



EUROCONTROL Civil/Military Cooperation Airspace Management Flexible Use of Airspace



Civil/Military Cooperation



Airspace users need to work closely together to ensure that the airspace is used efficiently at all times. That is why the flexible use of airspace (FUA) concept and airspace management (ASM) coordination are key priorities for EUROCONTROL.

As part of the Single European Sky regulatory framework, Commission Regulation (EC) No 2150/2005 of 23 December 2005 (the FUA Regulation) laid down common rules for the flexible use of airspace. Enhanced cooperation and real-time coordination between civil and military units are to contribute to the economic use of shared airspace resources.

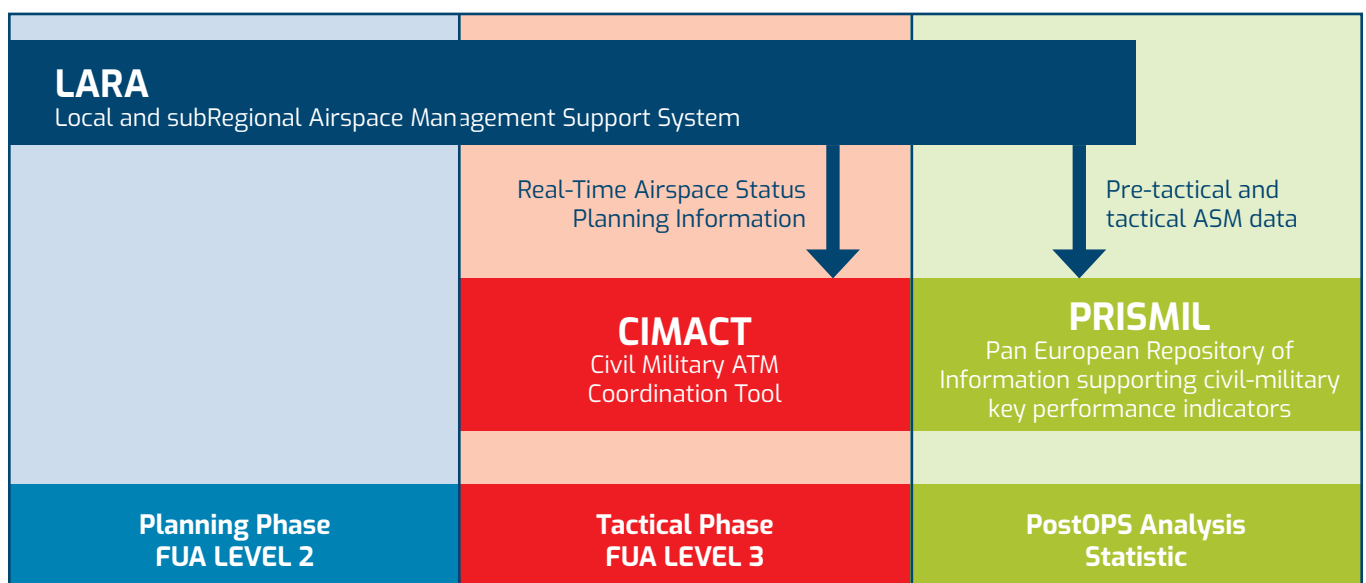
The FUA Concept provides the Air Traffic Management (ATM) system with the potential to increase capacity through enhanced civil/military co-ordination. The application of the FUA Concept ensures that any airspace segregation is temporary and based on real use for a specified time period.

EUROCONTROL developed concrete solutions to support the improvement of the ASM processes at strategic, pre tactical and tactical levels, including development of ASM systems and tools. These tools support dynamic and flexible sector configurations and are capable of sharing real time airspace status and possibly provide data for impact assessment of airspace configurations.

The following annexes are providing a global overview of the civil-military ASM tools/systems and services provided by EUROCONTROL CMC:

ASM/(A)FUA

- **LARA** (Annex 1)
- **CIMACT** (Annex 2)
- **PRISMIL** (Annex 3)
- **MILO** (Annex 4)
- **FUA Toolkit** (Annex 5)



THE ASM TOOLS

ANNEX 1:

LARA

LOCAL AND SUB-REGIONAL ASM SYSTEM

The air transport industry has faced significant challenges over the recent years, and recovery is ongoing. However, steady growth in air traffic is expected as military activities in Europe intensify, with increased demands for airspace due to the deployment of advanced weapon systems and the evolving nature of defence operations. Key enablers for improving airspace management include more flexible and dynamic airspace structures, as well as a more efficient and transparent decision-making process.

Despite notable progress, current airspace management procedures, airspace availability notification processes, and the fragmented or lack of automation systems remain key challenges for the efficient allocation of airspace.

LARA (Local And sub-Regional Airspace Management Support System) was developed to improve airspace management processes at local and sub-regional level by providing mutual visibility and understanding on civil and military airspace requirements and by enabling a more efficient collaborative decision-making process. The aim is to provide a harmonised ASM (Airspace Management) support system meeting the operational requirements of national stakeholders and conform to the European Union legislation and EUROCONTROL specifications and guidance material. LARA has proven to be an enabler for harmonisation and promoting good practices.

LARA is a EUROCONTROL software package provided without additional charge to ECAC (European Civil Aviation Conference) member States to support and enhance the airspace management process according to Advance Flexible Use of Airspace principles enabling collaborative decision-making and live situational awareness provision.

The LARA system is built around a robust, flexible and performant client-server architecture, offering multiple clients' seamless access to a variety of sophisticated ASM functions.

LARA's functionality encompasses all phases of airspace management as defined by the FUA concept. National procedures can be translated into customizable ASM and Collaborative Decision Making (CDM) processes in the tool.

The system supports long-term event planning and airspace management at level 2 and 3 - including real-time coordination of airspace activations. The capability to connect a national LARA system to neighbouring ASM systems allows seamless coordination between different States and facilitates efficient cross border operations. A variety of interfaces to other systems and the Network Manager enable improved collaborative decision-making.

LARA provides a user-friendly interface to allow online airspace reservation, enable transparent coordination and maximise automation of routine tasks. Through a shared real-time airspace status display, situational awareness of all players is enhanced, and flight safety improved. The system is designed to allow configuration of all relevant system parameters to adapt to national procedures, while contributing to harmonisation of the application of the Flexible Use of Airspace Concept in Europe.

The implementation of LARA supports States' compliance with the relevant provisions in the EU/EC Regulations and EUROCONTROL Specifications and guidance material.



THE THREE MODULES SUPPORTED BY LARA

AIRSPACE PLANNING ASM LEVEL 2

- Online and in real-time
- Reservation planner with airspace visualisation display
- Functionalities for civil and military bookings
- Functionalities for analysis (e.g. to detect conflicting bookings)
- Civil-military coordination features
- Automation of AMC tasks (NOTAM Request, AUP Drafting)
- Customizable to any hierarchic structure or organisation

AIRSPACE STATUS ASM LEVEL 3

- Common Situation awareness for tactical civil-military coordination
- Real-time activation and de-activation of airspace
- Three options for users:
 - Airspace status display on LARA
 - CIMA CT display with LARA Interface
 - Interface and display on ATM System
- (De-)Activation based on planning and acknowledgment of responsible roles/functions

ASM DATA COLLECTION

- ASM Data collection for performance measurement
- Interface with PRISMIL

All data exchanged is stored on a server and can be retrieved for national statistics on the use of airspace – including export functionality to PRISMIL¹ supporting the production of National Key Performance Indicators (KPI).

The LARA² software is developed by the GRAFFICA Team of Sopra Steria under supervision of EUROCONTROL's Civil-Military Cooperation Division.

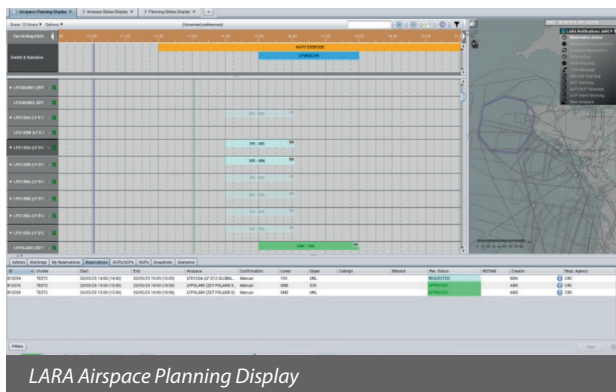
LARA development has been driven since its first prototype by its user's requirements and operational best practices. To ensure maximum compatibility with user expectations, an incremental development approach was chosen. The latest version of the software, LARA V5, available since April 2025, delivers a comprehensive set of new functionalities requested by users and required by the evolution of the Network Manager's systems, and ensures SWIM compliance with EU/EC regulations.

¹ PRISMIL is the Pan-European Repository of Information Supporting Civil Military KPIs (Key Performance Indicators). Its mission is to provide stakeholders with a single point of access to comprehensive and integrated high-quality information on ATM performance monitoring.

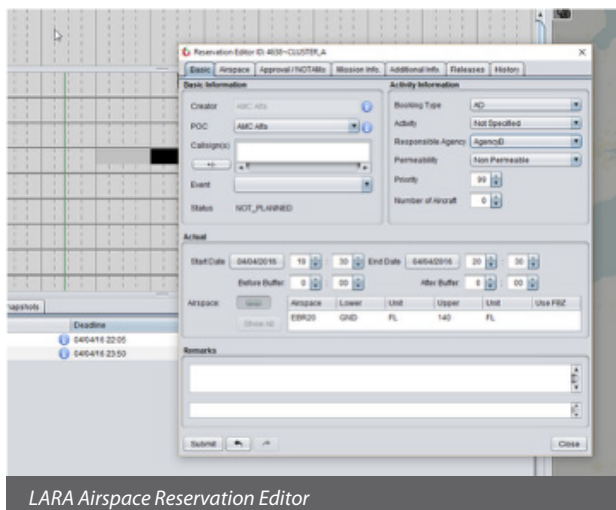
² The LARA Software is developed in line with ESARR6, Regulation 373/2017, EUROCAE ED-153, and the ISO 12207 standard, conforming to Software Assurance Level 3. A generic safety case is available to LARA users to support their local safety cases.

AIRSPACE PLANNING

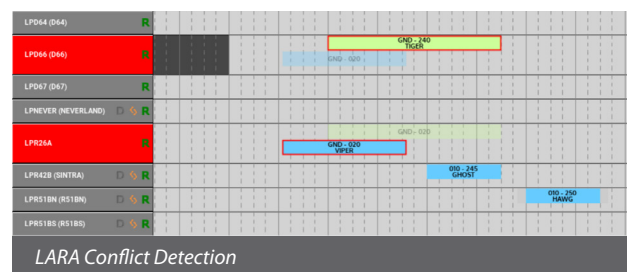
LARA HMI allows for creation and management of airspace reservations, including airspace scenarios. As all data is shared across the national network, every requestor benefits from an overview on all previously entered bookings in LARA and therefore base their own inputs on this information - allowing de-confliction of requests at an early stage.



Once a suitable airspace and associated time slot has been identified, the user calls the Airspace Reservation Editor by clicking on his desired airspace and period. This editor allows to fine-tune the request by selecting the requested levels, the type of usage and additional details on the planned mission.



LARA offers the possibility to join multiple adjacent or overlapping airspaces together and create a single reservation for an airspace block, thus supporting modular design principles. LARA's interface provides a complete overview of the airspace structure in a graphical display and in textual form from dropdown menus available for each airspace.



LARA is organised in "clusters". One cluster corresponds to a LARA System deployed within organizational (FAB) or national borders. A LARA Cluster can be connected to other clusters allowing a seamless exchange of data across borders. This allows airspace users to request airspace beyond national borders and provides an efficient way to manage commonly used cross-border areas and enable operations across country and FIR borders. When exchanging data with other LARA clusters are connected, the tool offers additional filtering capabilities to adequate the information flow to the operational requirements.

In addition to airspace reservation information, the user can add mission details for each reservation. This information is not mandatory, but can provide added value in joint operations, to produce statistics and to improve the coordination processes between different players. To address confidentiality, mission details are only accessible by authorized users.

Each airspace request will be subject to coordination and approval processes in line with national procedures and regulations. A wide variety of rules and configuration options are available in LARA allowing to tailor the Approval Process to reflect national procedures and regulations.

Every unit involved in the approval process is provided with an overview of reservations requiring their attention. Bookings will move up on the approval chain according to predefined rules and regulations until reaching the appropriate Airspace Management Cell. The system is provided with a Housekeeper function that allows each cluster administrator to configure the application and its approval chain to support national rules and agreements.

