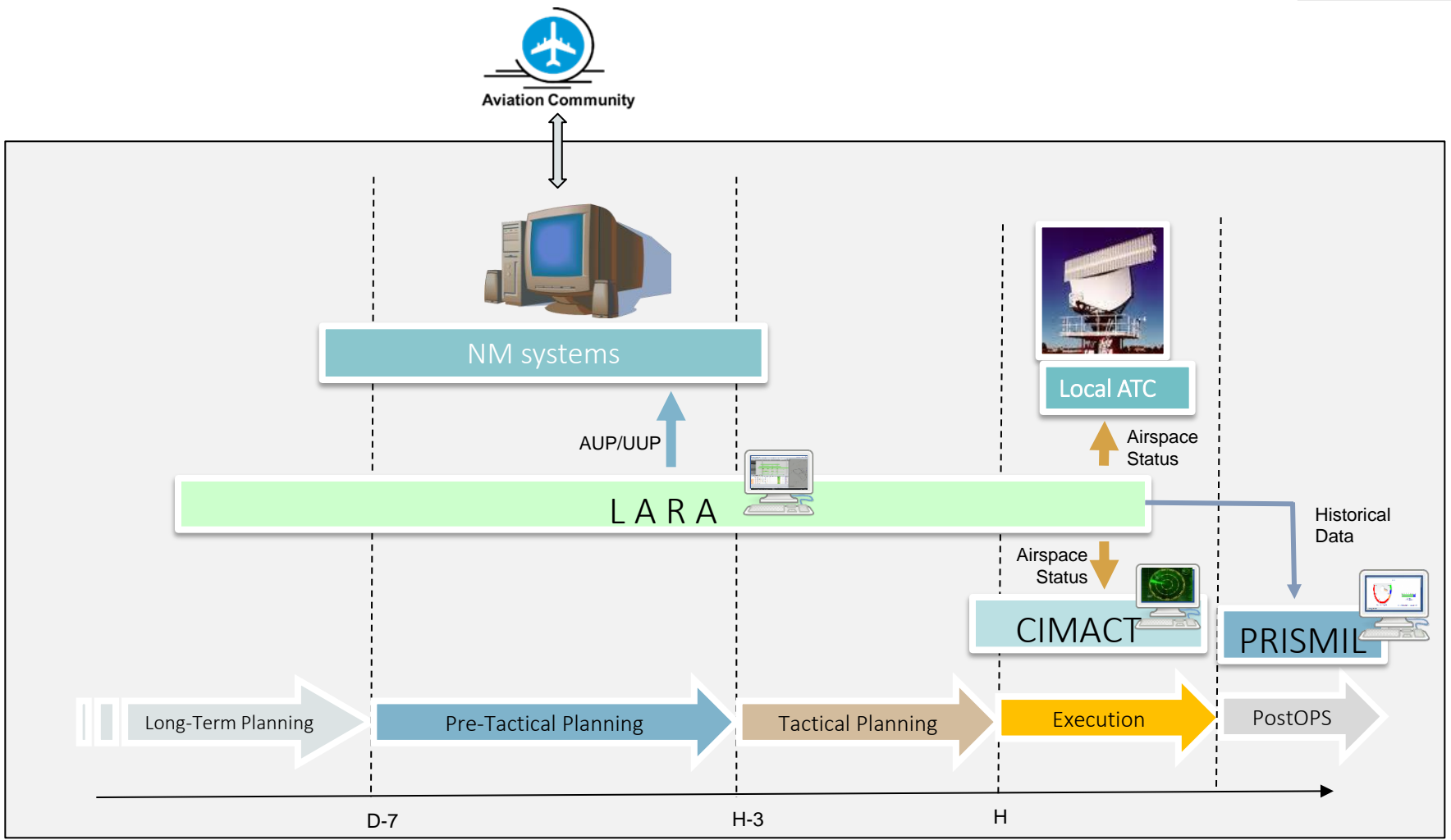
FUA Implementation Support Systems

EUROCONTROL ASM and civil-military ATM coordination systems supporting implementation of FUA and SES performance scheme

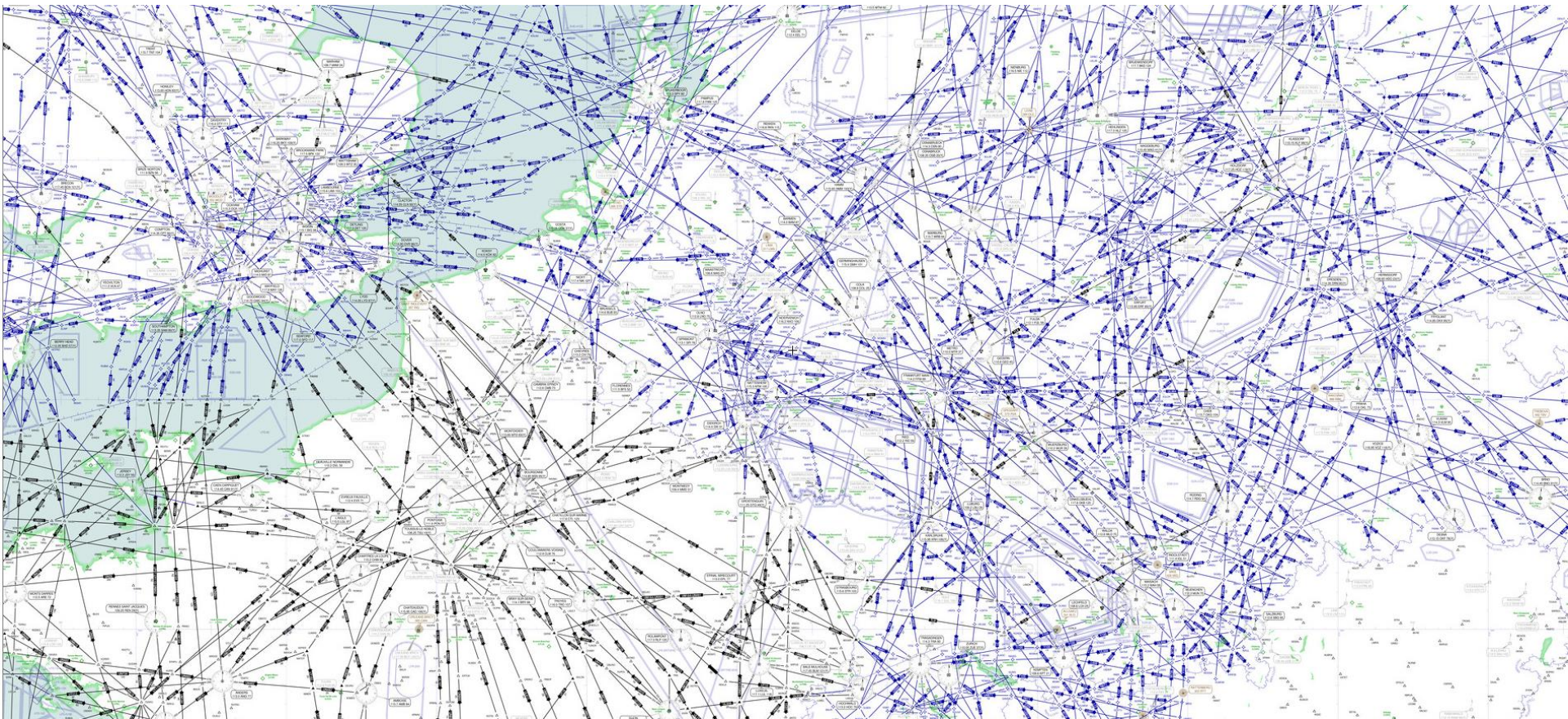
- CIAM
- LARA
- CIMACT
- PRISMIL

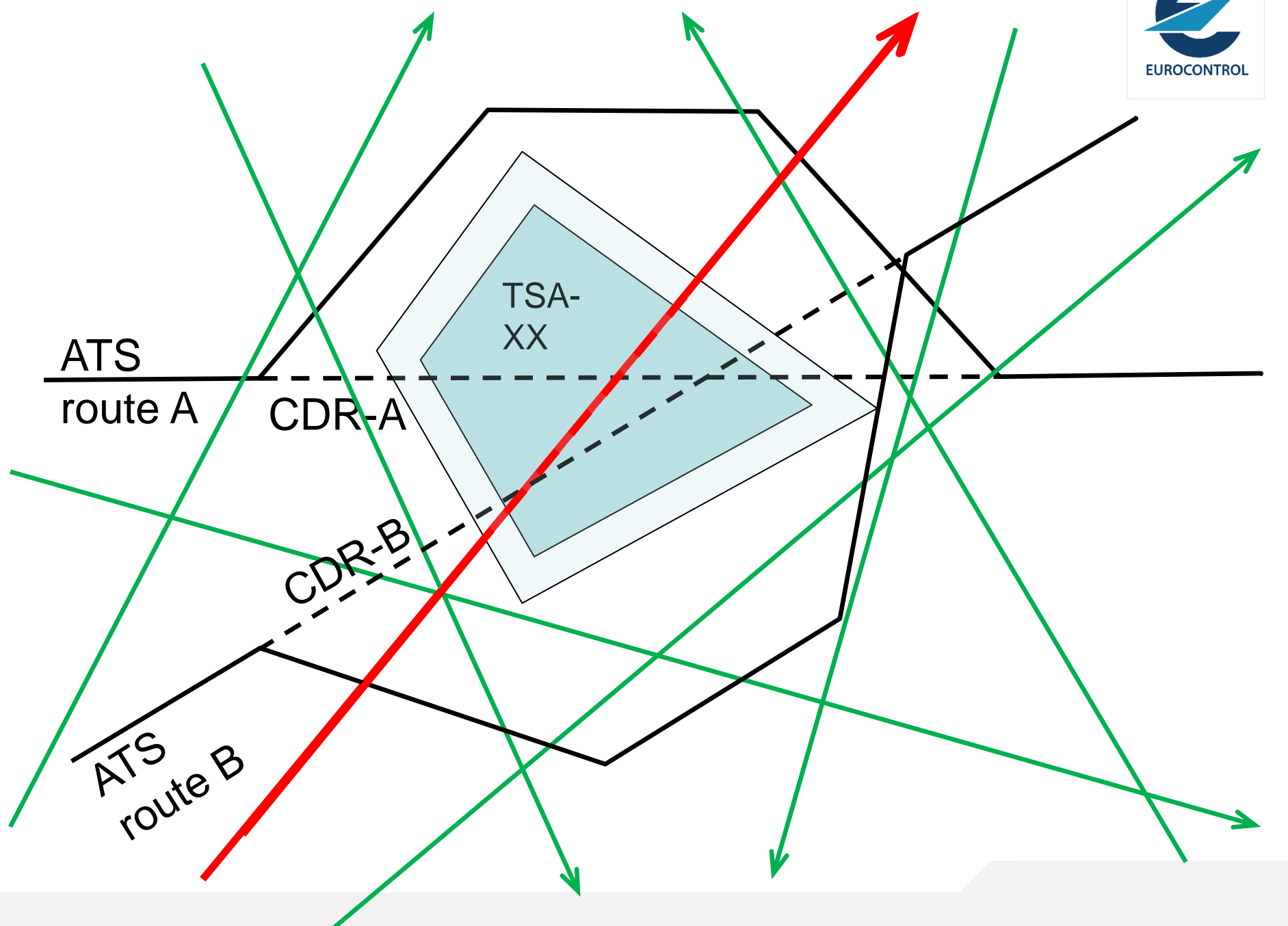






Flexible Use of Airspace Concept





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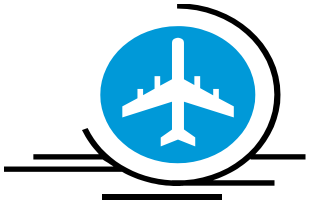
LARA

