



CIMACT

Civil Military ATM Coordination Tool

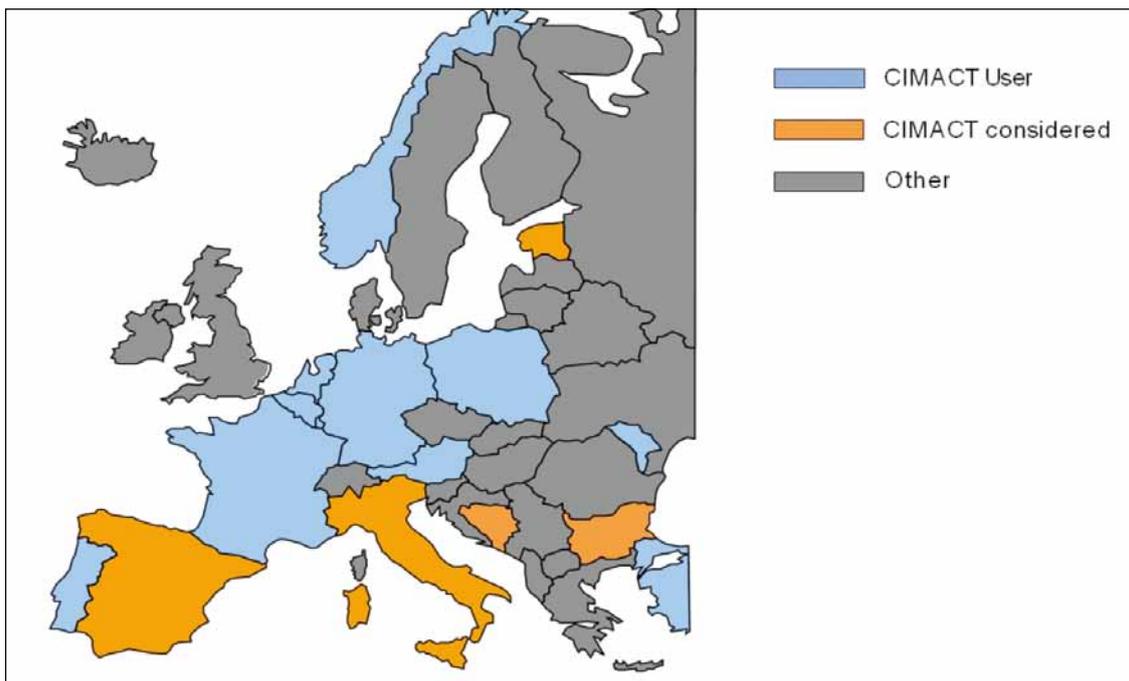
CIVIL MILITARY ATM COORDINATION TOOL – CIMA CT

CIMA CT is a common European product, developed by EUROCONTROL. It provides an Air Traffic Control (ATC) picture on off-the-shelf PCs, displaying all common forms of surveillance, track and flight plan data, with the ATC tools, filters and safety nets found in modern Air Traffic Management (ATM) systems.

CIMA CT has been developed to improve situational awareness in civil and military control units and to facilitate the exchanges between civil and military systems, so increasing the safety and efficiency of air navigation.

Given its flexibility and cost-effectiveness, CIMA CT has evolved and is being used in several European countries and Functional Airspace Blocks (FAB) to serve a variety of operational purposes:

- Civil-Military ATM Coordination and Airspace Management;
- Aerodrome and Approach Control;
- Analysis and Recording;
- Fallback;
- ATM security.



CIMA CT Users in Europe

HERITAGE

In order to improve Civil-Military Coordination, the German Air Force - in cooperation with EUROCONTROL - developed a system called ADMAR (Abgesetzte Darstellung Maastricht Radardaten – “Remote Display of Maastricht Radar Data”).

This system was installed at Air Defence Centres in Germany; it was used to improve coordination between civil and military units when military areas were activated, so as to allow civil flights to safely transit these when possible.



In order to modernise this system and to offer its benefits to all EUROCONTROL's Member States, EUROCONTROL developed CIMENT as the successor to ADMAR.

The primary goal remained to enhance coordination for safer and more efficient operations for both military and civil air traffic. Due to its flexible nature, CIMENT has been adapted for additional use on request, mostly for Radar Approach Control Service at Military Aerodromes and for ATM Security.