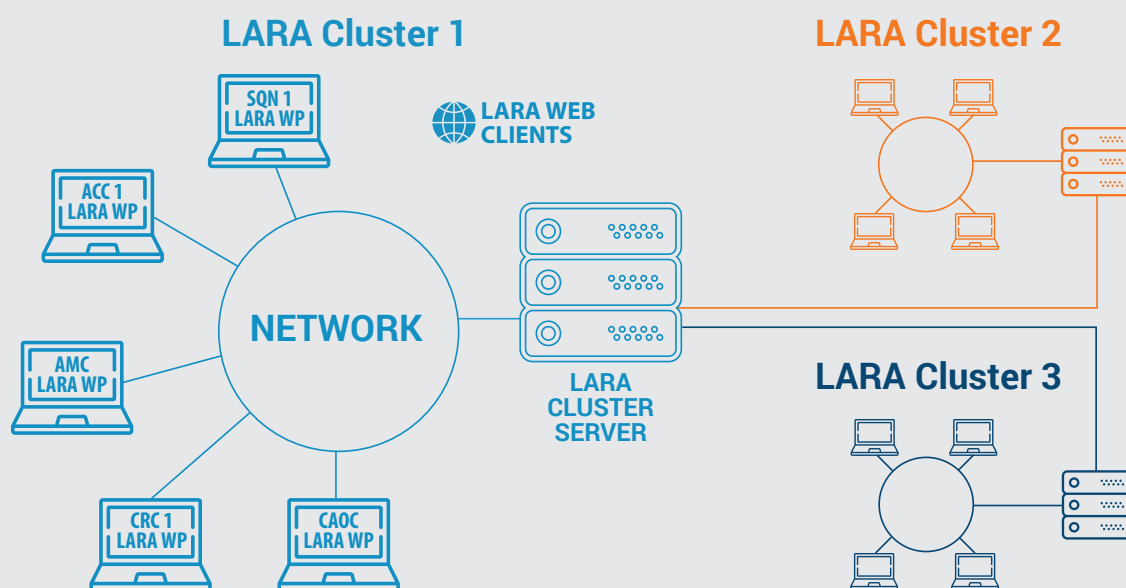
Each user on the approval chain has the option to approve a reservation request, or alternatively to send a proposal to the

requestor, which can consist of a new timeslot, a change of levels, a different airspace, or any combination of these. The approval chain can be highly dynamic, i.e., following different approval paths depending on configurable parameters, timelines and rules.

LARA provides different means to establish communication between different actors to enable fast and system wide coordination. Comments and remarks can be entered for every reservation, which can be used and complemented throughout the approval chain.

THE LARA SYSTEM

The LARA software is coded in Java and can be operated on various operating systems including Windows, Linux and MacOS. It communicates on standard IP-networks and supports common encryption standards. Additionally, SWIM compliant Web Services provided by LARA allow the exchange of information with other ASM and ATM systems.

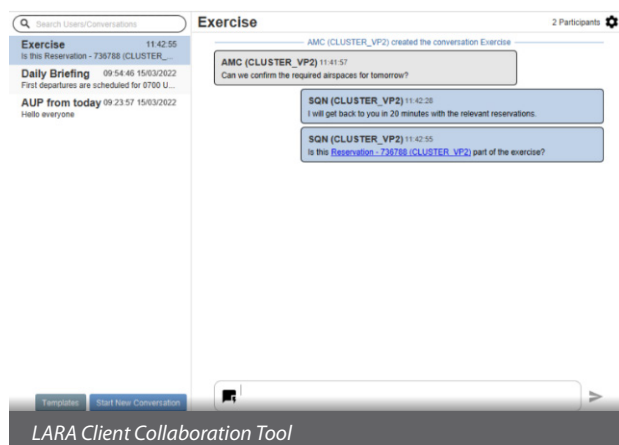


The LARA Server stores all static and dynamic data and manages the communication within the cluster. LARA's architecture allows deploying a second redundant server, ensuring seamless continuation of service even after a failure of the main server.

Airspace requests in LARA are not limited to military users booking areas for military missions. Civil airspace users – if provided with the privilege to do so - can book areas for their specific needs. Civil Area Control Centres have the option to book CDRs and Areas as Radar Vectoring or Off-Route Areas etc., depending on capacity and flow management requirements.

The closing of certain airspaces and routes may require the publication of a NOTAM to inform the aviation community. LARA automatically triggers and presents the user with a draft for the NOTAM to be issued for such airspaces. This draft can be adapted as required and used for filing a NOTAM Request at the appropriate NOTAM Office.

An online collaboration facility, similar to commonly known chat facilities, is available to allow direct and immediate communication between two or more users, including the possibility to use pre-defined templates, direct links to reservations and airspaces and a set of instant reactions to indicate approval, disapproval and alike. Email addresses, phone numbers and addresses can be retrieved for each user within the application. All previously described functionality and means of communication work seamlessly across all connected clusters.



LARA's Planning Prediction Tools (PPTs) support airspace managers in visually assessing AUP and UUPs, and to spot opportunities for allocation improvements. The current planning is made available on a designated Gantt chart, which allows the optimization of airspace utilisation by

rearranging existing reservations. This specific Gantt chart will not have any immediate effect on the plan and will allow to carefully streamline the airspace allocation. Once this process is finalised, the system sends out automated proposals to the involved users.

The PPTs allow the user to fast forward the plan and to visualize the effect on the airspace structure highlighting the activation of areas and the resulting effect on the network through time assisting the user in spotting opportunities for improvements.

Different LARA users have specific responsibilities and may be required to focus on distinct aspects of the information contained within the LARA System. E.g., for some users, the status during the planning phase might be of lower importance, while the origin of a booking could be a primary concern. To cope with this requirement, LARA provides the user a wide range of filtering and configuration options to ease their task. By selecting the appropriate options, the display can be changed to highlight the required information. Users can also configure pre-defined views and switch between those instantly to focus on certain hotspots or specific areas of interest.

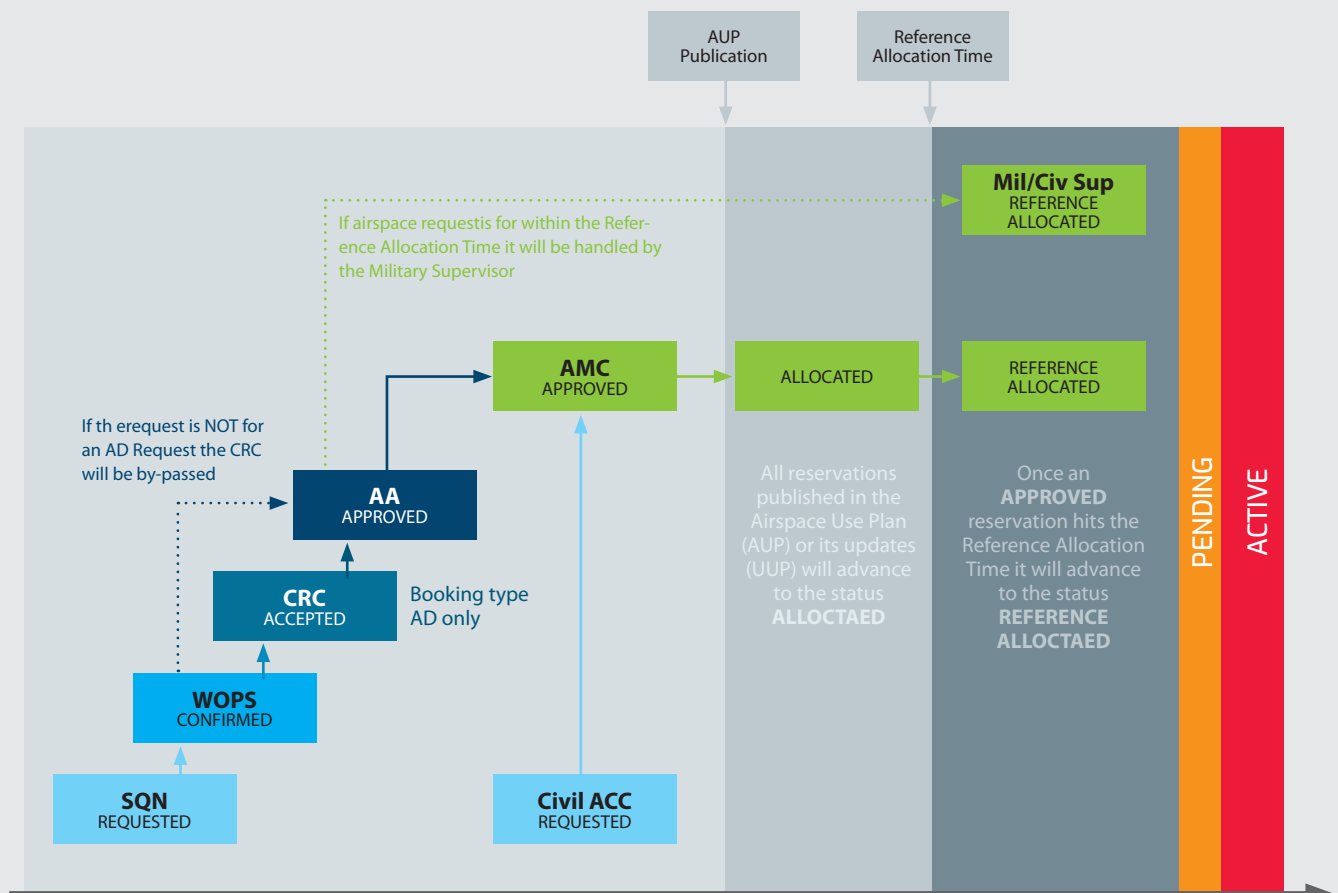
THE HOUSEKEEPING TOOL

Managing Environmental data, Users, Privileges and the Approval Chain

The LARA System is highly configurable to meet national requirements for an Airspace Management System across Europe. LARA is delivered with a set of tools to allow efficient management of all essential system parameters.

The LARA Housekeeper is in charge of managing the environmental data, users and roles and to establish and maintain the approval chain. Every role is granted certain privileges to book airspaces, approve certain reservations and to access specific tools. The housekeeper assigns these privileges and manages new and existing users, including their usernames and passwords.

The Housekeeper has access to the Housekeeping Tool to perform his task. This tool allows to setup and maintain the approval chain in a user-friendly way through simple mouse operations - by dragging and dropping roles and approval groups. The approval chain allows additional rules and procedures to be incorporated to reflect a wide variety of national procedures.



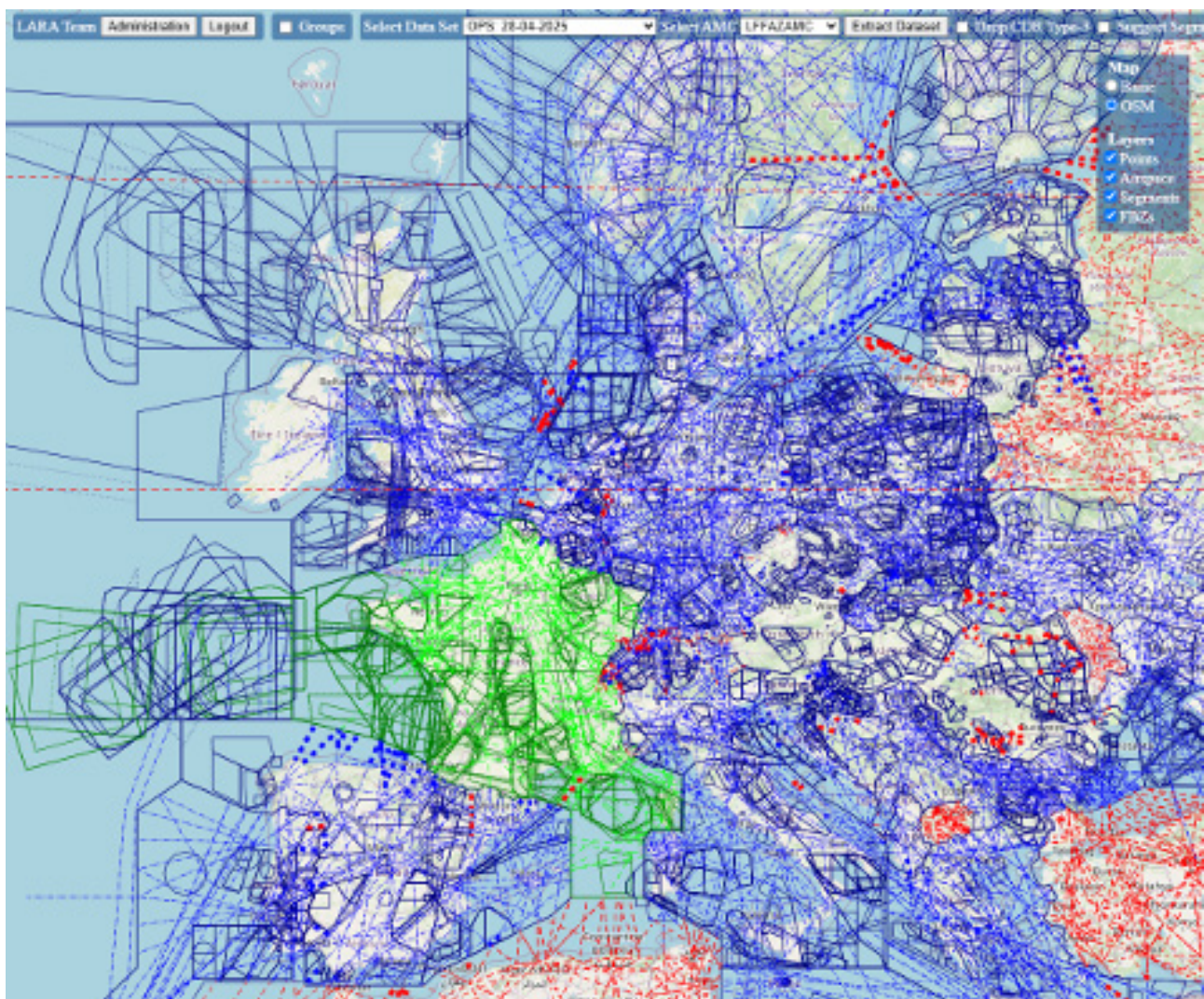
Managing Environmental Data

LARA requires a database containing up-to-date aeronautical data for operations. The Housekeeper of each cluster is responsible for ensuring the validity and completeness of the data

EDQ (External Data Quality Tool for LARA) is a web-based tool which allows national Housekeepers to select and fine-tune aeronautical datasets for download and import into LARA. These datasets are defined per country and are provided via the EUROCONTROL NM B2B Airspace Structures Services.