Local And sub-Regional ASM support system



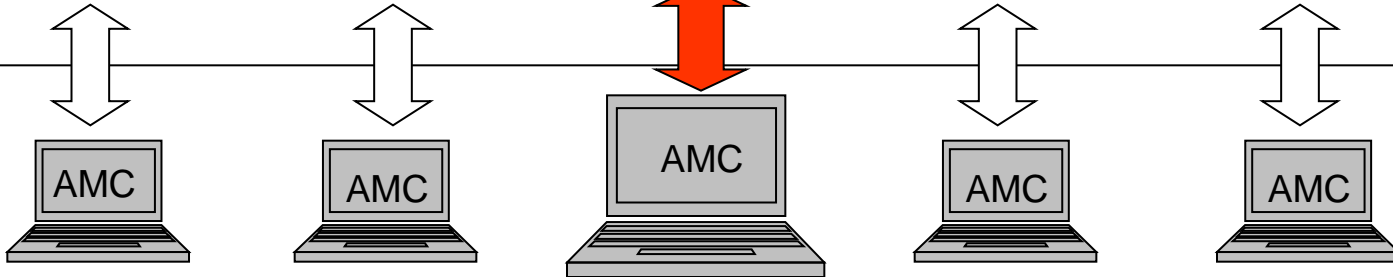
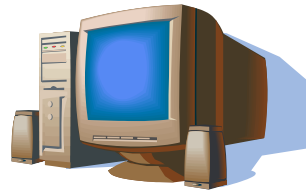
NETWORK
MANAGER



