FABEC Implementation Phase

FABEC Airspace Management

EC Information

Annex M

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

DOCUMENT SUMMARY

Objective : Provide evidence of FABEC Airspace Management	
Origin : OPS SC	**Audience :** FABEC Provisional Council, ANSCB, ASB, AFG, European Commission

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APPROVALS

Name:

Function: Chairman OPS SC

Date: 4/4/2012

Signature:

QUALITY CONTROL

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Date: 12/4/12

Signature:

ATTACHMENTS CONTAINED IN THIS ANNEX

ID	Origin	Status	Version	Date	Title
R.1	OPS SC				D7.1 Booking Principles and Priority Rules
R.2	OPS SC				D9 FABEC ATFCM/ASM Live Trial Closing Report

1 INTRODUCTION

The Single European Sky (SES) legislation is intended to have a major impact on performance through de-fragmentation; in particular it will foster airspace rationalization and restructuring, consolidation of facilities, and harmonization of systems and procedures. The 6 contracting FABEC States have committed to implement a common operational concept. As identified within the FABEC Feasibility Study a regional civil/military function for both air traffic flow management and airspace management, the ATFCM/ASM function, forms a central part of this operational concept. Further the harmonized application at FABEC level of all FUA elements is a key enabler for the efficient work of a regional ASM function.

The potential effects expected from a coordinated and centralized cooperation in the areas of ATFCM and ASM addressing the whole FABEC area, combined with implementation of best practices in operational service delivery should reduce the limiting effect of fragmentation and improve performance with regard to capacity and delay.

Within the feasibility study the FABEC ATFCM/ASM function was identified as an early step to be taken. A further review at the start of the FABEC implementation phase also identified the need for harmonized Booking Principles and Priorities Rules as a relevant early step in the area of ASM.

As a consequence 2 initiatives were carried out to:

- develop and study procedures for a future FABEC ATFCM/ASM function and
- to develop common Booking Principles and Priorities Rules.

Future development and implementation of FABEC ATFCM and ASM functions as well as harmonized application of the FUA elements will build upon the results of these activities, which are provided in the Attachments to this Annex.

2 OPERATIONAL COOPERATION

2.1 Cooperation management

The FABEC operational domain activity is organized according to the general scheme of the FABEC implementation phase project organization.

- The Operational Standing Committee (OPS SC) has the responsibility of the operational domain and monitors the operational activities, encompassing also all other operational subjects, which are described in annexes N and U.
- The operational activities are carried out by Projects when addressing trial or implementation of operational improvements, e.g. the ATFCM/ASM Function or airspace design changes.
- The operational activities are carried out by Task Forces (TF) or Work Groups (WG) when addressing studies, organisational or administrational subjects, e.g. the ANSP arrangements with the Network Management Function.
- An Operational Working Office (OWO) is in charge of the preparation of OPS SC decisions.
- Projects, Task Forces and Work Groups addressing FABEC operational cooperation activities are reporting to OPS SC.

Trial projects, TF and WG activities are usually carried out by a team of expert representatives from all affected FABEC partners. They are limited in time and end with delivery of the defined results, either organisational or administrational documents or with study or trial reports. OPS SC then reviews and approves the deliverables and decides about next steps building on the documented results.
Implementation projects are also limited in time, but follow a process defined by milestones related to delivery of more and more detailed information to ensure continuous control over the projects. They may be carried out with sub-structures of local implementation projects operated by each individual affected FABEC ANSP.

2.2 Operational strategy

Throughout the FABEC implementation phase activities were carried out in the domains of ATFCM and ASM that had been identified as required initial or early steps within the FABEC feasibility Study. They are considered as respective stepping stones upon which the FABEC operational strategy can build. The complete FABEC operational strategy and its goals are documented in Annex N.