The data in EDQ is updated daily to ensure the most up to date data is available for use in LARA. EDQ can be accessed using both open Internet and PENS networks.

The airspace data in the EDQ Tool is available for download in AIXM 5.1.1 format. The imported data can be reviewed, adapted and validated. New airspaces can be created and various configurations for each entity defined and set.



The External Data Quality Tool

AIRSPACE USE PLAN

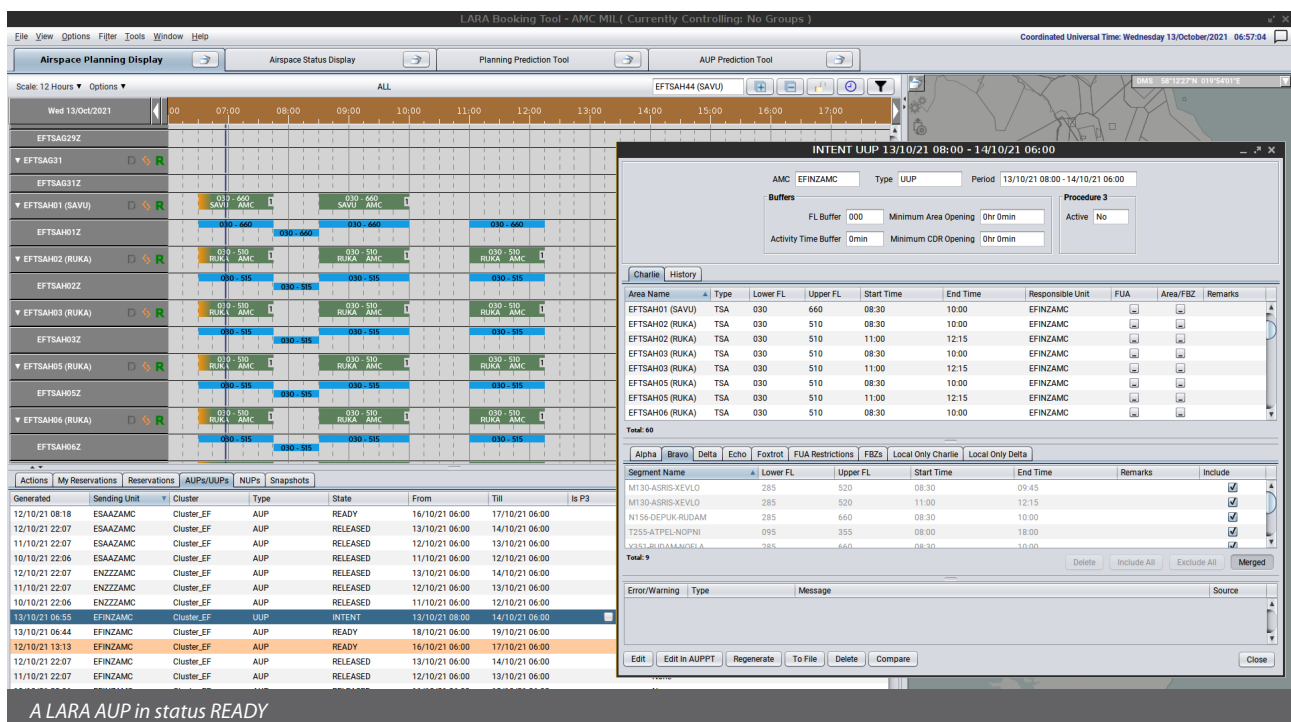
LARA has been designed to support the airspace management process – including the provision and distribution of the Airspace Use Plan (AUP) and its updates (UUP).

The AUP is generated by LARA based on all reservation data available for the referenced period. The local airspace manager can specify a set of parameters that are used to calculate correct closures of Conditional Routes. A user interface enables the airspace manager to remain in complete control of the AUP content, allowing adapting and

changing data, as necessary. It also allows AMCs to activate particular Flight Restrictions or Airspace Scenarios on NM systems via the AUP.

LARA is fully compatible with the latest NM B2B Web Services which allows LARA to create, update, delete, promote, and demote AUP/UUPs on the NM systems.

In addition, LARA offers functionalities to manage the National Airspace Use Plan (NUP) and its updates allowing the complete integration with existing ASM Level 2 processes.



A LARA AUP in status READY

Although AUP/UUP exchanges via file transfer and/or mail is available at any time of the process, LARA can also notify to selected addresses via email and attach AUPs/UUPs and/or NUPs in customisable formats:

Name	Email Address	Plan	Plan Text	ADIXP	ACA	AXM	KMZ	HTML	PDF
SGN user1	sgn1.lara@gmail.com	AUP/UUP NUP	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CRC user2	crc1.lara@gmail.com	AUP/UUP NUP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MIL SUP1	mlsup1@gmail.com	AUP/UUP NUP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CIV SUP1	civsup1@gmail.com	AUP/UUP NUP	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Remove selected from table

Add LARA user with existing email

Add new email Name Email

Unsubscribe email

☒ Emailed AUP should merge matching CFR sub-segments?

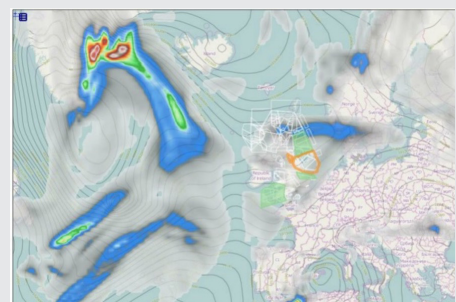
Name	Problem
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Released airspace usage publication notifications

LARA WEB SERVICES

LARA offers its own web services, which enable external systems to access the data within LARA. These services follow the REST protocol, with data provided in either JSON (JavaScript Object Notation) or HTML formats. The data sets accessible through these REST web services include reservations, airspace plans, activations, actions, missions, and airspace static data. Additionally, REST services allow external systems to create reservations and missions.

LARA also provides SWIM (System Wide Information Management) services, facilitating the exchange of aviation-related information across various systems. Real-time updates of critical information managed by the system enables external consumers to subscribe to live data and integrate LARA with other ATM sources, such as meteorological information or live traffic data. LARA's SWIM services enable States' compliance with EU/EC Regulations, including the interface with the European Aviation Common PKI service.



LARA combined with Meteo



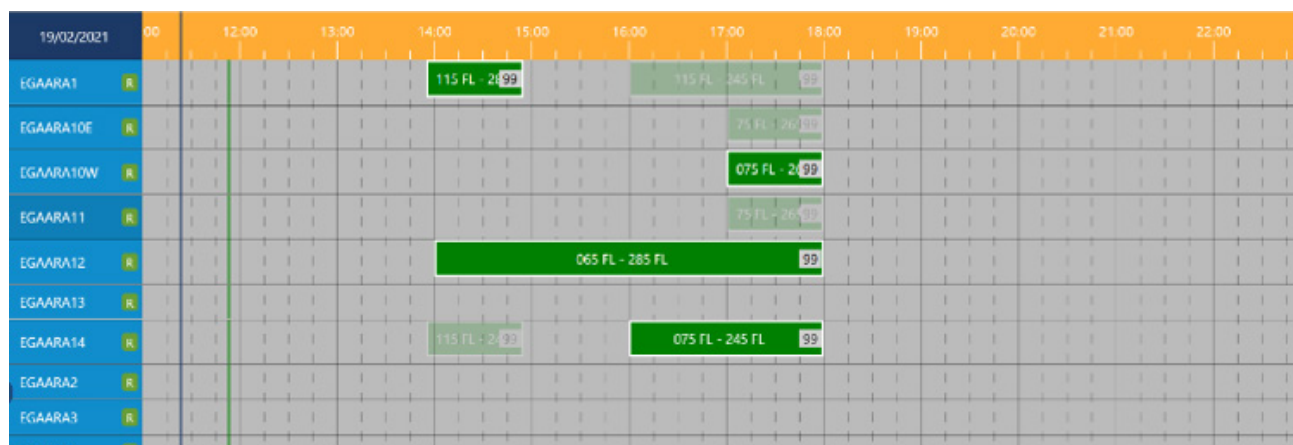
LARA combined with traffic data

LARA WEB CLIENT

The integrated LARA Web Booking Client (WBC) interfaces with the LARA Web Services to provide a subset of the desktop client functionality via a web application which can run on any device with a modern browser, including tablets, without the need for any other software. Removing the requirement for Java on client devices allows for more flexible deployments and opens LARA to more stakeholders.

Key features of the LARA WBC include:

- A Gantt chart for viewing and managing airspace reservations
- Common situational awareness from wherever you are
- The ability to take part in the full collaborative decision-making process



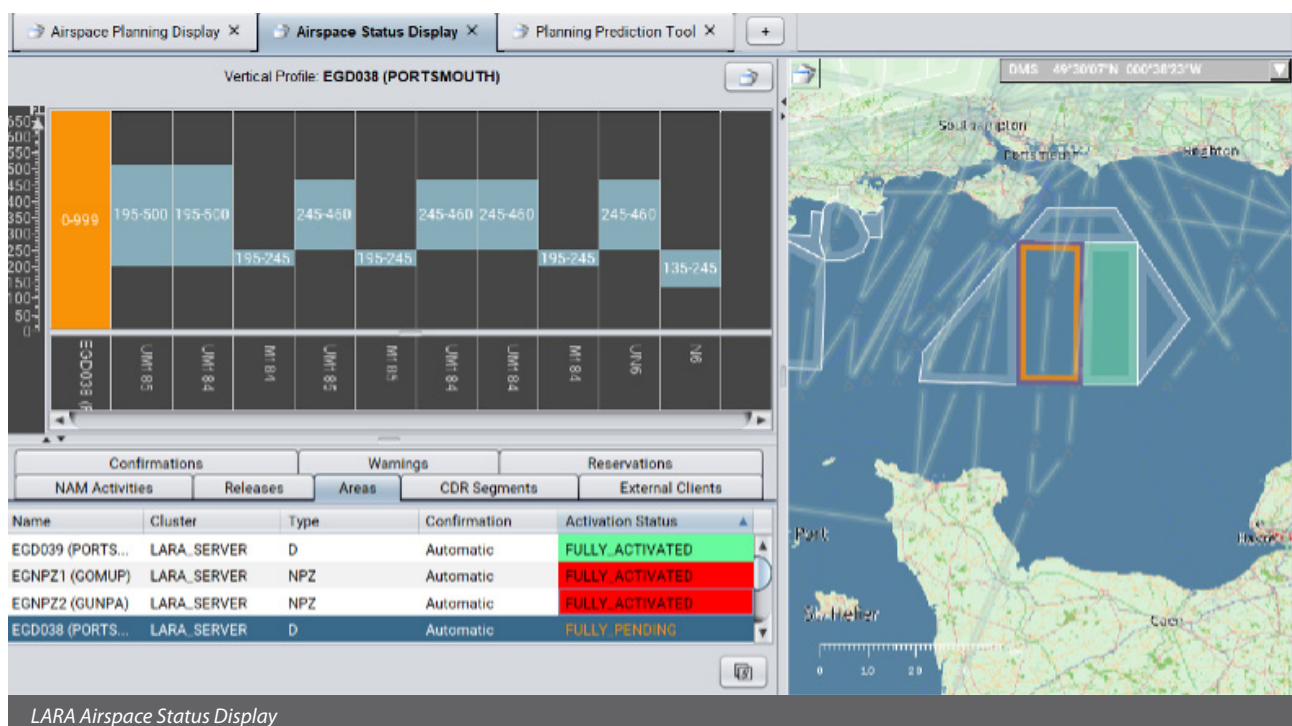
AIRSPACE STATUS

LARA transcends the planning phase and reaches seamlessly into the tactical phase of real-time airspace allocation. It supports activation and de-activation of airspaces and allows short-term changes to existing reservations. New requests can be introduced on short notice. Due to its network-based information sharing, all relevant users are instantly informed about every single change. Interfaces to ATM systems allow presenting the status information directly on the controller working position. All this is backed up by appropriate safety measures.