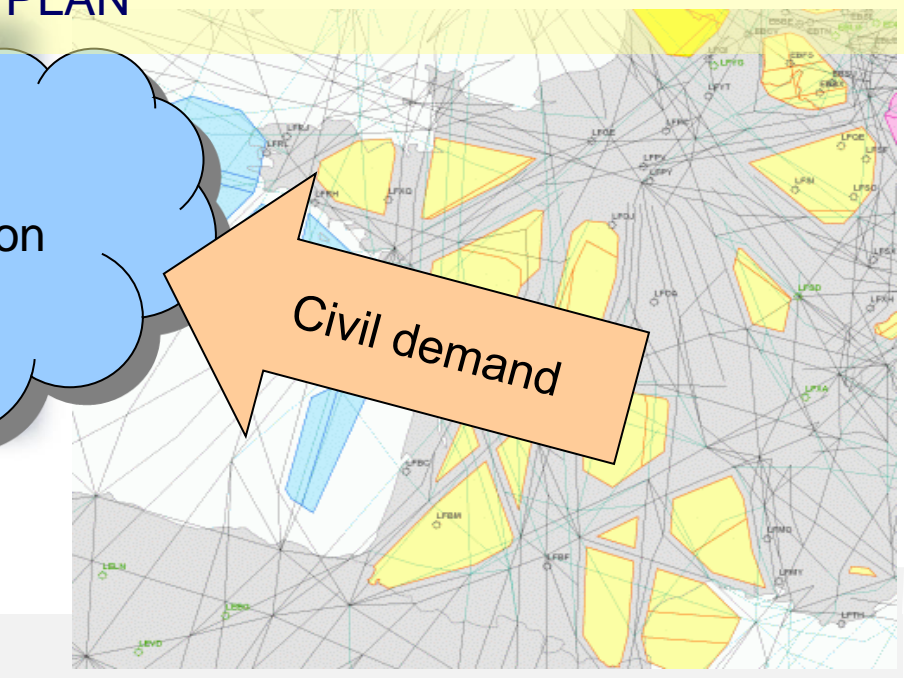


Aviation Community

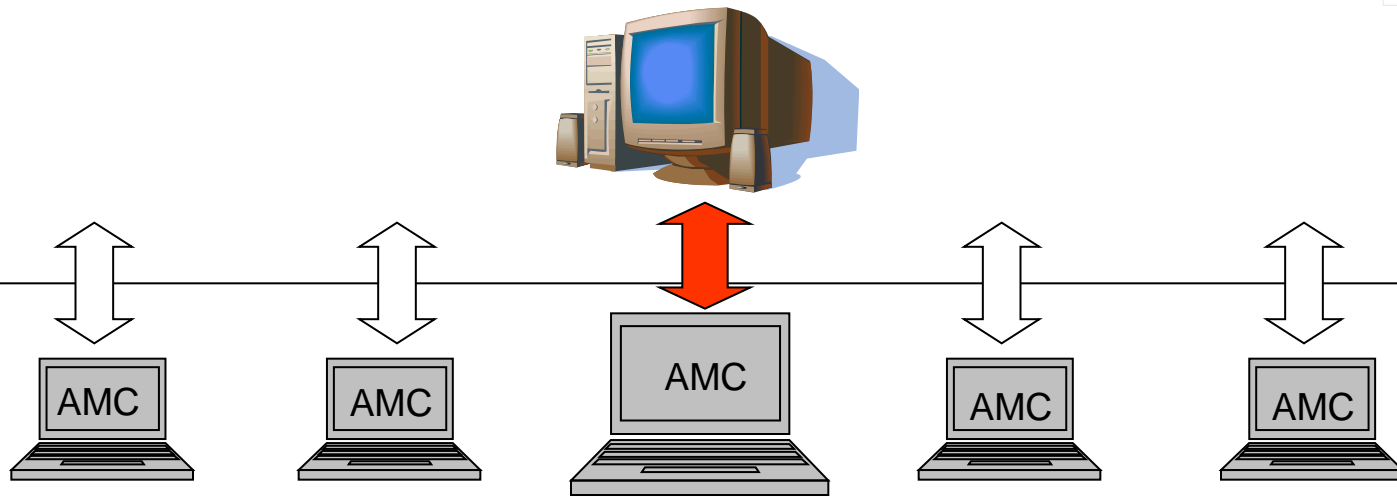
NM SYSTEMS



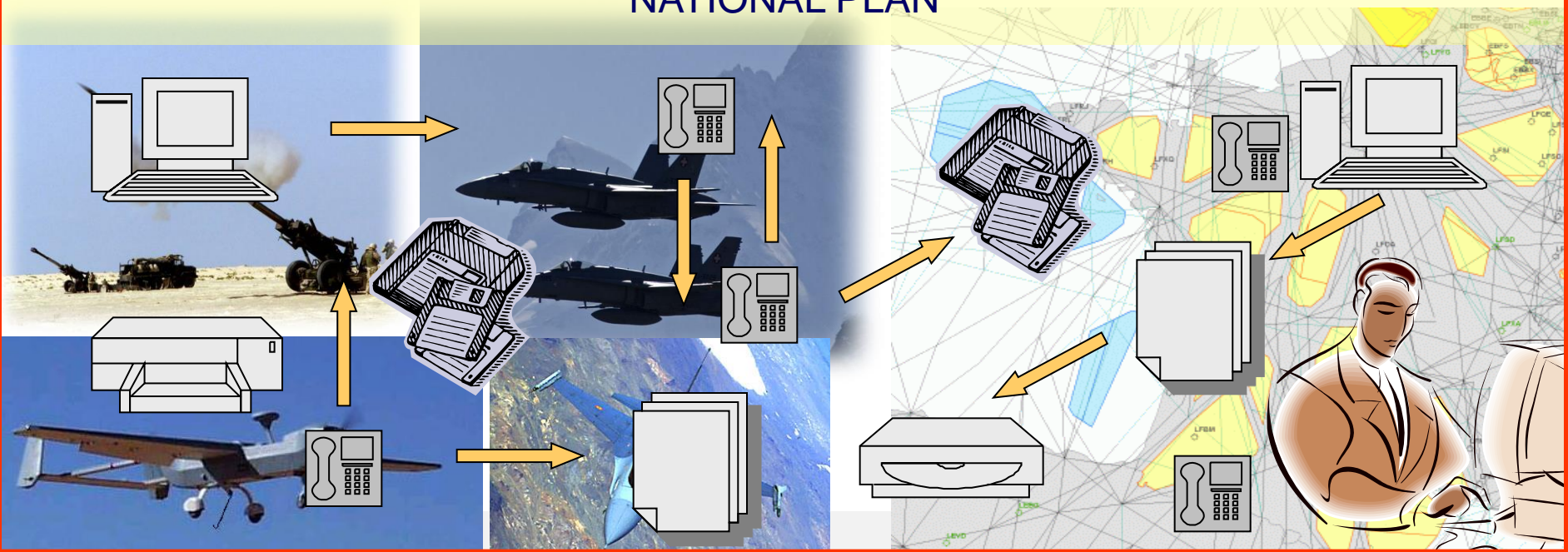
NATIONAL PLAN



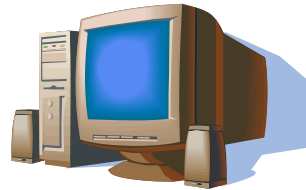
NM SYSTEMS



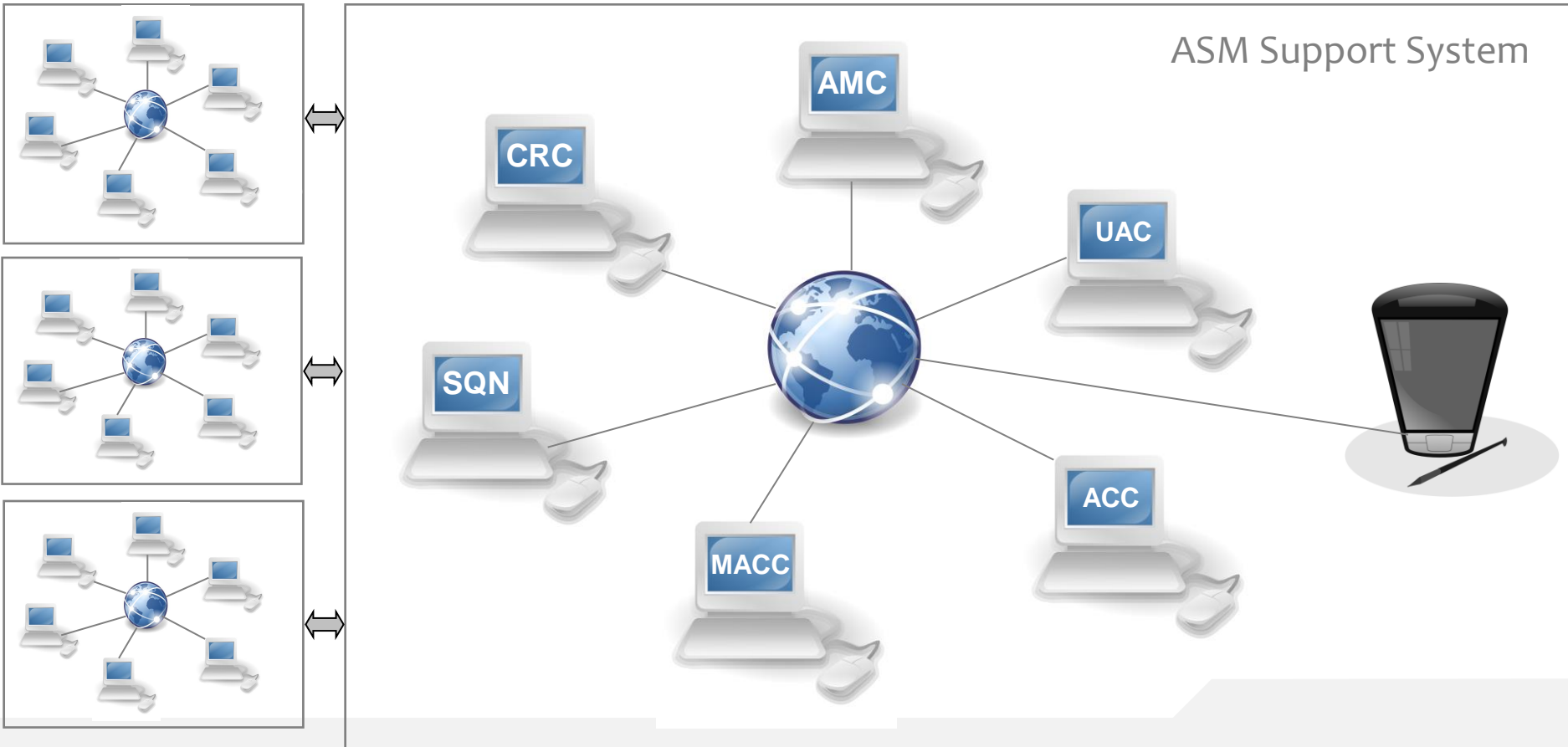
NATIONAL PLAN



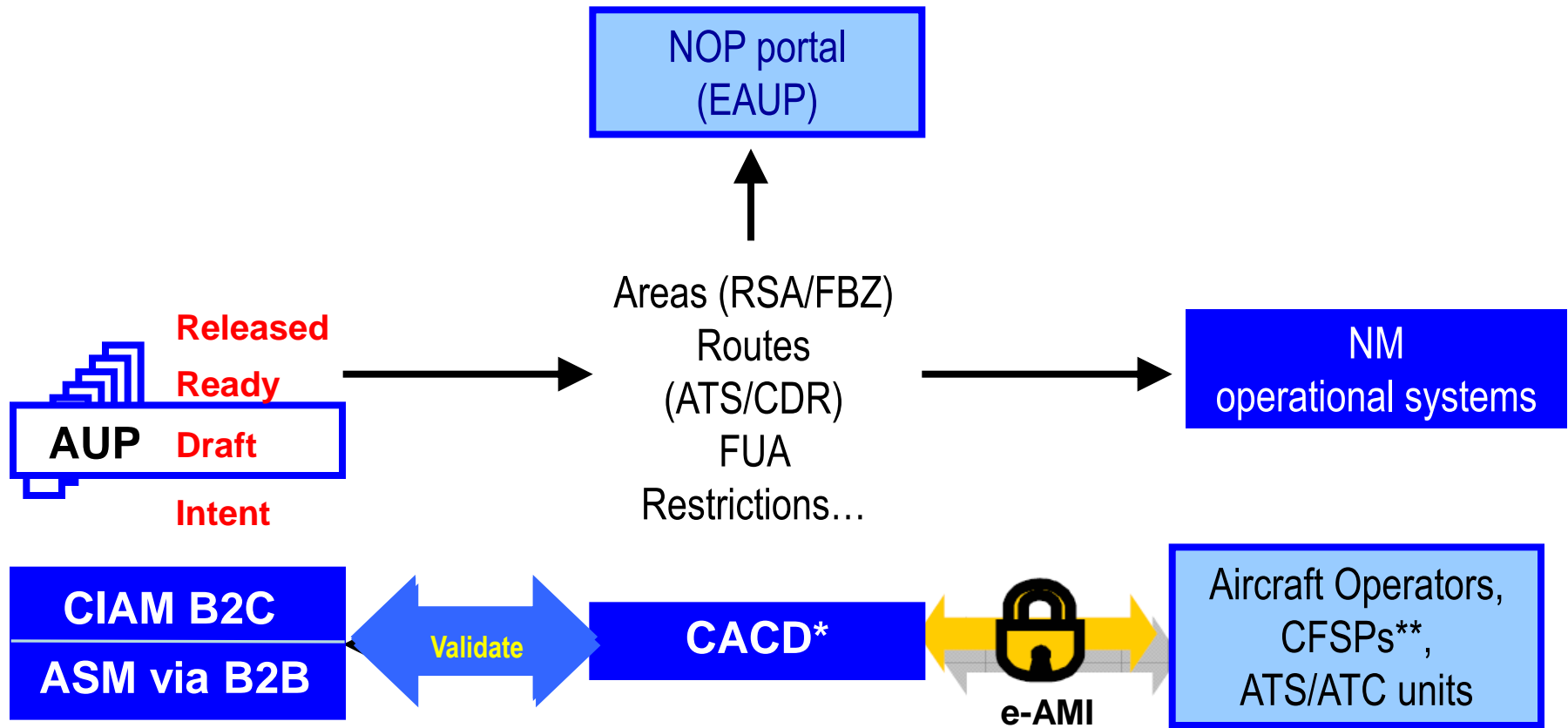
NM SYSTEMS



ASM Support System



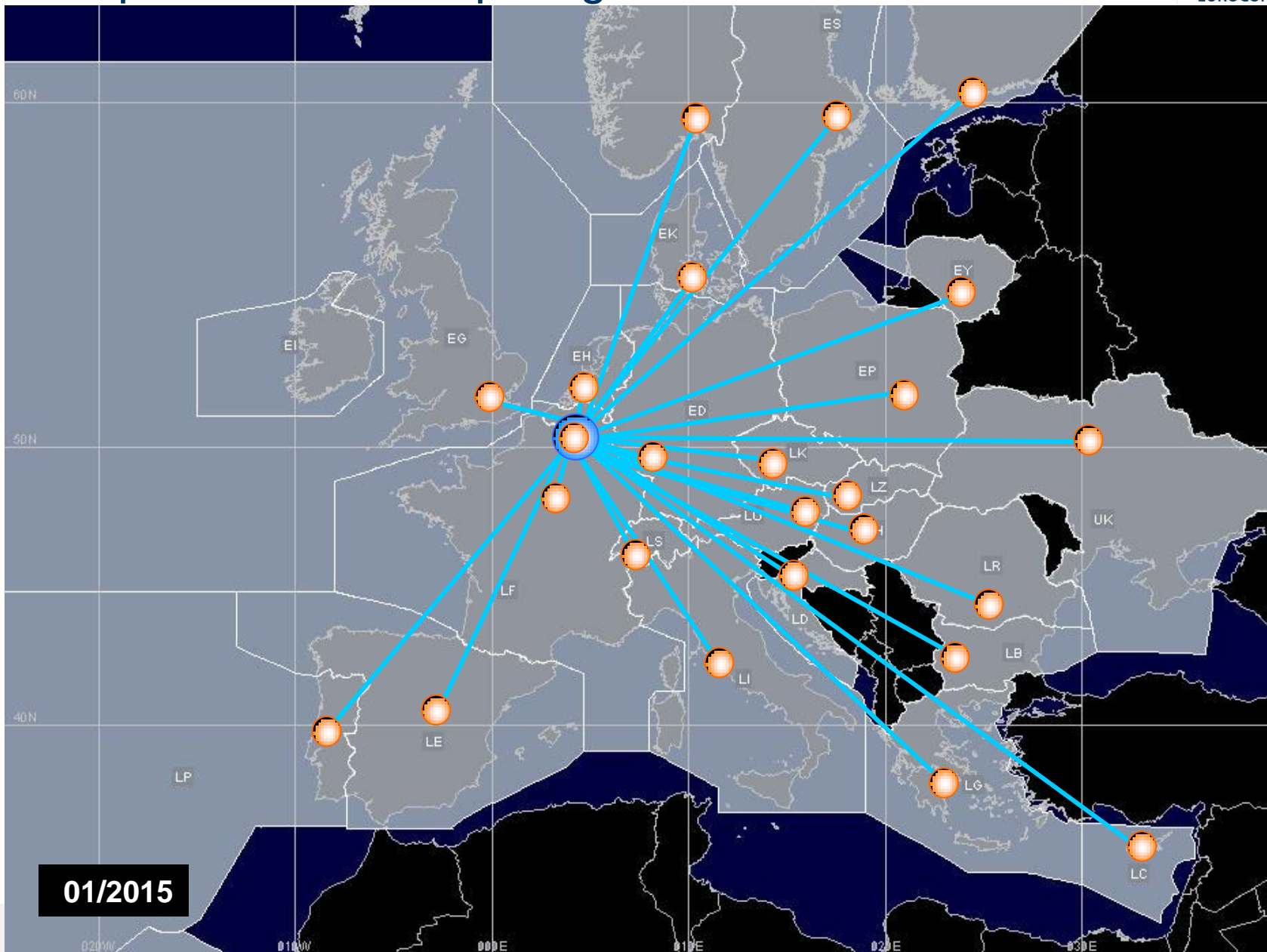
AUP/UUP process



* Central Airspace and Capacity Database (ENV Database)