3 RESULTS OBTAINED SO FAR

Refer to the following attachments for a description of what has been achieved so far in terms of FABEC cooperation in the ATFCM and ASM domains:

- Attachment 1 – FABEC Booking Principles and Priority Rules
- Attachment 2 – FABEC ATFCM/ASM Live Trial Closing Report

FABEC Implementation Phase

Booking Principles and Priority Rules

EC Information

Attachment M.1

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

DOCUMENT SUMMARY

Objective :	Define FABEC Airspace Booking Principles and Priority Rules		
Origin :	FABEC ATFCM/ASM Task Force	Author :	Booking Principles and Priority Rules Workgroup (WGBP)

Title :	FABEC Airspace Booking Principles and CIV/MIL Priority Rules				
Version :	1.0	Date :	17/03/2011	Status :	Release
Version :	1.1	Date :	11/04/2012	Status :	Revised FMCG

Table of Contents

FOREWORD

The aim of the Booking Principles and Priority Rules document is to improve the flow of civil aviation while ensuring and improving the effectiveness of the military missions.
In order to comply with the new ATFCM/ASM TF mandate, the SC OPS, who tasked the WGBP, defined the following objectives at all levels of FUA:

- To develop harmonized booking principles that improve responsiveness to traffic flows, airspace users and service provider's needs
- To facilitate decision making in the event the CDM process breaks down
- To develop generic priority rules that facilitate the decision-making process
- To enhance situational awareness of concerned ATFCM/ASM partners through improved CIV/MIL information exchanges.

Due to the nature of the airspace design and local aspects, there may be different needs for rules per area in the FABEC. Therefore the document is divided into 6 sections as follows:

- **Introduction** – provides background information, purpose and scope of the document.
- **Planning Concepts and Process** – describes the planning process and provides general planning guidance to ensure actions taken are in line with the FABEC regional framework.
- **Annex Preparation** – provides guidance to airspace planners for the preparation of the Annexes.
- **Airspace Request and Booking** – this section describes the procedures used to request and book airspace in the Strategic, Pre-Tactical and Tactical Phases.
- **System Support** – this section provides information on the various tools used by civil and military units to exchange information.
- **Annex template**

and complemented by Annexes describing the rules of engagement per Manageable Area.

ABBREVIATIONS

- AA	- Approved Agencies
- ACC	- Area Control Center
- AMC	- Airspace Management Cell
- AMS	- AMC Manageable Structure
- ASM	- Airspace Management
- ATC	- Air Traffic Control
- ATFM	- Air Traffic Flow Management
- ATFCM	- Air Traffic Flow and Capacity Management
- ATM	- Air Traffic Management
- ATS	- Air Traffic Services
- AUP	- Airspace Use Plan
- CADF	- Centralized Airspace Data Function
- CBA	- Cross-border Area
- CDM	- Collaborative Decision Making
- CDR	- Conditional Route
- CFMU	- Central Flow Management Unit
- CHMI	- CFMU Human Machine Interface
- CIAM	- CFMU Interface for Airspace Managers
- CIV	- Civil
- DSNA	- Direction des Services de Navigation Aérienne
- EAUP	- European Airspace use Plan
- EUUP	- European Update Airspace Use Plan
- EATM	- European Air Traffic Management
- FAB	- Functional Airspace Block
- FABEC	- Functional Airspace Block Europe Central
- FMP	- Flow Management Position
- FUA	- Flexible Use of Airspace
- GAT	- General Air Traffic
- LCL	- Local Time
- MIL	- Military
- MV	- Monitoring Value
- NOP	- Network Operations Plan
- OAT	- Operational Air Traffic
- RCA	- Reduced Coordination Area
- TLS	- Traffic Light Color Scheme
- TRA	- Temporary Reserved Area
- TSA	- Temporary Segregated Area
- TFV	- Traffic Volume
- UUP	- Updated Airspace Use Plan
- WGBP	- Workgroup Booking Principles and Priority Rules

Definitions

ACC Capacity – number of sectors available (depending on staffing availability, equipment availability, rules for sector manning) to handle flights.

Approved Agencies – units which are authorized by a State to deal with an Airspace Management Cell for airspace allocation and utilization matters.

ACC Sector Capacity – number of flights per hour that can enter the ACC sector without impeding safety by causing excessive workload for the controllers. The ACC sector capacity could be the nominal or differentiated as defined below.

ACC Nominal Capacity - number of aircraft ATC is able to handle, entering a volume where no military areas are interfering, during a defined interval (usually an hour but could be as well 20 min or 1 min).
Note. Military area interference depends on airspace design. Not the same in every FABEC country.