CIVIL MILITARY ATM COORDINATION

According to the Flexible Use of Airspace Concept, any airspace segregation shall be based on real-time usage within a specific time period. In order to facilitate this, close cooperation between civil and military controlling units is paramount.

CIMACT provides a correlated ATM picture at military controller positions to improve situational awareness. The system displays flight and track details, including intentions, to enhance efficient controller-to-controller coordination.

CIMACT is used in these areas of Civil Military Coordination:

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

Flexible Use of Airspace

Temporary Restricted Areas (TRA) are established to allow military aircraft carry out training exercises. Pilots are supported during these exercises by ground-based Intercept Controllers, who provide them with information, instructions and assistance.

At the request of a civil air traffic control centre, General Air Traffic (GAT) may penetrate the TRAs. In order to coordinate these crossings, the Intercept Controllers are equipped with a CIMACT Working Position displaying the civil correlated air picture next to their tactical control system.

CIMACT allows them to quickly identify the civil flight and approve the transit, if possible. This reduces telephone coordination between military and civil controllers and so cuts down the workload on both sides.

Secondly, the military controller's situational awareness is greatly improved and this contributes to a safer and more efficient handling of flights. The increased possibility of penetrating an active TRA improves capacity, efficiency and fuel consumption and so contributes to the ATM system's overall performance.



Maastricht Upper Area Control Centre relies on efficient coordination with their military partners

Cross-Border Areas

The need for efficient military-military and civil-military coordination becomes very apparent in cross-border operations and when establishing Cross-Border Areas (CBA). Incompatible military controlling systems and diverging levels of civil-military integration present a challenge to data exchange in civil-military coordination.

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

A CIMACT subsystem, GAFPLAN, is used to collect flight plans in different formats from various air traffic control centres which it can then translate, merge and relay 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. This pre-processed data is used by Military Air Defence Systems as well.

This functionality is being extended to support additional cross-border operations in Functional Airspace Blocks in Europe.

Cross-Border Civil-Military Coordination via CIMACT has already been used operationally for several years by the Maastricht Upper Area Control Centre (MUAC) and the French Air Force. The CIMACT system was installed to enhance civil-military coordination between MUAC and three Air Defence Centres belonging to the French Air Force to coordinate activities in the CBA1, located between France and Maastricht's Area of Responsibility.

The CIMACT systems in France receive data from the Maastricht Data Processing System (MADAP) to display the position, identification and intentions (flight plans) of General Air Traffic (GAT) controlled by MUAC. Short-Term Conflict Alerts (STCA) involving civil and military traffic are relayed and displayed to form an additional safety barrier.

Surveillance and Identification

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

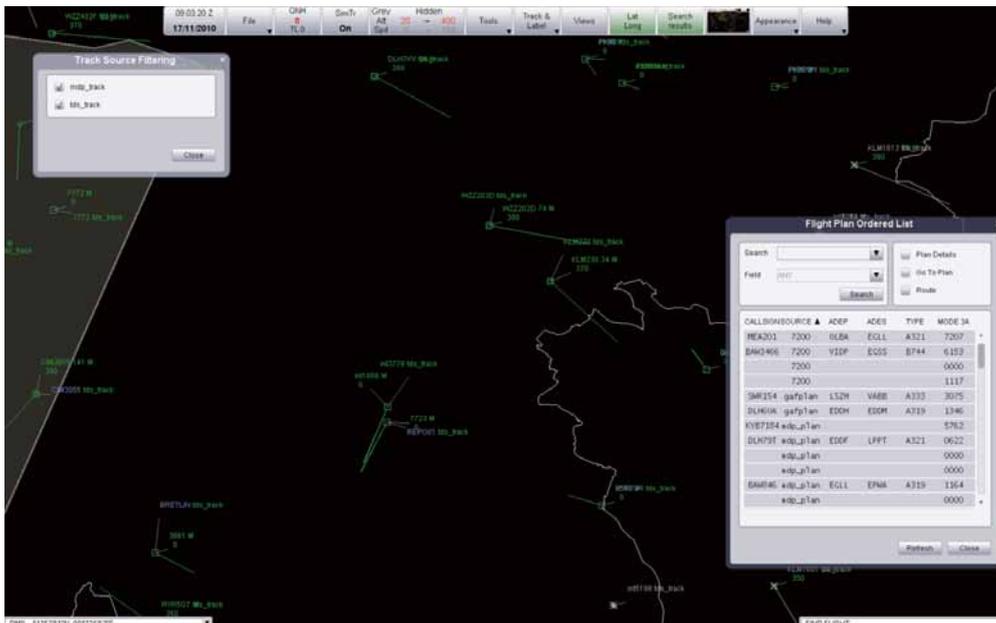
Multiple controllers monitor the airspace and identify every aircraft entering into their country. This is done by assessing the available flight plan information and coordinating with those civil ATC Units responsible for that particular portion of airspace.