** Computer FPL Service Providers

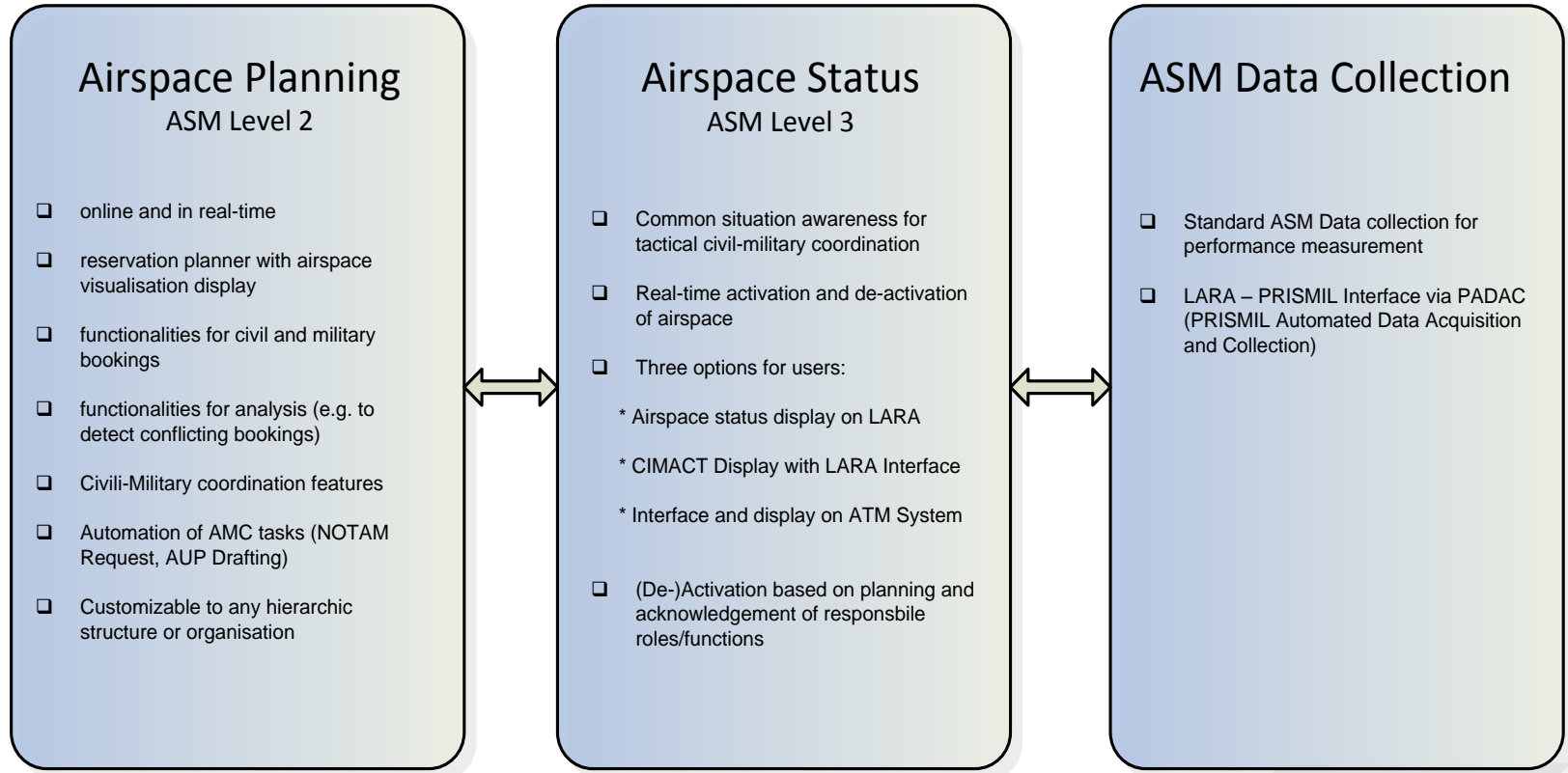
AUP process – Participating AMCAs



01/2015

LARA Overview




LARA's functionality encompasses all phases of airspace management – from the airspace planning process to real-time airspace activation and de-activation. LARA also provides necessary data for performance measurement.