ACC Differentiated Capacity - Differentiated Capacity - number of aircraft ATC is able to handle, entering a volume where military areas are interfering, during a defined interval (usually an hour but could be as well 20 min or 1 min)
Note. Military area interference depends on airspace design. Not the same in every FABEC country.

Annex – an attachment to this document that describes the rules of engagement for a particular manageable area which is established by means of negotiation, based on the standard demand for airspace and agreed by Level 1.

Sector configuration - Selection of opened sectors which is foreseen to handle the traffic on the day of operation. The sector configuration is sent to CFMU by ATFCM Units during the Pre-Tactical Phase and is updated during the Tactical Phase. During Pre-Tactical and Tactical Phases, the sector configuration depends on staffing availability, equipment availability, rules for sector manning and flows of traffic.

GAT constraint – a constraining situation for GAT either caused by traffic demand exceeding the declared nominal sector capacity or caused by complexity factors.

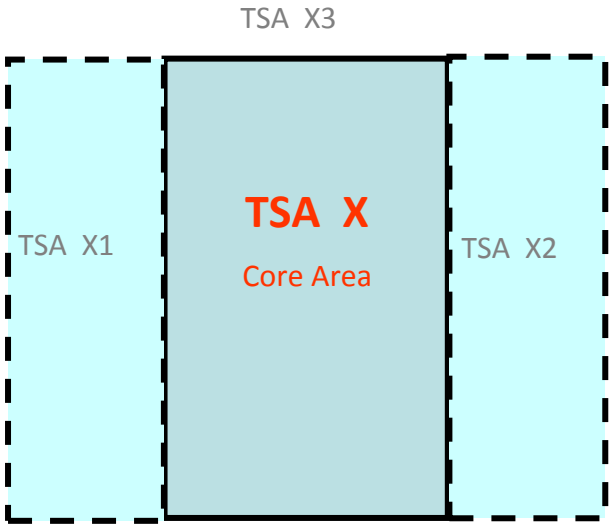
Complexity Factors - for a given traffic load, parameters influencing work load such as:

- Coordination process (number of coordination partners)
- interaction of traffic flows
- slow aircraft in high level and fast aircraft in low levels
- network design complexity
- airspace availability
- climbing or descending aircraft
- weather
- technical shortcomings

Elementary Sector – Elementary sectors are sectors which, by definition, cannot be divided into smaller sub-sectors.

Flow Capacity - Number of aircraft composing a flow during a defined interval (usually an hour but could be as well 20 min or 1 min) ATC is able to handle.
Monitoring Value (MV) - a value at which the load is monitored and is the point at which ATFCM action is required (CFMU Handbook).

Military Core Area - volume of airspace guaranteed for military use during military operating hours within a particular area.



Rate - value, required as input to slot allocation (CFMU Handbook).

Traffic Volume (TFV) - (ATFCM operating procedures for ATFCM Unit / Supplement to CFMU Handbook)
A Traffic Volume (TFV) is an element of ETFMS/Predict allowing the selection of a specific volume of air traffic, in order to compare the Traffic Load and the declared monitoring values during the activation period.
A Traffic Volume is a tool used by the CFMU and the ATFCM Units for:

- Monitoring.
- Applying ATFCM Measures.

Slot – agreed period of time during which GAT airspace request may have priority.

1 Introduction

1.1 Background

In view of the new organizational structure in the core area of Europe, the FABEC ATFCM/ASM Task Force mandated the development and harmonization of airspace booking procedures and generic priority rules in order to improve civil/military coordination and optimize the use of airspace through Strategic, Pre-Tactical and Tactical management of predetermined airspace structures. The need for new guidance arose with the creation of FABEC and as a result of the differing methods used by the participating States to book airspace and resolve airspace conflicts. Although the Eurocontrol ASM Handbook provides guidance to airspace management units for the booking of airspace, it does not provide guidance on how airspace priority rules should be applied, nor the required level of granularity that is necessary in the current working environment. This document focuses exclusively on CIV/MIL coordination and includes procedures and priority rules that are relevant to the ATFCM/ASM Strategic, Pre-Tactical and Tactical Phases respectively.