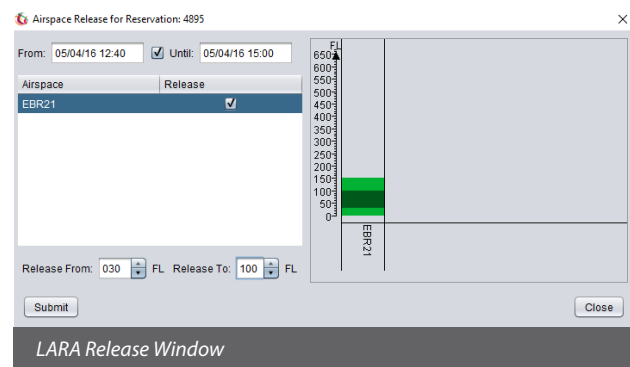
The Reference Allocation Time is a configurable parameter in LARA, which allows defining a moment in time when the planning becomes consolidated and only minor changes are expected thereafter. This period is different in most countries and can be configured in LARA. The approval chain can be defined differently for changes and new requests before

and after this time parameter. One common example would be that the Airspace Management Cell (AMC) oversees airspace allocation before the Reference Allocation Time and its authority is transferred to the responsible supervisor thereafter.

LARA provides the users with a designated overview for these tasks, the Airspace Situation Display (ASD). The ASD provides the users with all information regarding the status of airspaces. Once a reservation is approaching activation, its status is changed to "Pending" and is coloured orange on the ASD. The pending time is configurable. This "Pending"-state will inform all users about the scheduled activation of an airspace and allows them to prepare appropriately. All maps on LARA also supports integration with OpenStreetMaps, bringing additional situational awareness to the users.



Once the pending state is reached, the supervisor in charge of the activated airspace (typically the military supervisor) can be triggered by the system to confirm the planned activation of the airspace. After his confirmation, the civil supervisor(s) will be prompted to acknowledge the activation to ensure their awareness. LARA offers the alternative to handle this process in an automated mode, not requiring manual intervention by the supervisors. Like for all LARA functionality, the modes of activation are configurable to suit different national procedures.

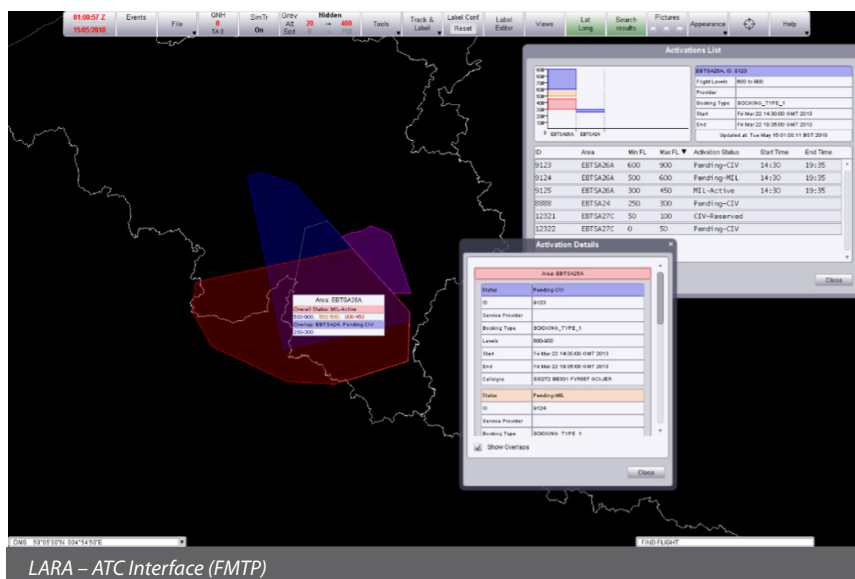


Once the airspace is activated it will be coloured green on the display of the agency responsible for service provision within the activated airspace - and in red for all others. The ASD provides a vertical view for each selected airspace to indicate the vertical limits of the activation and if two or more independent level blocks have been reserved for different missions.

When a reservation is active, it is possible for the supervisor to release airspace, allowing temporarily unused blocks of airspace to be made available to other users.

Planning and Status views can be combined using the Planning Status Display (PSD), which integrates the planning Gantt chart with the real-time status map.

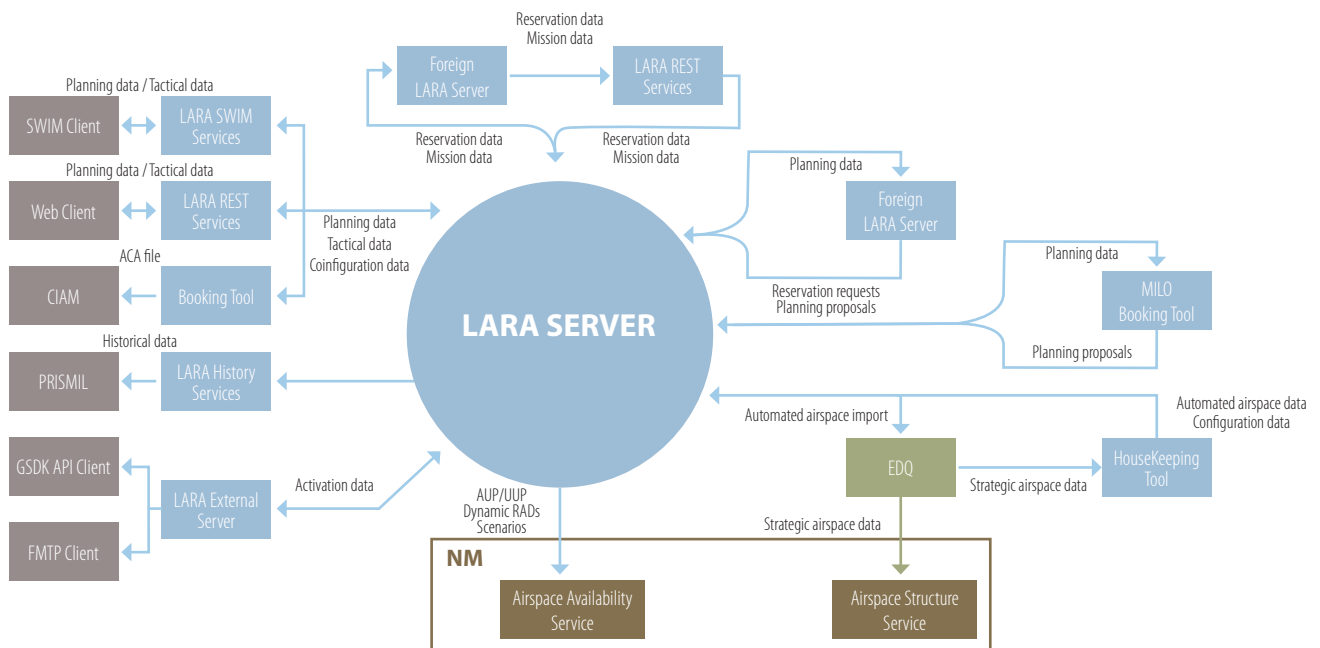
LARA can provide information on airspace status to external systems by several published interfaces. One of these allows a LARA embedded FMTP server to exchange ADEXP messages with Air Traffic Control Systems to indicate airspace status on the Controller Working Position (CWP) increasing situational awareness. In addition, this data can be made available via web interfaces to other clients and devices, e.g., to provide airspace status on a mobile device.



LARA – EU CP1 COMPLIANCE

COMMISSION IMPLEMENTING REGULATION (EU) 2021/116 of 1 February 2021 on the establishment of the Common Project One (CP1) places requirements on ASM Support Systems for ATM functionalities and aeronautical information exchange using the SWIM yellow profile technical infrastructure.

LARA deployment ensures compliance with CP1 AF3 requirements. To address the AF5 ones, LARA implements the “EUROCONTROL Specification for Airspace Management (ASM) Support System Requirements supporting the ASM process at local and FAB level - Part II” thus ensuring States’ compliance with the relevant SWIM requirements.



PERFORMANCE



All data managed and exchanged in LARA is maintained in a database which allows further processing and extraction. This stored information can be used to investigate and trace occurrences as all actions performed on the system can be tracked back to each user. It can as well be used to establish and maintain statistics on the allocation and use of airspaces by different users and provide a means for performance measurement.

If LARA is used in combination with an air situation display like CIMAQT or any other modern Flight Data Processing System, the statistical data can be further enhanced by mapping actual flight profiles onto the airspace reservations to obtain a precise overview of actual use of airspaces, transit times and derived mission effectiveness.

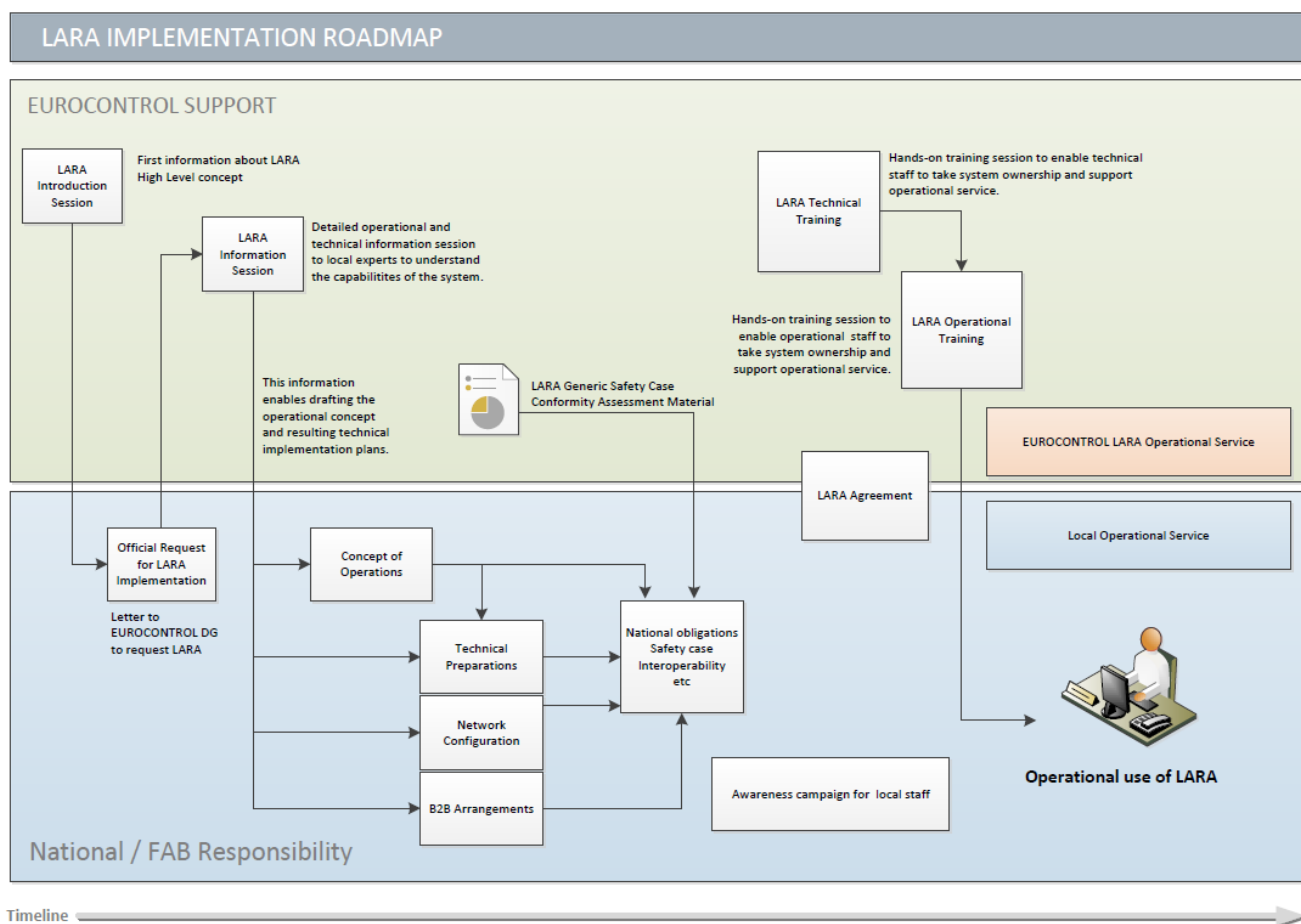
An interface to PRISMIL supporting the production of standardised Key Performance Indicators (KPI) is available. Historical data contained in the system can also be provided via Web Services to third party applications.