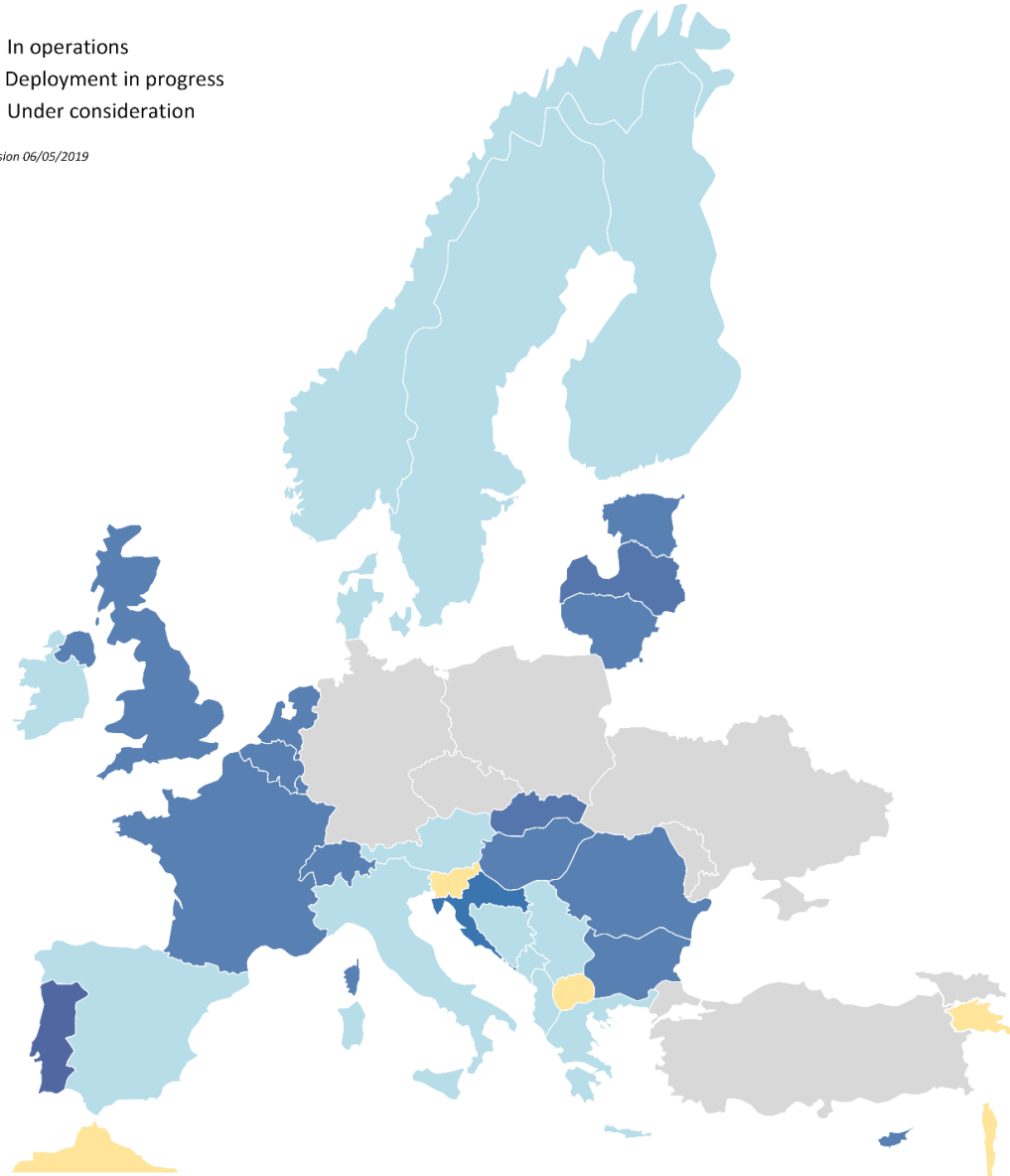
LARA Deployment Status



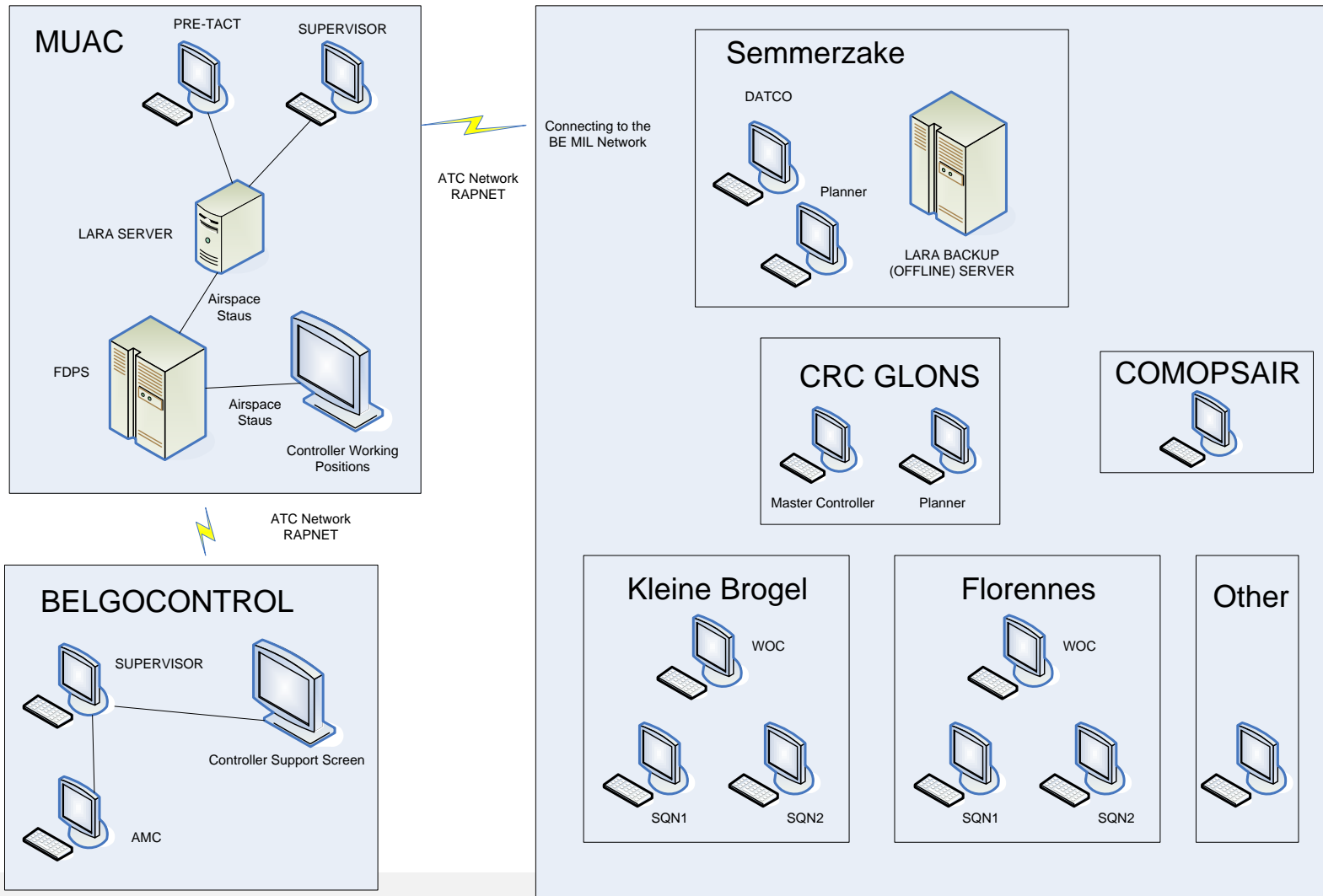
LARA Deployment

-  In operations
-  Deployment in progress
-  Under consideration

Version 06/05/2019



LARA Deployment - Example Belgium



LARA Enables

- Combined, central DB for all airspace demands
 - *requests and their status are shared with all roles/functions involved in the ASM/ATFCM process*
- On-line and in real time
- Collaborative Decision Making (CDM)
 - *the decision makers are all connected, using the same data, taking informed decisions*
- Awareness
 - *all updates are presented in real time to all users involved in the ASM/ATFCM process*
- Consistent Data
 - *all users use a single source DB*
- Interface with
 - *NM systems, based on agreed B2B services using AIXM5.1*
 - *ATC systems allowing timely updates of the airspace status on the ATCO working position*
- Extension to FAB functionality

LARA



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CIMACT

Civil-Military ATM Coordination Tool

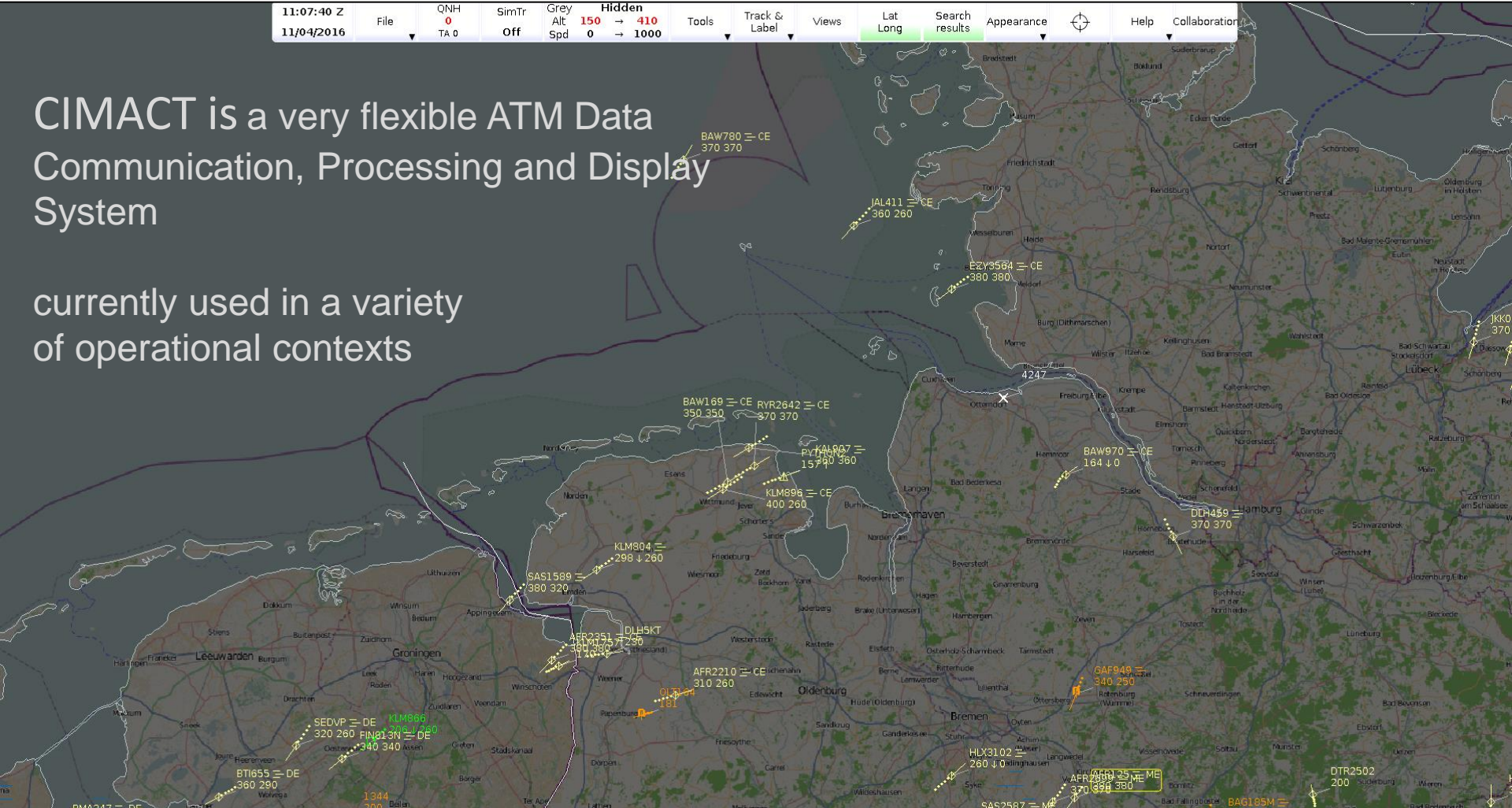


CIMACT Civil-Military ATM Coordination Tool

11:07:40 Z
11/04/2016 File QNH 0 TA 0 SimTr Off Grey Alt Spd 150 → 410 Hidden 0 → 1000 Tools Track & Label Views Lat Long Search results Appearance Help Collaboration

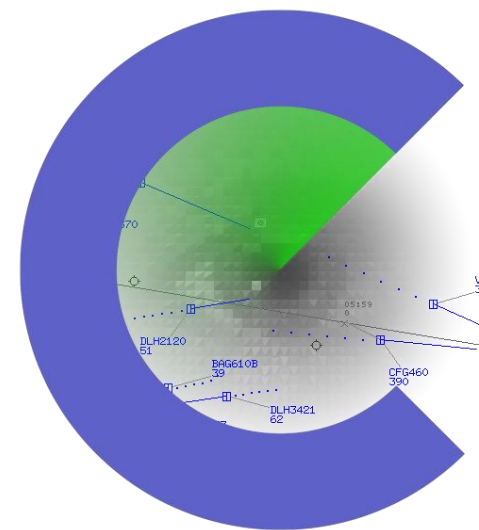
CIMACT is a very flexible ATM Data Communication, Processing and Display System

currently used in a variety of operational contexts



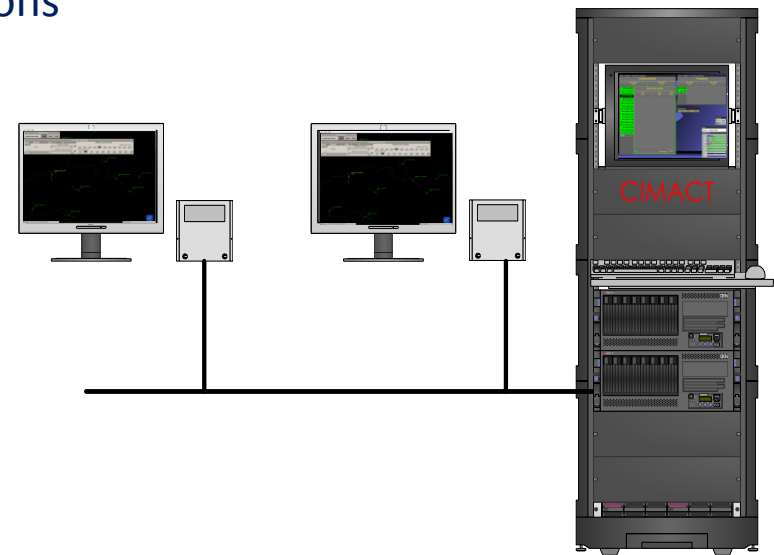
CIMACT main features

- Decoding of multiple types of surveillance (tracks/plots) and flight plan data
- Produces one correlated air picture
- Communication over various networks and protocols (TCP/IP, UDP, X.25, UMTS, etc.)
- Coordination, Filtering and Highlighting capabilities
- Interfacing to several tools and databases (LARA, EAD, EDQ, WX Systems)
- Simulation/training capabilities