1.2 Purpose

The purpose of this document is to provide guidance to ATFCM/ASM units comprising the FABEC region in order to improve the flow of civil traffic while maintaining military mission effectiveness. The processes defined in this document should ensure a FABEC-wide standardization of airspace booking procedures and application of priority rules in each of the manageable areas or part of the FIR/UR. This document is intended for airspace planners and ATFCM/ASM operators responsible for preparing the Annexes for military areas and applying the guidance described herein.

1.3 Scope

The FABEC Booking Procedures and Priority Rules document describes basic principles, timeframes and working arrangements for the use of airspace. It complements the Eurocontrol ASM Handbook as it relates to the flexible use of airspace concept, providing guidance material in the form of processes and best practices in order to assist States in the application of the FUA concept throughout the FABEC region.

1.4 Relationship with Other Documents and Programs

The concept is based on the FUA concept. Therefore the following documents form the basis for this document and work procedures:

- ASM Handbook, ASM.ET1.ST08.5000-HBK-03-00
- ATFCM OPERATING procedures for flow management position, Edition N°: 4.1 with effect from01 JULY 2010
- AMC/CADF Operations Manual Edition N°: 3.0

Wording Convention:
To classify the strength of the requirements laid down in this document, the following conventions are used:

- The word “shall” denotes a mandatory requirement.
- The word “should” denotes a preferred requirement.
- The word “may” denotes an optional requirement.
- The word “will” denotes a statement of intent by any partner to implement a requirement.

2 Planning Concepts and Process

All of the actions to be taken need to be inline within the FABEC regional framework, insofar as they concern the networks of aviation routes and the “flexible use of airspace concept”, approved by all the participating States. The effective application of this collaborative, flexible management concept of the entire FABEC airspace according to the three ATFCM/ASM Levels of coordination should enable the optimization of its use in order to significantly improve the flow of civil traffic and the meeting of military needs.
In consideration of the fact that the three ATFCM/ASM Levels of coordination are mutually inseparable and complementary, the workgroup responsible for the development of this document has considered the implementation of booking principles and priority at the three ASM and ATFCM Levels. These Levels are described in the chapters below.

2.1 ASM – FUA Concepts & ASM Levels

The basis for the FUA Concept is that airspace should no longer be designated as either military or civil airspace but should be considered as one continuum and used flexibly on a day-to-day basis. Consequently, any necessary airspace segregation should be only of a temporary nature.
One of the major objectives of EATM is the more efficient use of airspace by civil and military users through the implementation of the FUA Concept. Airspace Management Cells (AMCs) will ensure that there is a more effective sharing of airspace through joint civil/military Strategic planning and Pre-Tactical airspace allocation.
The FUA Concept has increased the flexibility of airspace use and has provided ATM with the potential to increase the capacity of the air traffic system. The FUA Concept allows the maximum joint use of airspace by appropriate civil/military co-ordination to achieve the required OAT/GAT separation. The application of the FUA Concept also ensures, through the daily allocation of flexible airspace structures, that any necessary segregation of airspace is based on real usage within a specific time period.

The FUA Concept is based on three Levels of ASM which have been identified as:

Level 1 - Strategic ASM is the act of defining and reviewing, as required, the national airspace policy taking into account national and international airspace requirements.

Level 2 – Pre-Tactical ASM is the act of conducting operational management within the framework of pre-determined existing ATM structure and procedures defined in Level 1 and of reaching specific agreement between civil and military authorities involved.

Level 3 - Tactical ASM is the act, on the day of operation, of activating, de-activating or real-time reallocating of airspace allocated in Level 2 and of solving specific airspace problems and/or of individual OAT/GAT traffic situations in real-time between civil and military ATS units and/or controllers, as appropriate. This co-ordination can take place either in active or passive mode with or without action by the controller.

The three ASM Levels correspond with civil/military ATM co-ordination tasks. Each Level is related directly to, and impacts on, the others.

2.2 ATFM and ATFCM Concepts & Planning Phases

Air Traffic Flow Management (ATFM) is a service established with the objective of contributing to a safe, orderly and expeditious flow of air traffic by ensuring that air traffic control capacity is utilized to the maximum extent possible, and that the traffic volume is compatible with the capacities declared by the appropriate air traffic service authority.
Air Traffic Flow and Capacity Management (ATFCM) is an extension of ATFM that includes the optimization of traffic patterns and capacity management. The aim of ATFCM is to facilitate capacity/demand balancing and to enable flight punctuality and efficiency, based on available resources, with the emphasis on optimizing the network capacity through Collaborative Decision Making (CDM) and the application of the procedures contained in this document.