IMPLEMENTATION

The LARA system is implemented nationally according to a common established roadmap. Initial sessions aim at raising awareness within the different Organisations on the Tool and its functionalities, followed by in-depth explanations and theoretical training for both operational and technical staff.

A common Implementation Charter is defined describing the different steps leading to a successful implementation.



ANNEX 2:

CIMACT

CIVIL MILITARY ATM COORDINATION TOOL

CIMACT produces a correlated Air Traffic Control (ATC) picture on commercial off-the-shelf (COTS) hardware, by processing a wide variety of surveillance, flight plan and coordination data. The system provides tools, filters and safety nets found in modern Air Traffic Management and Air Defence systems.

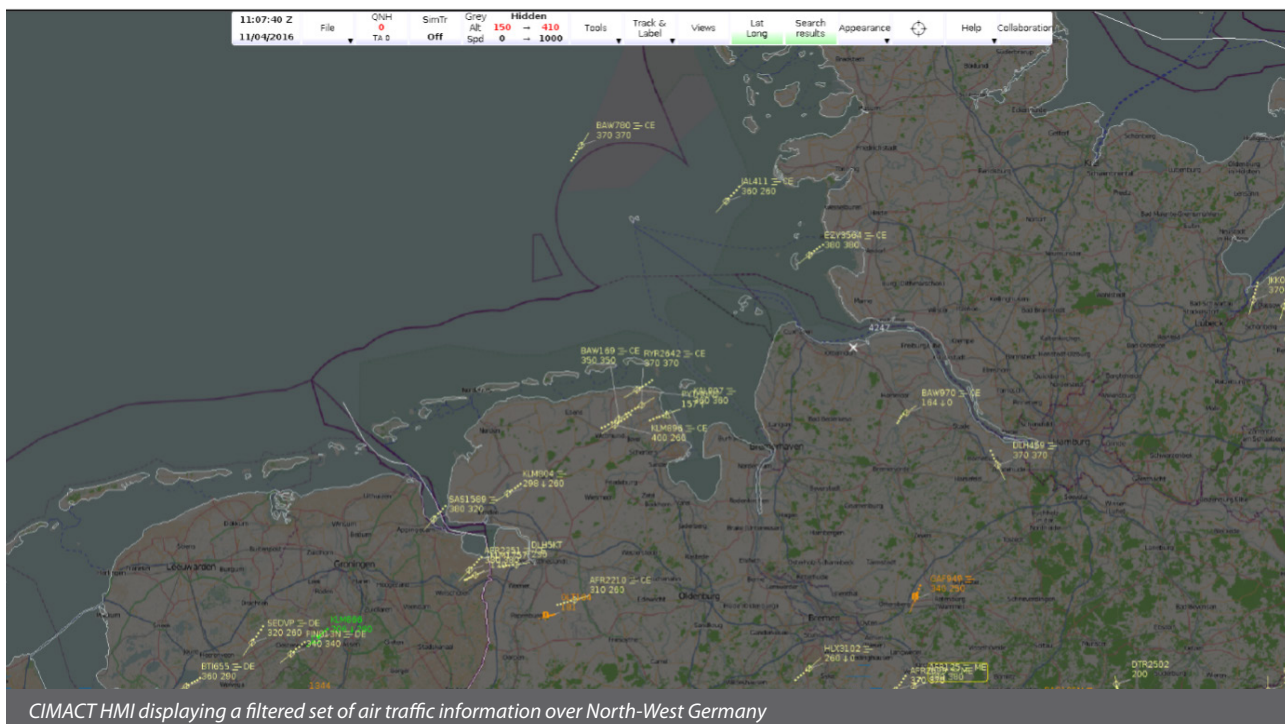
CIMACT is being developed and maintained by EUROCONTROL to improve situational awareness of civil and military control units and facilitating the exchange of

information between civil and military systems, thereby increasing safety and efficiency of air navigation.

The system has been developed with a focus on flexibility and versatility, making it easily adaptable to a wide variety of operational environments and contexts, accepting new or changed data sources and by defining and implementing new data exchanges.

Given its flexibility and cost effectiveness, the use CIMACT has been constantly evolving. It is now being used in several European countries to serve in **various operational scenarios**:

- civil-military ATM Coordination and Airspace Management
- Aerodrome and Approach Control
- Recording, Analysis and Evaluation
- Fallback
- ATM security



CIVIL MILITARY ATM COORDINATION

The Flexible Use of Airspace Concept states that any airspace segregation, for example reserving airspace for military activities, shall be limited to the actual usage in time and dimension. In order to effectively and safely facilitate this, close co-operation between civil and military controlling units is paramount. CIMA CT is providing a correlated (civil) ATM picture at military controller positions to improve situational awareness. The system displays flight and track details including intentions to allow for efficient controller to controller co-ordination.

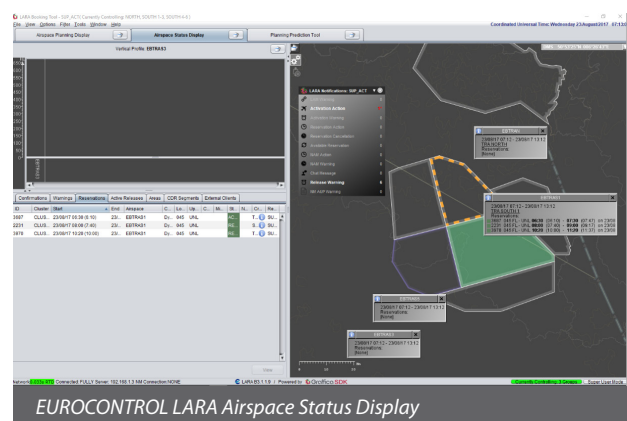
CIMA CTs use in the field of Civil Military Coordination covers the followings areas:

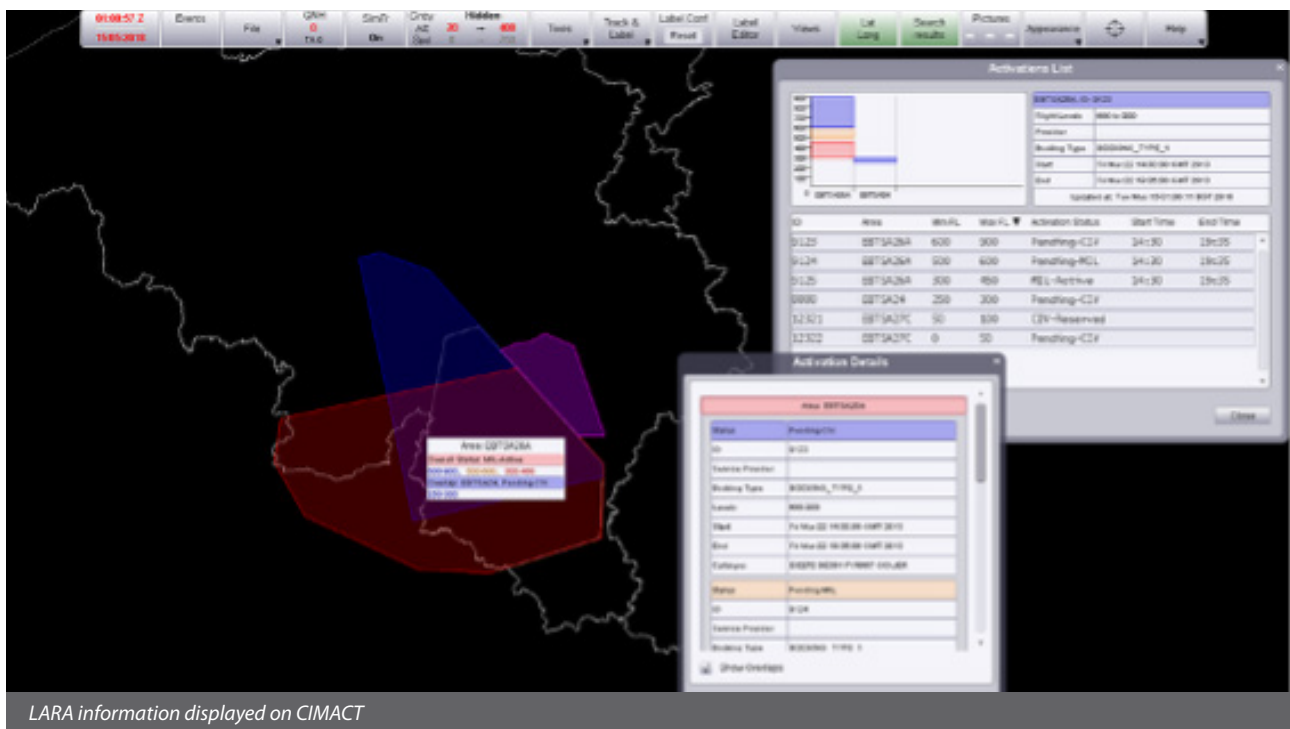
- Flexible Use of Airspace
- Management of Cross Border Areas
- Surveillance and Identification
- Radar Assisted Flight Information

FLEXIBLE USE OF AIRSPACE

Temporary Restricted Areas (TRA) and Temporary Segregated Areas (TSA) are established to allow training of military aircraft. Pilots are supported during these exercises by ground based Intercept Controllers providing them with information, instructions and assistance. When these areas are activated, close coordination between civil and military controllers is required to guide civil traffic outside this area and thereafter transit military aircraft safely into this reserved airspace to start their exercise.

CIMA CT interfaces with EUROCONTROL's LARA (Local and sub-Regional Airspace Management Support System) to safely and efficiently handle airspace activations and deactivations. If an area is being deactivated on LARA, this is displayed on CIMA CT with additional information on the short term planning, so the controller is aware of upcoming events in his airspace. LARA and CIMA CT are capable to synchronize the airspace data used in order to ensure correctness and completeness of the displayed data.





LARA information displayed on CIMA CT

After an area is activated for military use, General Air Traffic (GAT) may penetrate the TRAs if requested by the appropriate ATC controller and approved by the military controller. In order to coordinate these crossings the (military) Intercept Controllers are equipped with a CIMA CT Working Position displaying the civil correlated air picture next to their tactical control system.

CIMA CT allows them to quickly identify the civil flight and approve the transit if possible. This reduces telephone coordination between military and civil controllers, thus reducing workload on both sides. Secondly the situational awareness of the military controller is greatly improved and contributes to a safer and more efficient handling of flights. The increased possibility of penetrating an active TRA improves capacity, efficiency and fuel consumption, thus contributing to the performance of the ATM system.

Cross Border Operations

The need for efficient military-military and civil-military coordination becomes very apparent during cross border operations and for the establishment of Cross Border Areas (CBA). Different military controlling systems and diverging levels of civil-military integration increase complexity in the exchange of data for civil-military coordination.

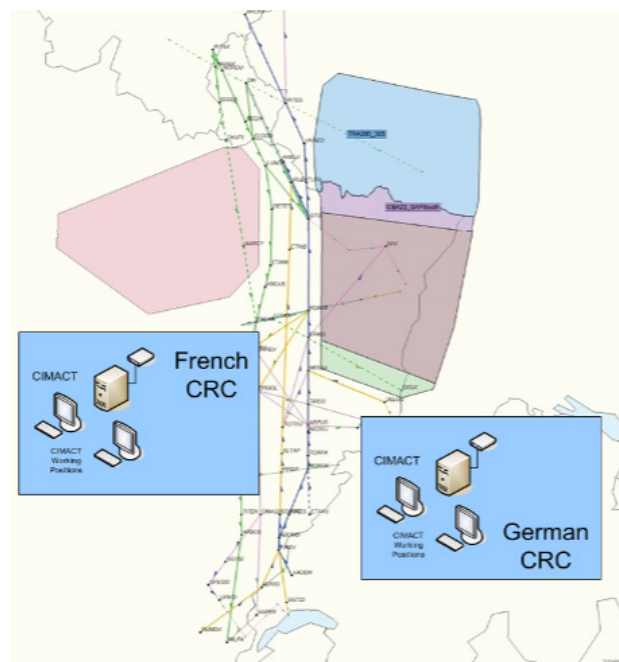
CIMA CT is very flexible in adapting to various data formats and very efficient in data processing, conversion and relay, allowing otherwise incompatible systems to interface.