CIMACT hardware and software

- Consists of a central server and working positions
- Operating on COTS hardware
- LINUX OS, coded in C++ and JAVA
- SWAL 3 compliant, Declaration of conformity and a generic safety case



CIMACT history

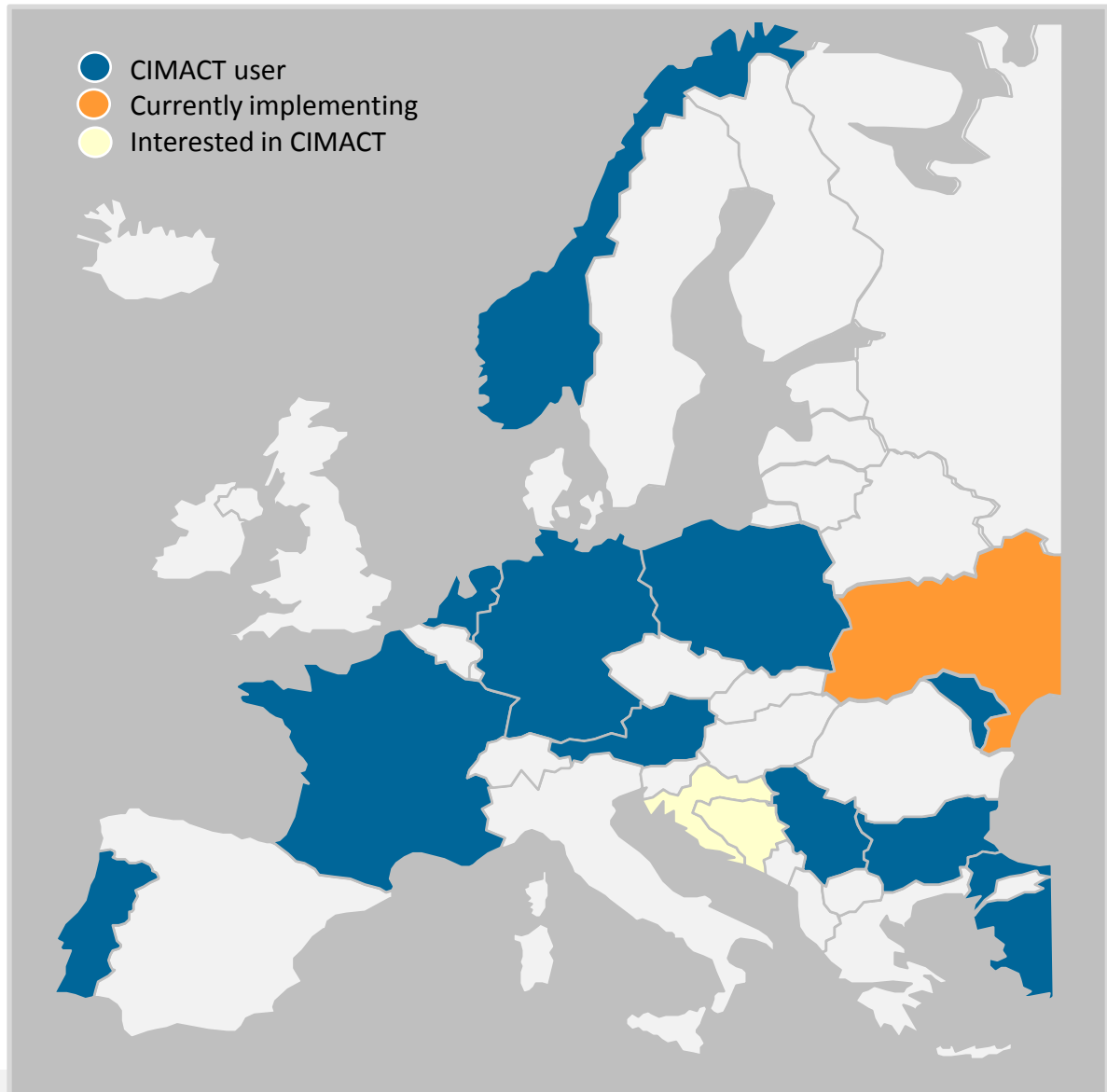
- Request from German Ministry of Defense to develop ADMAR 2000
- Primary objective:
improve civil military coordination
- Installed in 14 air defence centres and other military sites in Germany with a total of 65 working positions
- CIMACT was developed by EUROCONTROL to modernise ADMAR2000 and to offer the benefits to other ECAC States
- CIMACT is managed by EUROCONTROL's Civil Military ATM Division



CIMACT Users in 2019

Working Positions ~220

Servers ~100



CIMACT operational use



CIMACT is used for:

- Monitoring and coordinating airspace activations
- ATM security
- Identification support
- Radar assisted flight information
- Fall-back system
- RADAR approach control

CIMACT operational use



German Air Force

- Civil-Military coordination
- Identification
- Fallback
- Air Defense Centers
 - CRC Schönewalde
 - CRC Erndtebrück
 - DCRC Holzdorf
 - SSZ Uedem



CIMACT operational use

PCC Bann

- Polygone Coordination Centre
- Exercise control and Radar Assisted Flight Information Service (RAFIS) in a military exercise area
- Using Maastricht track picture



CIMACT operational use

Neuburg and Manching AB

- RADAR approach control
- Improved coverage
- ARTAS
- Combining local ASR with civil sensors



CIMACT operational use



Neuburg approach control

CIMACT operational use

NATO - CAI

- Data exchange between NATO and the Russian Federation
- Early renegade detection
- Trust building



CIMACT operational use



Warsaw CC

Bodø LCU

Warsaw LCU

Ankara LCU

CIMACT operational use



NATO CAI live exercise 2011

Turkish F-16 “handing over” a simulated renegade to Russian Su 27

CIMACT operational use

NATO – Regional Airspace Security Program (RASP)

- Data exchange between UKRAINE and PO, NO and TU
- Early renegade detection
- Civil-Military Coordination



CIMACT operational use

Moldova

- Improve coordination between MoldATSA and Moldovan Air Force
- On request of NATO
- Display of civil data in military sites



CIMACT operational use



Bulgaria

- ATM Fallback system
- Civil-Military Coordination
- Installed in ACC, Airports and Military Sites

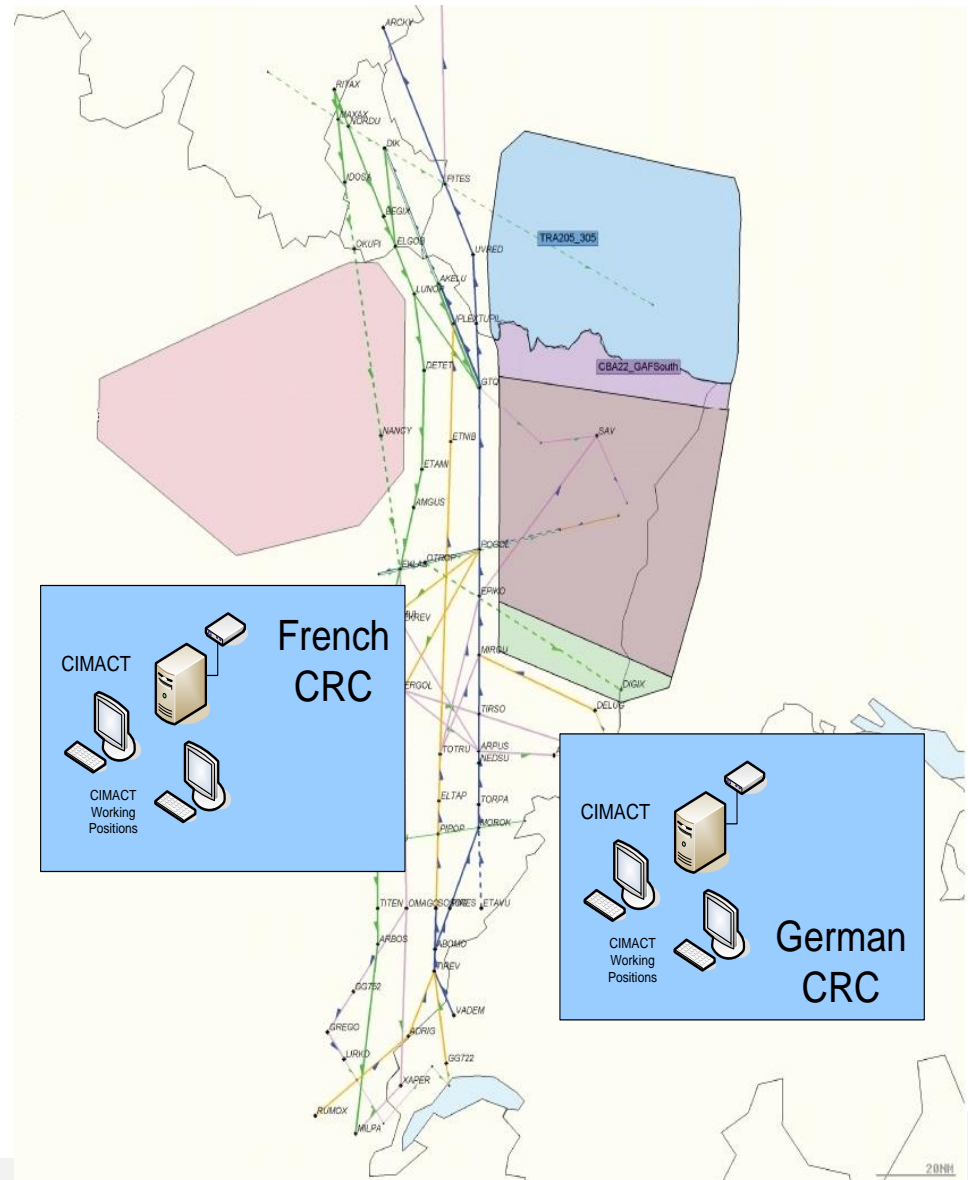


Cross Border Operations

CBA between France and Germany

Air Defence Units controlling outside their national borders with the need for efficient civil-military coordination.

Requirement to process and display different data formats between different civil and military systems. CIMA CT is enabling this exchange and display of data between neighboring countries.