CIMACT provides these units with a consistent air picture, containing detailed information for all correlated flights. Before CIMACT, information about these flight details had to be requested manually from each ATC Unit handling these flights, resulting in a dramatic increase of workload for all parties. As the CIMACT data is based on common standards, the 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 high altitudes in the vicinity of en-route traffic, other military exercises are executed at low altitudes. Here, the potential conflicts stem 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, CIMACT is used to provide flights with Radar Assisted Flight Information Service (RAFIS).

These exercise areas are often declared as RAFIS Mandatory Areas and crossing VFR traffic is required to contact the RAFIS Controller prior to entry. This contact is maintained until the aircraft leave the area. These flights are identified and monitored on CIMACT, and provided with information.



The CIMACT Human Machine Interface (HMI) displaying Track and Flight Plan 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

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

Air Traffic Control

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

The Radar Approach Control Unit is responsible for enabling the 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

Close coordination with the respective ACCs, adjacent aerodromes and the local Aerodrome Control Tower is of utmost importance to Radar Approach Control. Manual coordination and transfer of aircraft impose a high workload on the controller team. To support this task CIMACT provides coordinating controllers with a separate CIMACT Working Position allowing them to access detailed flight plan and track information as well as follow the proceedings in the area of focus.

Should an additional working position be made available at the Tower, this coordination is further enhanced and simplified. CIMACT offers the functionality to “Assume” traffic and allow for the automated transfer of traffic in the CIMACT network.

Area Proximity Warning (APW) and Minimum Safe Altitude Warning (MSAW) are currently under development in order to improve safety levels still further.

CIMACT as Fallback Display System

Air defence units use their own tactical air situation displays for controlling operational exercise traffic. Should this main system suffer outages, CIMACT can be used as a fallback display in order to maintain flight safety and fulfil high priority tasks.

CIMACT itself offers two types of fallback facilities:

- Should the data reception be affected due to network problems or should the central server stop working or shut down, CIMACT will inform the controller by displaying a “data transmission disrupted” warning on the display. It 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 usually equipped with two independent CIMACT Servers configured in a “Hot Standby” mode, which will automatically switch to the back-up server in case of failure.

ATM Security

CIMACT is the Information Exchange System (IES) of the NATO-Russian Council Cooperative Airspace Initiative (CAI) and so functions as an operational ATM Security System.

The CAI started in 2003 and there are at present three NATO nations exchanging ATM data with the Russian Federation, using CIMACT as a display and data exchange system.

Two coordination centres, one in Warsaw and one in Moscow, facilitate efficient coordination during ATM Security incidents. Another system in Anchorage, Alaska has been planned as an extension to the CAI system; it will connect to the CIMACT systems used in Warsaw.

The exchange of information between CIMACT, the Russian SINTEZ system and the FAA system will form an airspace security network, giving early warning of suspicious air activities through commonly agreed procedures. In situations where an aircraft behaves erratically, this system offers increased information sharing and communication to ensure a rapid, joint response to terrorist threats.



The capabilities of CIMACT in the ATM Security domain are widely recognised and serve as a baseline for an Airspace Security Incident Management System (ASSIM) in Europe.

CIMACT is being used by NATO and the German Air Force for high-profile events like Football Championships, Olympic Games and suchlike for increased situational awareness and coordination.

Human Machine Interface

The CIMA CT Human Machine Interface provides the controller with a means for quickly identifying and following flights of interest. CIMA CT displays various types of flights in a range of different colours and symbols which enable the operator to quickly acquire an overview of the complete situation and to support him in accessing detailed information in a short space 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 with a range of data available on tracks, flight plans and the aeronautical environment. All tracks and flight plans in the system can be searched to find flights matching the desired criteria.

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

CIMA CT contains a full-featured Map-Drawing Tool for creating and maintaining aeronautical maps. In addition, it is possible to display a graphical map based on image tiles as a background to the Air Situation Display. OpenStreetMap is currently being used for this purpose.

The CIMA CT Pilot Working Position allows trainers to inject and operate simulated traffic on connected CIMA CT positions for exercises and training.