CIMA CT's subsystem GAFPLAN is used to collect flight plans in different formats from various air traffic control centres to translate, merge and relay these to external systems as a single stream of data. This is used to produce a correlated air

picture for Germany, Benelux and parts of France on CIMA CT. This pre-processed data are used by Military Air Defence Systems as well.

Cross-Border civil-military Coordination via CIMA CT is operationally used for several years already between the Maastricht Upper Area Control Centre (MUAC) and the French Air Force. The CIMA CT system is installed to enhance civil-military coordination between MUAC and three Air Defence Centres of the French Air Force to coordinate activities in the CBA1 located in France on the border of Maastricht's Area of Responsibility.

The CIMA CT systems in France are provided with data from the Maastricht Data Processing System (MADAP) to display the position, identification and intentions (flight plan) of General Air Traffic (GAT) controlled by MUAC. Short Term Conflict Alerts (STCA) involving civil and military traffic are relayed and displayed to serve as an additional safety net.



Surveillance and Identification

Every state is responsible for the integrity of its own airspace and is taking measures to protect and monitor all aerial movements within their boundaries. Typically, Air Defence Units are responsible and operate a Surveillance and Identification Section to perform this task.

Multiple controllers are monitoring the airspace and identify every aircraft crossing the border into the respective country. This is done by assessing the available flight plan information and coordination with civil ATC Units responsible for the particular airspace.

CIMA CT provides these units with a consistent air picture with detailed information for all correlated flights. Before the use of CIMA CT, information on these flight details would

have had to be requested manually from the ATC Unit handling these flights resulting in a significant increase of workload of both parties. As the CIMA CT data is based on common standards, this data can be fed directly into Air Defence Systems for correlation and display.

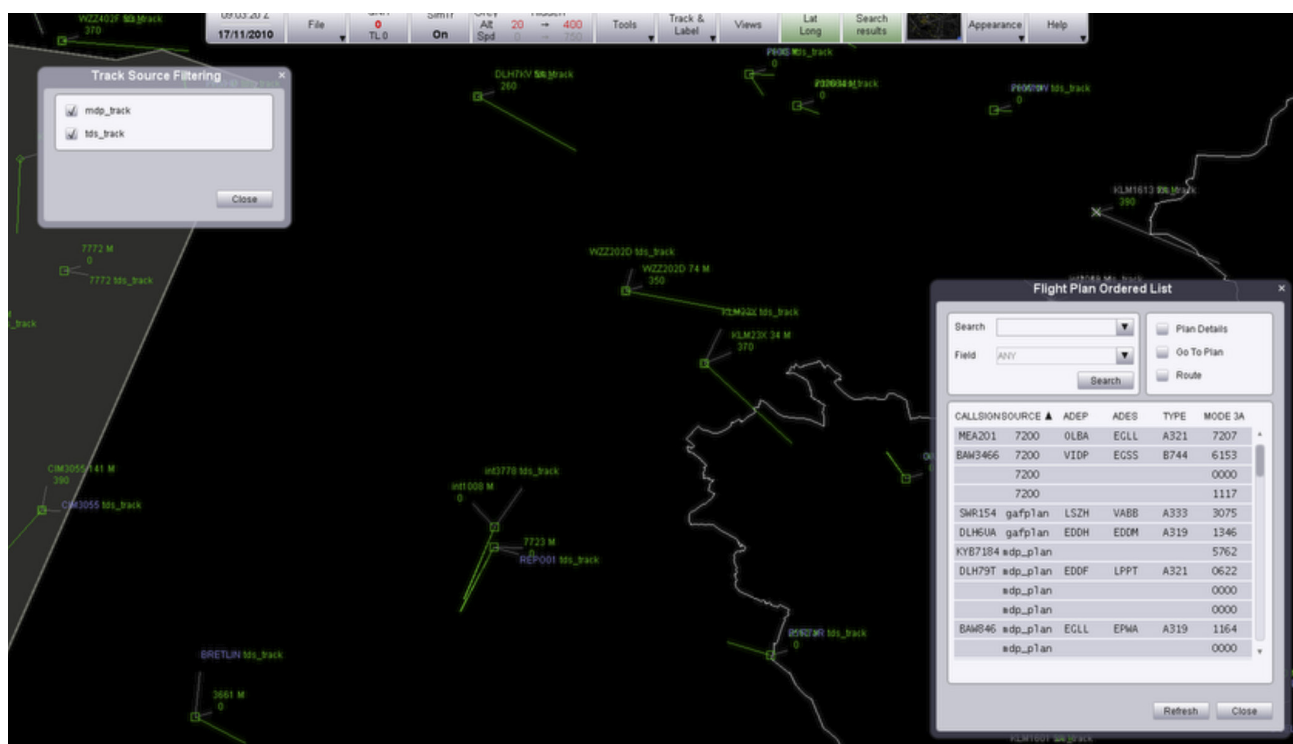
Radar Assisted Flight Information Service

While Air Combat Exercises generally take place at higher altitudes , other military exercises are executed at low altitudes. Here the potential conflicts arise from low flying civil and military VFR traffic and arriving and departing traffic in the vicinity of aerodromes. In order to improve safety and situational awareness CIMA²CT is used to provide flights with Radar Assisted Flight Information Service (RAFIS).

These exercise areas are often declared RAFIS Mandatory Areas and traffic is required to contact the RAFIS Controller prior entry. This contact is kept up until leaving the respective

area. These flights will be identified and monitored on CIMAQT, and provided with information on other flights.

In case potential conflicting traffic is observed these flights will be informed about distance, bearing, altitude and moving direction of the potential conflict. In case the pilot is not able to establish visual contact a recommendation for avoiding action is given in accordance with ICAO Regulations.



The CIMA^{CT} Human Machine Interface (HMI) displaying Track and Flightplan Data from the Maastricht Upper Area Control Centre. This is used in Air Defence Centres in Germany and in France to coordinate effectively with Civil Area Control Centres.

Air Traffic Control

CIMACT is used for the provision of Radar Approach Control Service and Flight Information Service at several Military Aerodromes in Germany and Portugal. A working position is installed additionally on the Tower (Aerodrome Control) for enhanced situational awareness and coordination.

The Radar Approach Control Unit is responsible for enabling a safe, expeditious and continuous flow of air traffic within their area of responsibility. To facilitate their task they issue clearances to aircraft under their control based on the air situation picture that is provided by CIMACT.



Radar Approach Control at a German Air Force Base using CIMACT.

Within the scope of Radar Approach Control close coordination with the respective ACC, adjacent aerodromes and the local Aerodrome Control Tower is of utmost importance. Manual co-ordination and transfer of aircraft impose a high workload on the controller team. To support this task CIMACT is providing the coordinating controller with a separate CIMACT Working Position allowing him to access detailed flightplan and track information as well as following the proceedings within the area of interest. If an additional working position is available on the Tower this coordination is further enhanced and simplified. CIMACT offers the functionality to "Assume" traffic and allow for automated transfer of traffic within the CIMACT network.

Area Proximity Warning (APW) and Minimum Safe Altitude Warning (MSAW) are available to further improve safety levels.

CIMACT as Fallback Display System

Air defence units use their own tactical air situation display for controlling operational traffic. In case of outages of this main system, CIMACT is used as a fallback display in order to maintain flight safety and fulfil high priority tasks.

CIMACT itself offers two types of fallback facilities:

In case the data reception is stopped due to network problems or the central server stops working/shuts down, CIMACT will inform the controller by displaying a "data transmission disrupted" warning on the display and continues to display the last given air situation on the HMI. A transfer of control to other units is thereby simplified as the last known information is still visible on the screen.

Sites with a safety and mission critical task are normally equipped with two independent CIMACT Servers configured in a "Hot Standby" mode, which will automatically switch to the back-up server in case of failures.

ATM Security

CIMACT has been used in the past as the Information Exchange System (IES) of the NATO-Russian Council Corporative Airspace Initiative (CAI) and was developed to function as operational ATM Security System.

The CAI started in 2003 and lead to three NATO nations exchanging ATM data with the Russian Federation using CIMACT as display and data exchange system for NATO. Two coordination centres, one in Warsaw and one in Moscow facilitated efficient coordination during ATM Security incidents. In 2014, the this data exchange was stopped.

However, the concept is still very valid: the exchange of information between CIMA CT system and other systems to form an airspace security network, which allows early warning of suspicious air activities through commonly agreed procedures across country borders. In situations where an aircraft behaves erratically, this system offers increased information sharing and communication to ensure a rapid, joint response.. The Regional Airspace Security Programme has been implementing CIMA CT in a number of states to form such network. Additional European nations and the US (Federal Aviation Administration – FAA) actively support the project and consider connecting in the future.

The capabilities of CIMA CT within the ATM Security domain are widely recognized and serve as baseline for an Airspace Security Incident Management System (ASSIM) in Europe.

CIMA CT is being used by NATO and the German Air Force during high – profile events like important sport events, state visits and alike for increased situational awareness and coordination.

System capabilities

The CIMA CT Human Machine Interface provides the controller with the means to quickly identify and follow flights of interest. CIMA CT displays various types of flights in a range of different colours and symbols to enable the operator to quickly acquire an overview of the complete situation and supporting him or her in accessing detailed information in a minimum of time. The planned flight routes and flight levels as well as the cleared and current flight levels are available for correlated flights.¹

The identification of flights is supported by having a range of data available on tracks, flightplans and the aeronautical environment. All flights and flightplans in the system can be queried to find flights matching the desired criteria.

Flights can be highlighted and marked for adjacent controllers and filtered for de-cluttering the screen.

Individual flights can be tagged with configurable criteria to coordinate with other units and indicate flights of interest (Potential Renegade, Loss Com, Deviating from flight plan etc.)

Controllers can exchange free text (chat functionality), link tracks, flight plans, and geographic locations in their messages and unlock increased situational awareness and coordination potential among its users.

CIMA CT can import and display aeronautical information in AIXM from EAD (European Aeronautical Database) and EDQ (EUROCONTROL Enhanced Data Quality Tool for LARA). To complement this data, CIMA CT contains a full-featured Map-Drawing Tool for creating and maintaining aeronautical maps. It is possible to display a graphical map based on image tiles as a background of the Air Situation Display. Currently Open Street Map is used for this purpose, but other map sources can be implemented as well.

The CIMA CT Pilot Working Position allows injecting and operating simulated traffic on the connected CIMA CT positions for exercises and training. This can range from individual flights to complete scenarios, where any type of behaviour can be simulated (turn of transponder, change heading, altitude etc.) supporting complex simulation and training requirements.

CIMA CT is implementing a set of SWIM compliant services for exchange of data with LARA and other systems.

For a full and detailed description of the available functionality, please refer to the Systems Users Manual, available on request.

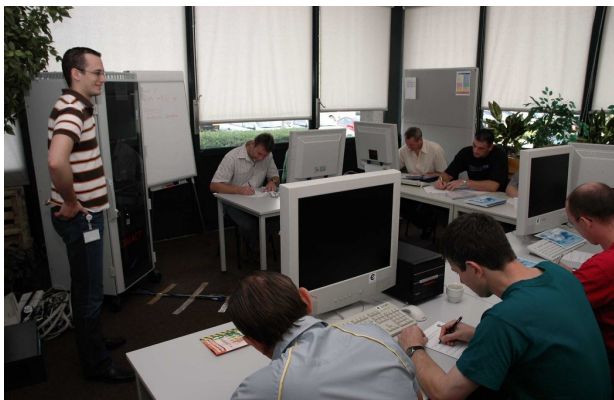
¹ Please note that the data items for display on CIMA CT is closely linked to the data made available locally.

Training and Proficiency

After installation of CIMA CT at a user site, EUROCONTROL provides a hands-on instructions for operators and technical staff prior entering operations. User Manuals are provided in hard- and softcopy for reference.

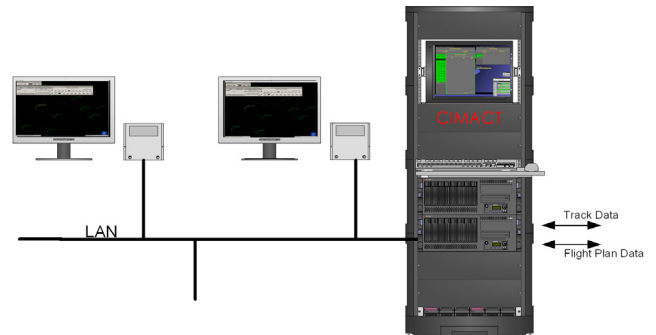
CIMA CT System administrators can attend a three day course at Maastricht Upper Area Control Centre. This enables them to handle routine operations, start first investigations in case of problems and support the CIMA CT Team for other maintenance activities.