INTERFACE WITH OTHER SYSTEMS: LARA, EAD, WX, ETC



LARA Booking Tool - LVNL
 File View Options Filter Tools Window Help
 Coordinated Universal Time: Friday 05/February/2016 08:05:11

Airspace Planning Display | Airspace Status Display | Planning Prediction Tool

Vertical Profile: UZ708 - KEKIX-AGISU
 RELEASED UUP 05/02/16 06:00 - 06/02/16 06:00

AMC: EHMZAMC | FL Buffer: 000 | Minimum Area Opening: 0hr 0min
 Type: UUP | Activity Time Buffer: 0min | Minimum CDR Opening: 0hr 0min
 Period: 05/02/16 06:00 - 06/02/16 06:00

Area Name	Type	Lower FL	Upper FL	Start Time	End Time	Responsible Unit	FUA	FBZ	Remarks
EHCBASEA1	TSA	055	660	12:00	19:00	EHMZAMC	<input type="checkbox"/>		
EHD01	TSA	055	285	06:15	11:15	EHMZAMC	<input type="checkbox"/>		
EHD01A	TSA	285	660	06:15	11:15	EHMZAMC	<input type="checkbox"/>		
EHD02	TSA	055	285	06:15	11:15	EHMZAMC	<input type="checkbox"/>		
EHD02A	TSA	285	660	06:15	11:15	EHMZAMC	<input type="checkbox"/>		

Segment Name	Lower FL	Upper FL	Start Time	End Time	Remarks	Include
UZ705-AMADA-MOKUM	245	660	11:15	12:00		<input checked="" type="checkbox"/>
UZ733-ANDIK-UNEXO	195	660	07:00	08:00		<input checked="" type="checkbox"/>
Z733-ANDIK-UNEXO	095	195	07:00	12:00		<input checked="" type="checkbox"/>
UZ733-ANDIK-UNEXO	195	285	08:00	17:00		<input checked="" type="checkbox"/>
UZ703-BABIX-LERVO	245	660	07:00	17:00		<input checked="" type="checkbox"/>
UZ709-BARTU-RUPIN	245	660	07:00	17:00		<input checked="" type="checkbox"/>
UP603-BEDUM-EEL	245	660	07:00	08:00		<input checked="" type="checkbox"/>
UP603-BEDUM-EEL	245	285	08:00	12:00		<input checked="" type="checkbox"/>

CDR	Index	Segment Name
UZ703	3	BABIX-LERVO
UZ703	2	SIPSA-BABIX
UZ703	1	LISBU-MALID
UZ704	1	KONOM-LIMBI
UZ704	0	SPY-KONOM
UZ704	2	LIMBI-AMADA
UZ705	0	AMADA-MOKUM
UZ705	1	MOKUM-PAM
UZ708	1	KEKIX-AGISU
UZ708	0	HELEN-KEKIX
UZ709	0	BARTU-RUPIN
UZ709	1	RUPIN-OMORU
UZ709	2	OMORU-KUVE
UZ733	1	UNEXO-KONG
UZ733	0	ANDIK-UNEXO
UZ733	2	KONOM-GREFF
UZ738	0	PAM-IVLUT
UZ738	3	RENDI-EDUPO
UZ738	2	LUNIX-RENDI
UZ738	1	IVLUT-LUNIX
UZ738	4	EDUPO-NAPRO

Error/Warning	Type	Message	Source

Compare

Cluster Name	Responsible Unit	Lower FL	Upper FL	Status
CLUSTER_NL	EHMZAMC	200 FL	660 FL	NOT_ACTIVATED
CLUSTER_NL	EHMZAMC	195 FL	660 FL	FULLY_ACTIVATED
CLUSTER_NL	EHMZAMC	195 FL	660 FL	FULLY_ACTIVATED
CLUSTER_NL	EHMZAMC	195 FL	660 FL	FULLY_ACTIVATED
CLUSTER_NL	EHMZAMC	195 FL	660 FL	FULLY_ACTIVATED
CLUSTER_NL	EHMZAMC	195 FL	660 FL	FULLY_ACTIVATED

Network: 0.035% RTD Connected: FULLY Server: 192.168.13
 LARA B3.0.23.8 / Powered by Grafica SDK

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PRISMIL Introduction



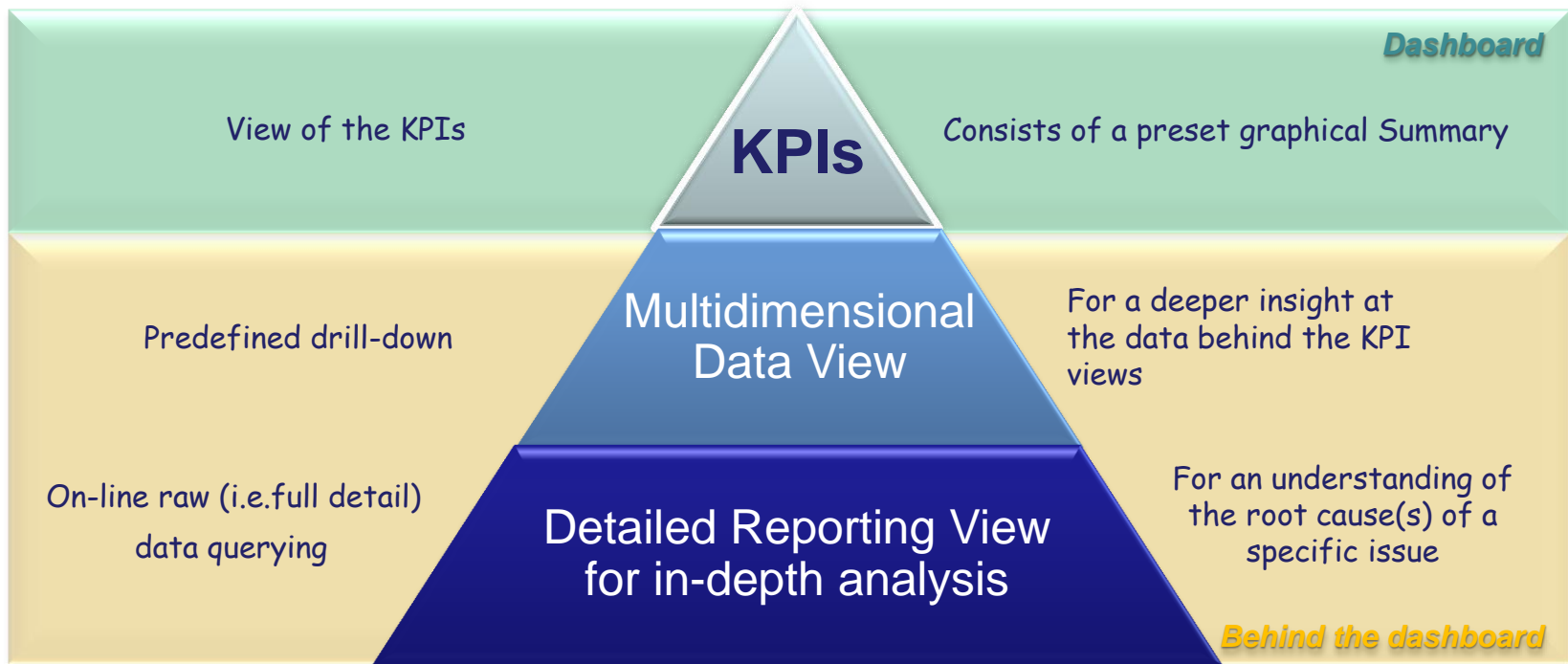
What is PRISMIL?

PRISMIL is the **on-line civil-military performance measurements system** that supports an implementation of the FUA concept and SES performance scheme at national, FAB and pan-European level.

PRISMIL provides:

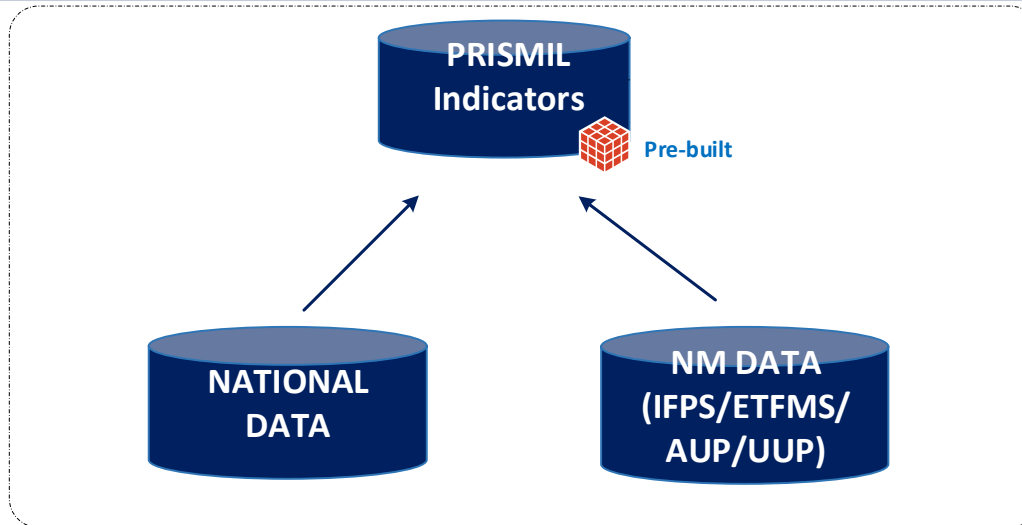
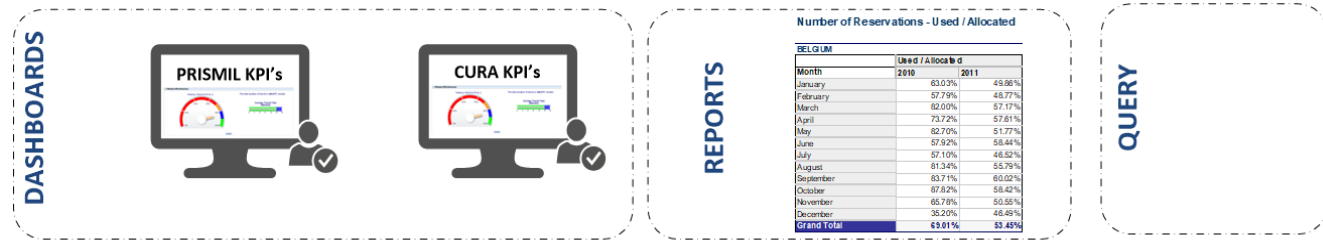
- ✓ Data collection and integration
- ✓ Performance indicators aggregation
- ✓ On-line data querying and reporting
- ✓ Multidimensional view of civil-military ATM performance
- ✓ Combined use of civil and military performance indicators
- ✓ Data access control