Training and Proficiency

After installing CIMA CT at a user site, EUROCONTROL provides hands-on instruction for operators and technical staff prior to operations. User Manuals are provided in hard- and soft-copy for reference.



CIMA CT System administrators are offered a three-day course at the Maastricht Upper Area Control Centre. This enables them to handle routine operations and begin first investigations in case of problems as well as support the CIMA CT Team in other maintenance activities.

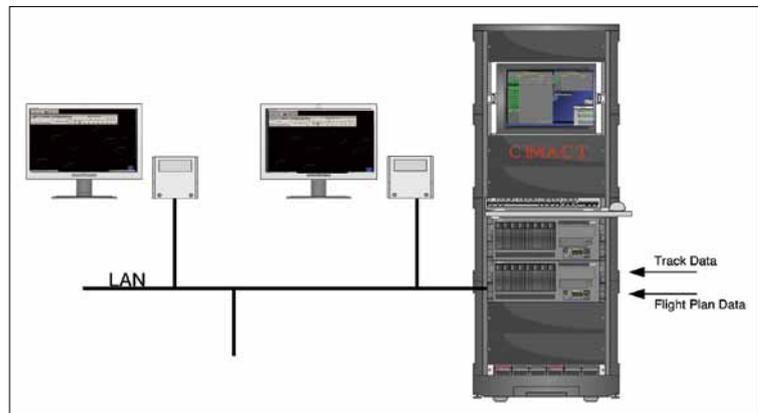
Each CIMA CT Site has a team of trained CIMA CT System Administrators responsible for operating the CIMA CT System. They are in a position to remedy initial problems and to arrange for additional support from the CIMA CT Team at Maastricht, if required.

CIMA CT Administrator Training at the Maastricht Upper Area Control Centre

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

Technical Aspects

A typical CIMA CT Suite consists of a Central CIMA CT Server and a number of connected CIMA CT Working Positions. The server manages the networking and processing of incoming data: track information is correlated to flight plan information and a seamless air situation picture is 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.



All hardware is “commercial off the shelf”. The detailed hardware requirements are available on request.

Data Provision

The CIMA CT System is 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 data received is used to generate the CIMA CT Air Situation Picture, enabling the operator to access detailed information about surveillance and flight plan data; to filter, search and highlight traffic and environmental data as required.

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 several months or over 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 together with the CIMA CT System (e.g. ARTAS). This tracker is then provided with various sensors to form the track picture.

Normally, the ACC will forward surveillance data in real-time to the CIMA CT Server. This data is taken directly from the ACC’s processing system and is identical to the data used in the ATM System.

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

Rad ar and Flightplan Data formats supported by CIMA CT

ASTERIX Categories

000; 001; 002; 003; 004; 008; 009; 021; 030; 034; 048;
062, 065; 142; 149; 150; 152; 252

P1/ATCAS ADEXP messages: BFD; CFD; TFD

VAFORIT ADEXP messages: ADMFPL; ADMFPU; ADMFPT

ICAO messages: ACP; AR; CNL; CHG; DEP; DLA; EST; FPL

NMEA messages: GPRMC

AFTN messages: FF

SELEX-SI Track messages

and a number of ACC specific flight plan formats (Slovenia, Portugal, Poland).

CIMACT will accept most common surveillance data formats and has the capability to interface with any other kind of surveillance data, given the appropriate Interface Control Documents (ICD) and sample data, in order to develop a suitable interface.

CIMACT is capable of displaying two or more track pictures from independent sources on its air situation picture.

Flight plan data

The CIMACT Server is capable of receiving flight plans in various formats and from various sources, converting these into standardised formats and merging all into one consistent flight plan repository.

The quantity and quality of data is dependent on the ACC's data output. CIMACT is able to process the initial flight plan, flight plan activation and deactivation as well as flight plan updates.

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

Programme Management

CIMACT is managed by EUROCONTROL's Civil-Military ATM Coordination Division. The development and maintenance of CIMACT is coordinated by the CIMACT Team based at EUROCONTROL's Maastricht Upper Area Control Centre (MUAC).

EUROCONTROL delivers the software, required interface adaptations, installation/configuration on site, training and helpdesk support.

Business trips and effort expended are charged on a cost-recovery basis. The software itself is provided to ECAC states without additional charge. Hardware (standard COTS) and required networks have to be obtained by the nation/user themselves; EUROCONTROL provides assistance and information for both.

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