Each CIMA CT Site has a team of trained CIMA CT System Administrators responsible for the operation of the CIMA CT System. They are in the position to remedy first problems and coordinate additional support from the CIMA CT Team at Maastricht if required.



CIMA CT Administrator Training at Maastricht Upper Area Control Centre

Technical Aspects



A typical CIMA CT System consists of a Central CIMA CT Server and a number of connected CIMA CT Working Positions. Track information is correlated to flight plan Information and a seamless air situation pictures is being produced. This is sent to connected CIMA CT Working Positions running the CIMA CT HMI allowing the user to select from a variety of tools and filters. Data can be processed and enriched and exchanged with other (CIMA CT) systems. All hardware is "commercial off the shelf". The detailed hardware requirements are available on request.

Data Provision

The CIMA CT System can be fed by a variety of data sources. In most cases, the system is being provided with surveillance and flight plan data by the appropriate Area Control Centres (ACC) and/or local sensors.

CIMA CT is able to connect over various fixed and mobile network infrastructures and various network protocols. Redundant network interfaces are available on the CIMA CT Server and can be handled by the CIMA CT Application.

The received data is used to generate the CIMA CT Air Situation Picture enabling the operator to access detailed information about surveillance and flight plan data, filter, search and highlight traffic and environmental data as required. Data can be exchanged with other systems.

Depending on the local setup and requirements, the redundancy of datalines and data providing systems are supported, same accounts for the CIMA CT network connecting the server and the working positions (hot standby, dual networks etc).

The CIMA CT Server records all incoming and processed data for later replay on a designated data storage facility. Depending on the amount of data and the size of the recording medium CIMA CT can record data for a period of multiple months to more than a year.

Surveillance Data

The System can be fed with various types of surveillance data – most commonly tracks and/or plots from one or more local and regional surveillance sensors. These can be connected directly to the CIMA CT Server or via a tracker installed as part of the CIMA CT System (ARTAS). This tracker is then provided with various sensors forming the track picture.

Normally the ACC will forward surveillance data in real time over a suitable network to the CIMA CT Server. This data is directly taken from the ACCs processing system and is identical with the data used within the ATM System.

In order to fulfil requirements for low level coverage around the airfield, a local sensor based at or near the aerodrome can be included in forming the air situation picture.

Among the extensive amount of radar and flight plan data formats CIMA CT supports, are the following:

ASTERIX categories:

000; 001; 002; 003; 004; 008; 009; 030; 034; 048; 062 (v0.19; v1.13; v1.16); 065; 142; 143; 148; 149; 150; 152; 252.

ADEXP (version 3.1) messages:

BFD; CFD; TFD.

ICAO (version 2012) messages:

CPL; FPL; CNL; ARR; CHG.

CIMA CT will accept most common surveillance data formats with the possibility to interface to any other kind of surveillance data given the appropriate Interface Control Documents (ICD) and sample data to develop a suitable interface.

CIMA CT is capable to display two or more track pictures from independent sources on its air situation picture.

Flight plan data

The CIMA CT Server is capable to receive flight plans in various formats and various sources, convert these into standardized formats and merge all into one consistent flight plan repository.

Flight progress data will be made available by the appropriate ACCs and fed into CIMA CT. The quantity and quality of data is dependent on the ACCs data output. CIMA CT is capable to process the initial flight plan, flight plan activation and deactivation and flight plan updates.

The CIMA CT Server processes surveillance and flight plan information and correlates both into one consistent air situation picture.

ANNEX 3: PRISMIL

PAN-EUROPEAN REPOSITORY OF INFORMATION SUPPORTING CIVIL- MILITARY PERFORMANCE MONITORING

What is PRISMIL?

PRISMIL is a unique on-line pan-European service that facilitates the performance monitoring of common civil and military airspace management (ASM) processes. PRISMIL stands for “Pan-European Repository of Information Supporting civil-military Performance Monitoring”. In coordination with civil and military stakeholders, EUROCONTROL’s Civil-Military Cooperation Division (CMC) led the development and runs the service. It was built using off-the-shelf business intelligence and Big Data Technologies.

PRISMIL key functions

The PRISMIL data is accessible thru the EUROCONTROL data warehouse. PRISMIL aggregates raw data and transforms it into useful business information that guarantees transparency and reliance for both civil and military stakeholders. PRISMIL enables:

- data collection and integration from different data sources for analysis.
- performance indicator aggregation at national, FAB and EU level.
- on-line data querying and interactive reporting.

- a multidimensional view of ATM performance.
- horizontal and vertical integration of performance measurements.
- combined use of civil and military performance indicators.

The Cloudera data platform (Big Data) enables another perspective to visualise the civil traffic over and around SUA’s using maps displaying information either terms of density (Heatmaps) or Flight models (Trajectories).

PRISMIL and European ATM

To improve the performance of air navigation services and network functions in the single European Sky (SES), a performance scheme for air navigation services and network functions has been mandatory for EU Member States since 2012. Civil-military cooperation and coordination should play a fundamental role in the implementation of the SES thriving towards enhanced flexible use of airspace (FUA) to meet the SES performance targets. Performance monitoring and assessment of FUA operations indicate areas for improvement, for the benefit of civil and military stakeholders. Consequently, outcomes of the FUA operations at local level directly contribute to network performance. PRISMIL allows a civil-military results-oriented partnership in support of the SES performance objectives. Also, PRISMIL makes it possible to:

- assess and review airspace procedures and the performance of flexible-use-of-airspace operations.
- establish mechanisms to archive data relating to requests, allocations and actual airspace structures for further analysis and planning activities.
- data access control.

What can be measured with PRISMIL?

Performance indicators (PI's) are vital means that provide insight on how the "business" is doing. It enables the assessment of the performance of the ATM System in terms of objectives and targets. Sets of civil-military performance indicators are developed in collaboration with EUROCONTROL and contribute to establishing "common methodologies to measure the actual usage of the airspace structure for military activities, assessing its impact on both civil air traffic and military operations». Performance indicators implemented through PRISMIL can be used for:

- decision-making based on facts and figures rather than on opinions or assumptions;
- track the elements which clearly tell you how your process or business is doing;
- monitor whether or not your objectives or targets are being met;
- indicate performance trends, triggering appropriate timely management actions.

Performance indicator are grouped within the following areas:

- The Airspace Efficiency KPA addresses the efficiency of SUA management and usage from both civil and military perspectives. The set of performance indicators monitors the efficiency of civil planning and actual use when SUA is available or released to general air traffic (GAT).

Another set of performance measures monitors military requests, and allocation and actual use of airspace subject to reservation or restriction (SUA) for military activities.

- Within the Flexibility KPA, a set of performance indicators are designed to monitor the application of the FUA concept in the airspace designed as SUA.

FOCUS AREA	PERFORMANCE INDICATOR
Airspace efficiency	AUP allocation efficiency Use of allocated SUA Number of aircrafts planned vs Number of aircrafts used by GAT in available and released SUA
Flexible use of airspace	Management of the SUA's at all 3 levels: <ul style="list-style-type: none">• Strategical• Pre-Tactical• Tactical

PRISMIL and stakeholders

The PRISMIL service is EUROCONTROL's tailored activity supporting civil and military stakeholders in the implementation of the FUA concept and the SES performance scheme. It supports decision-makers at all levels of ASM, civil and military aviation authorities, operational users, and also supervisory authorities. The service is open to all EUROCONTROL stakeholders on a voluntary basis.

PRISMIL technical requirements

Users can access relevant information through on-line performance dashboards. Consequently, no additional investments are required. The applied solution optimises the resources available at national and EUROCONTROL levels. The dashboards are accessible via the EUROCONTROL website. All the users needs are: a PC, laptop or tablet, an access Internet access and, of course, the proper credentials to access the PRISMIL performance dashboard. The national data owner defines who are granted access rights.

PRISMIL dashboard

The PRISMIL dashboard is a user-friendly, multi-layered application built on a business intelligence and a data integration platform. It allows users to obtain an integrated view of the status of the critical and most interesting performances at national, FAB or European level. Users can customise the layout and organise the dashboard in compliance with their specific business needs. In addition, by using drilldown functions, users can access lower levels of the information and data.

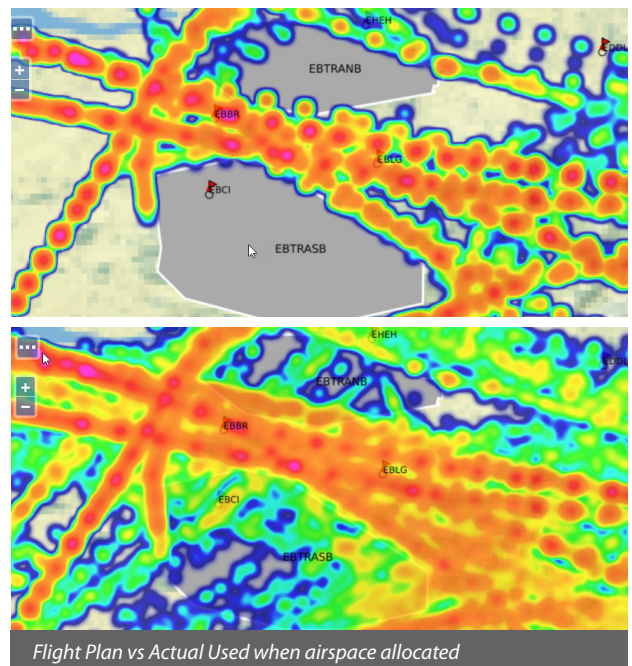
A Common Dashboard enables states to support the requirements of the SES Performance. New functionalities also allow for Civil traffic to be visualised as Heat maps.

Data confidentiality

States supplying national data are the owners of that data. They define the list of users authorised to access raw and aggregated national data. Data access on a need-to-know basis is the key principle of the PRISMIL service. Security covers several levels: access to the dashboards, reports, subject areas, data, design of reports, and management of folders.

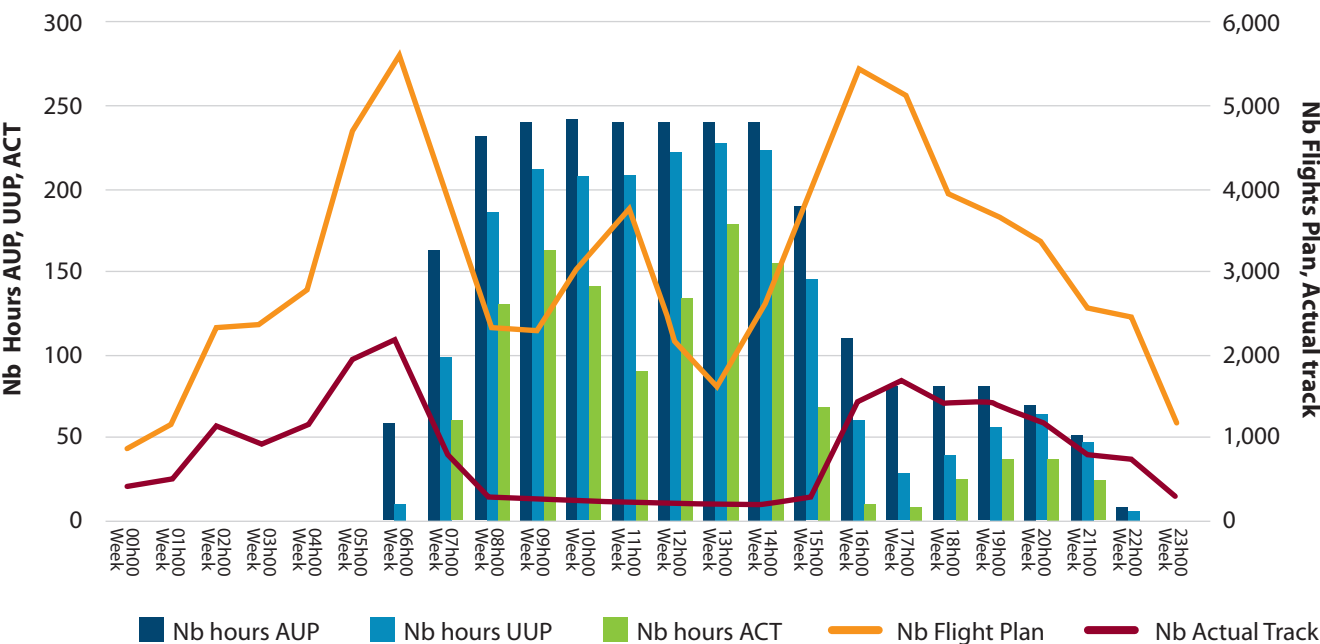
PRISMIL data source

PRISMIL integrates data from national AIP's, national ASM Systems and GAT and AUP/UUP data available at the level of the network (NM). LARA is the EUROCONTROL airspace management tool, which generates required ASM performance data at national level. Interoperability between LARA and PRISMIL facilitates a seamless data flow from the national data source to the EUROCONTROL data warehouse.