PRISMIL – Information Layers



PRISMIL: Civil military performance monitoring system

Query-Reports-Dashboards



PRISMIL Dashboard: Use of Allocated SUA

Time Based

Used Time vs Allocated Time (B.1.7)

Provides planners with a measure of the degree of over- or under-use of allocated SUA time

$$\frac{\sum \text{Used Time}}{\sum \text{Allocated Time}} [\%]$$

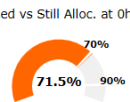
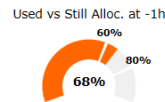
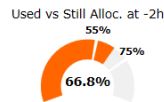
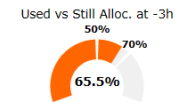
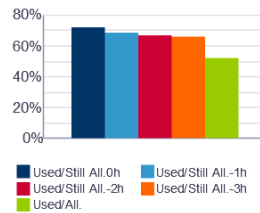
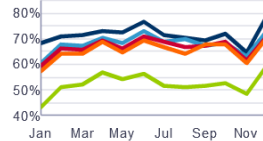
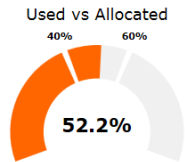
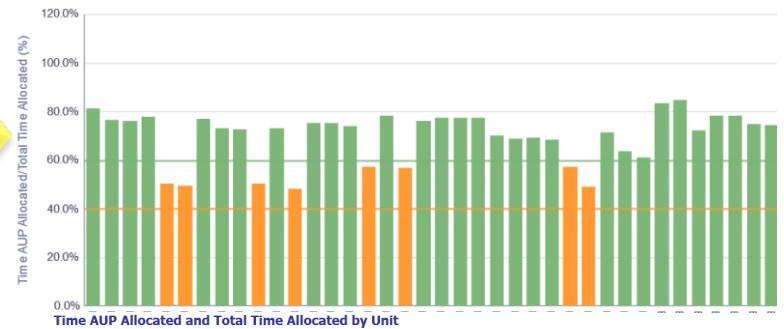
Details

filtered by
SUAs

Time AUP Allocated and Total Time Allocated by SUA

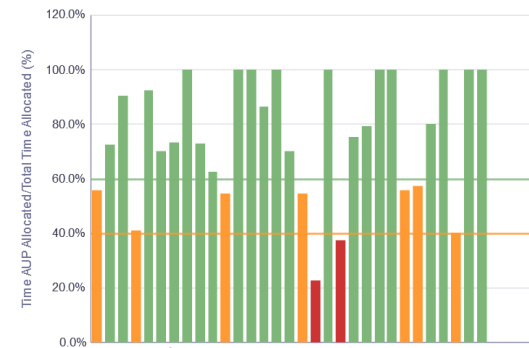
[Click SUA for Unit and Monthly Details](#)

Time AUP Allocated/Total Time Allocated by SUA



filtered by
units

Time AUP Allocated/Total Time Allocated by Unit

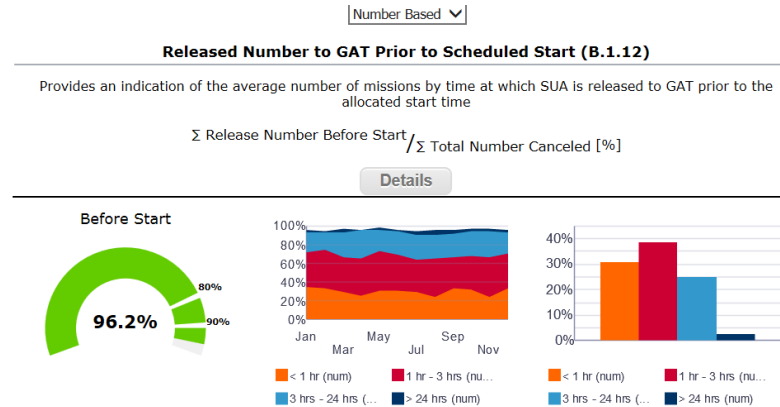


Provides planners with a measure of the degree of over- or under-use of allocated SUA time. For the purpose of more detailed assessment, the PI could be calculated for each individual means of allocation.

PRISMIL Dashboard: SUA release to GAT

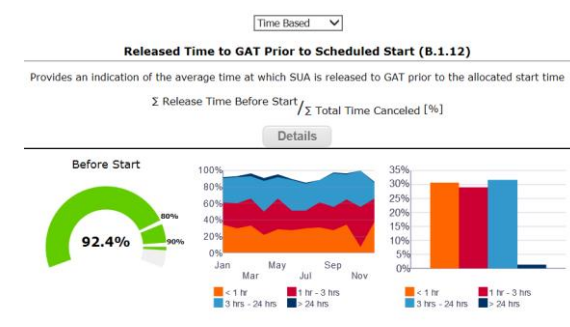
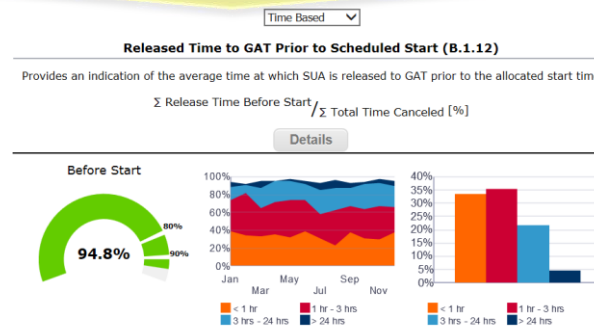
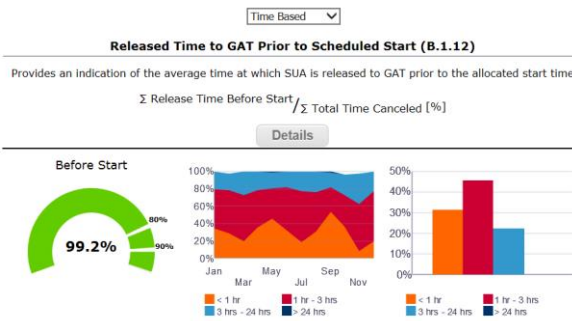


This indicator provides an indication of the average time at which SUA is released to GAT prior to the allocated start time.



It allows planners to track the progressive release of SUA to GAT following cancellation of a mission for a particular release reference time .

Drill-down by countries or units



PRISMIL Dashboard: CURA

Time Based ▾

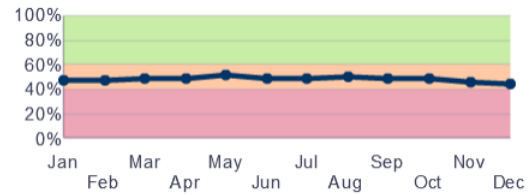
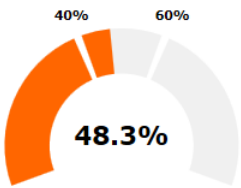
SUA Planned vs SUA Used by GAT in Available (B.1.8)

Provides planners with a measure of the level of GAT planning efficiency on D-1

$$\frac{\sum \text{Time Planned}(M1)}{\sum \text{Time Actual (CPF)} [\%]}$$

filtered by
airliners

Details



Civil Use of Released and Available Airspace (CURA) indicators provide planners with a measure of the level of GAT planning efficiency on D-1 and ability of the ATM system to make the GAT use of released SUA back to GAT users.

filtered by
SUA

Filter selection

Year
2015 ▾

Provider ISO3
DEU ▾

Mil Airspace Identity
(All Column Values) ▾

Airport Departure ICAO Country Code
(All Column Values) ▾

Airport Destination ICAO Country Code
(All Column Values) ▾

Show Unplanned Airspaces
 Yes
 No

Sort By
 Planned Time
 Used Time
 Airspace Identity

Apply Reset ▾



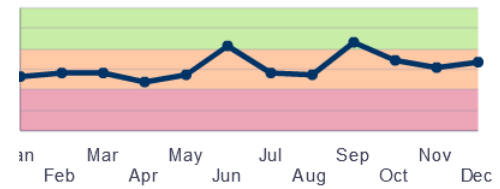
GAT vs Number Used by GAT ▾

Number of SUA Released vs Number Used by GAT in Released (B.1.9.1)

Percentage of SUA released time actually used by GAT

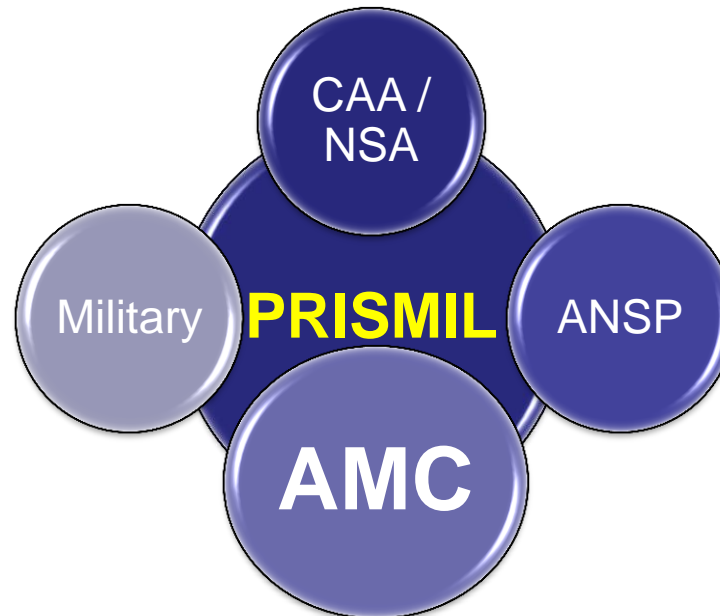
$$\frac{\text{Time Released}}{\sum \text{Number Used by GAT in Released} [\%]}$$

Details



Who can be a PRISMIL user?

- ❖ Monitoring
- ❖ Reporting
- ❖ Analysis
- ❖ Data
 - collection
 - integration
 - provision



- ❖ ASM processes optimisation
- ❖ Improve airspace utilisation
- ❖ Enhance ANSP performance inputs
- ❖ Improve civil-military cooperation
- ❖ MME safeguard

Customized performance dashboard for each user(s)