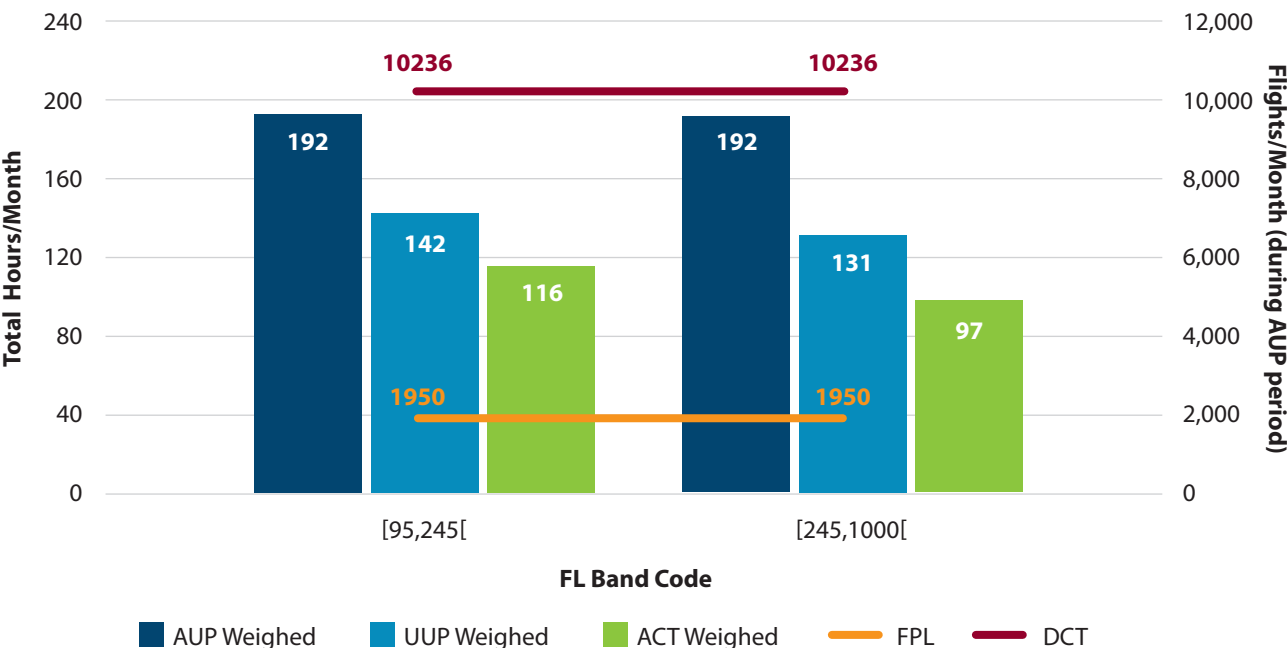


Overall benefit

With PRISMIL, civil and military authorities, ANSPs, airspace users and EUROCONTROL are in an optimised position to evaluate the performance of the ATM System and the FUA concept. PRISMIL provides «a single version of the truth» of combined civil-military ASM processes.



Composit (weighed) TRA per FL



ANNEX 4:

MILO

MILITARY LIAISON OFFICER

The MILO is the Point of Contact for all operational civil-military matters in the Network Manager Operations Centre (NMOC).

The MILO's Mission

To reconcile civil requests with military requirements.

Who are the MILOs?

MILOs are operational Airspace Management/Air Traffic Management (ASM/ATM) experts from different national organisations. Some members of the team are former Air Force Air Traffic Controllers (ATC), bringing military ATC expertise, and a former military pilot, providing valuable operational flight experience. This diverse and experienced team ensures that military operational requirements are properly represented and coordinated within Eurocontrol's civil aviation framework, contributing directly to the safe, efficient, and effective functioning of the European airspace network.

The MILO team, including the Liaison Officer (LNO) assigned to NATO HQ AIRCOM in Ramstein, forms the civil-military coordination bridge between strategic and tactical levels of airspace management within the NMOC framework.

The MILO's Tasks

- Enhance the civil-military ASM coordination process on the European network level.
- Increase airspace capacity, while ensuring military mission effectiveness.
- Be a source of military expertise in the NMOC, promoting better understanding of military requirements on a network level.
- Represent military interests on the operational level.
- Transfer knowledge from national military bodies to the Network Manager (NM) and vice versa.

MILO acting as a LNO

The MILO function not only supports daily network operations but also acts as a liaison between military stakeholders and the NM at strategic and operational levels. The LNO is a MILO deployed permanently at NATO HQ AIRCOM with additional strategic-level responsibilities.

The LNO Tasks

- Represent EUROCONTROL at HQ AIRCOM, acting as ATM advisor.
- Facilitate early integration of ATM considerations into military strategic planning.
- Support and coordinate large-scale NATO and national exercises impacting civil airspace.
- Supports strategic civil-military coordination during crisis, hybrid, and contingency situations.
- Maintain direct liaison with MILOs at NMOC to ensure tactical/strategic alignment.

- Provide continuous situational reporting (SITREPs) to EUROCONTROL civil-military Cooperation Division (CMC).
- Initiate escalation procedures when civil-military coordination issues cannot be resolved at operational level.
- Support the coordination of NATO higher airspace and space operations impacting ATM.
- Maintain close cooperation with national authorities, NATO entities and EUROCONTROL operational units.

What does the MILO do for NM?

- Collects, collates and harmonises national information on major military exercises and events.
- Becomes involved in the preparing and planning (in the strategic and pre-tactical phases) as well as in the execution (tactical phase) of military events.
- Produces Network Impact assessments and initiates civil – military coordination to minimize network impact.
- Validates initiatives for better civil-military cooperation and/or higher integration of military service providers and users into European ATM Network.
- Provides support and liaison for quick and impartial investigation of incidents involving military flights and military airspace users.

What does the MILO do for military users?

- Airspace management support, with airspace reservations, allocations, and optimization.
- Supports Military planners if they want to anticipate the network impact of their operations.
- Ensures the appropriate implementation of ASM and Air Traffic Flow and Capacity Management (ATFCM) measures to safeguard mission effectiveness.
- Flight planning (FPL) assistance, solving of ASM/ATFCM/ FPL issues for military flying General Air Traffic (GAT), Operational Air Traffic (OAT) or improved Operational Air Traffic (iOAT).

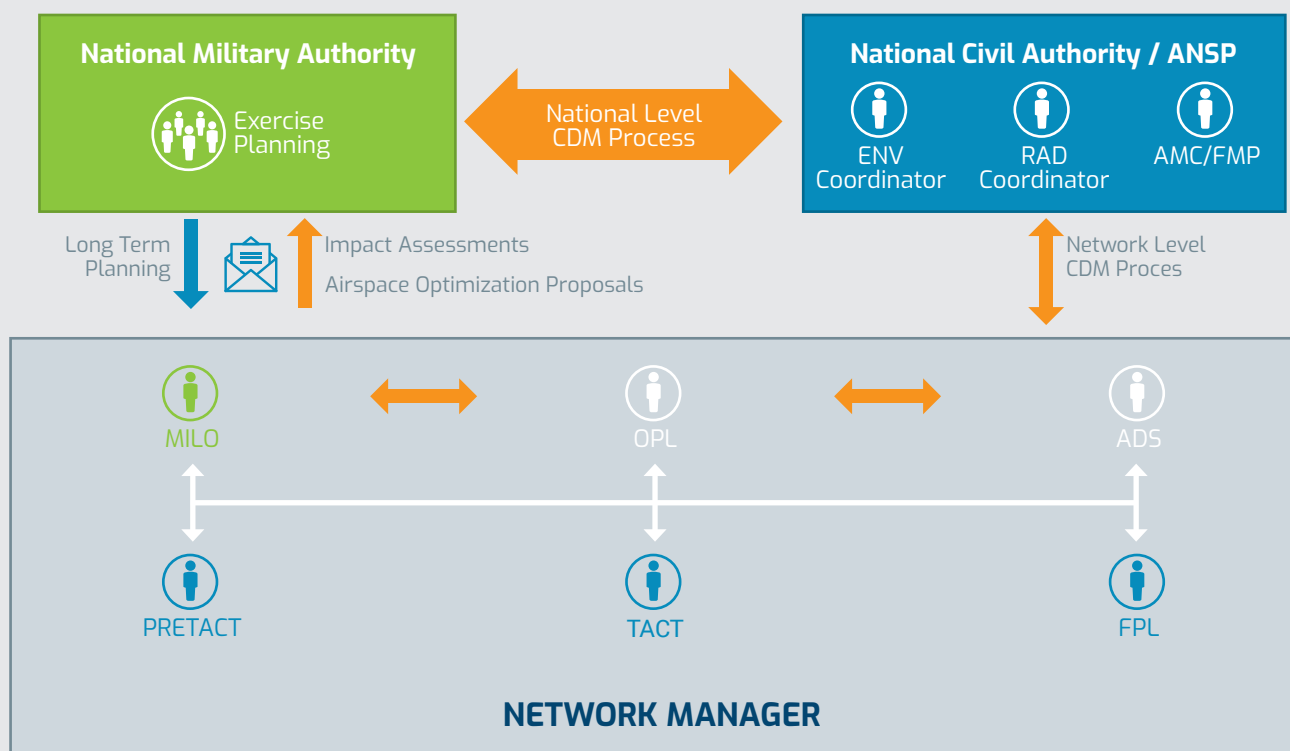
What does the MILO do for civil users?

- Creates opportunities for increasing flight efficiency by supporting the optimisation processes.
- Responds to any query about military aviation activities.
- Publication of military activity information on the Network Operations Portal (NOP) about upcoming military activities.
- Act as a trust point of contact for civil users regarding military activities impacting normal operations.
- Strengthens mutual understanding between military planners and civil ATM service providers

How can the States contribute to the MILO tasks?

- Close levels of cooperation from national entities are essential in achieving the best overall outcome for military and civil network users.
- If States and their military authorities commit to a Collaborative Decision-Making process, it would help the MILO to arrange balanced solutions.
- Sharing military mission and exercise information that might affect civil airspace.
- Support the FUA concept in order to maximize airspace availability for civil users when military needs allow.

MILO ROLE IN STRATEGIC PLANNING PHASE



- ENV/RAD coordinator - designated focal points regarding Aeronautical Information and Route Availability publications
- AC/FMP - designated focal points regarding Airspace Management and Flow management
- OPL - NM Operational Planning Unit
- ADS - NM Airspace Data Section
- PRETACT - NM Pre - tactical ATFCM Planning Team
- TACT - NM Tactical ATFCM Team
- FPL - NM Flight Planning Unit

ANNEX 5:

FUA TOOLKIT

FLEXIBLE USE OF AIRSPACE

EUROCONTROL's civil-military Cooperation Division has supported the implementation of Airspace Management Support Tools across Europe and thereby acquired a thorough understanding of the various FUA elements implemented in the different States. It was observed that personnel involved in the Airspace Management Process had acquired different levels of knowledge and understanding of the concept elements and their practical implementation.

One important aspect for the successful application of FUA is appropriate training of all involved civil and military actors. To support this training, the FUA Toolkit was developed by EUROCONTROL's Civil-Military Cooperation Division and is available for use by civil and military national authorities and stakeholders.

The Toolkit, available online, provides a set of presentations, documents and other media that can serve either directly as raw material for training or as a basis for the development of local training based on national requirements. All presentations include comprehensive notes to aid the presenter and to allow for self-study.

FUA toolkit content

The FUA Toolkit consists of different Toolboxes, each of which provides the user with guidance on a particular aspect:

- Informative material, such as our FUA concept briefs and instructional videos to raise awareness of the benefits of the concept.
- Guidance material via standards, modules and business-to-business services, deployment measurement and description of performance monitoring.
- Hands-on exercises used in courses at the EUROCONTROL Aviation Learning Centre.
- Access to explanations of the support systems, such as our local and sub-regional airspace management support system (LARA), our civil-military air traffic management coordination tool (CIMACT) and our pan-European repository of information supporting civil-military key performance indications (PRISMIL).

TOOLBOX 1 - Introduction to Flexible Use of Airspace

Introduction to FUA

TOOLBOX 2 - Flexible Use of Airspace in detail

Legislative Environment

The FUA Concept

ASM - Level 1

ASM - Level 2

ASM - Level 3

TOOLBOX 3 - Performance Monitoring

Performance

TOOLBOX4 - Support Systems

NM Systems

Interoperability

Local Systems

LARA

CIMACT

PRISMIL

TOOLBOX 5 - Reference Material

FUA Exercises

Specifications

Regulation



SUPPORTING
EUROPEAN
AVIATION

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