The ATCFM Concept is based on three phases which have been identified as:

The Strategic Phase – The Strategic Phase consists of the evaluation of demand and capacity, up to around one year and a half in advance of the day of operation. It will provide, at any specific time, the best picture of the planned traffic situation, in which collaboratively agreed solutions will seek to balance demand and capacity requirements. The output of this Phase is the Strategic Plan.

The Pre-Tactical Phase -This working process, which starts seven days before the day of operation, aims mainly at refining the details of the original forecast over time and at preparing and promulgating an optimized and detailed operational plan (ATFCM Daily Plan - ADP). It is supported by CDM activities involving all partners concerned (CFMU, ANSPs, AMCs, and AOs).

The Tactical Phase - The Tactical Phase consists of considering the real-time events and applying any refinements needed to the ATFCM Daily Plan in order to restore the ATFCM stability. The need to adapt the original plan may result from significant weather phenomena, unexpected ground or space infrastructure opportunities/limitations, more accurate FPL data, revised monitoring values, etc. The main purpose will be to minimize the impact of any disruptions and to take benefit of any opportunity (e.g. opening of a new sector, closure of military areas, etc.) This will rely on the provision of the traffic and capacity situation as accurate as possible to all partners.

2.3 Collaborative Decision Making

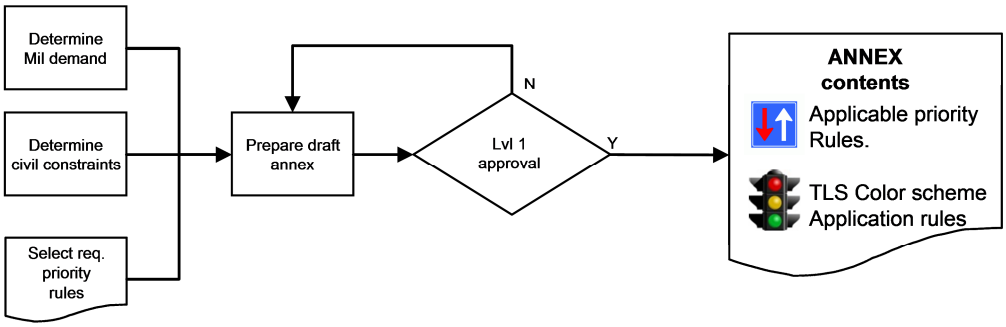
Collaborative decision making (CDM) aims at improving air traffic management through increased information exchange among the various parties in the FABEC region. CDM is a process that starts as soon as civil and military requests for airspace are known.
The AMCs carry out the process of comparing requirements and allocation of manageable airspace structures on the basis of the requirements expressed, the preceding information and, if necessary, involving the approved agencies concerned by following the procedures of negotiation and principles of priority defined hereafter.

2.4 Decision Levels

Within the ATFCM and ASM process different phases/levels on planning and on decision making are identified. The phases points to a place in time were a process starts, ends and is handed over to the next phase. The planning levels show the level of responsibility towards decision making.
The so-called Level 1 is the level of the highest authority dealing with ASM. Final decision on airspace design, priorities and approval of procedures is allocated to this body. It is acknowledged that prioritizing of airspace usage is a task of the Level 1 authorities. In practice the work is commonly delegated to working groups of experts. The final product is then presented to Level 1 for approval.
The tasks and responsibilities of Levels 2 and 3 are defined by the Level 1 body. The ASM tasks assigned to Level 2 extend until the day of operation, whereas Level 3 tasks are carried out on the day of operation. Operational responsibility for Level 3 tasks is assigned to the duty supervisor of the unit concerned.

2.5 Planning and Decision Making

To facilitate the optimal use of available airspace, a solid agreed basis for decision making and a well-structured process for assignment of airspace are required in all three planning phases. This chapter will generally describe this principle.
All the different needs for airspace can potentially be of a conflicting nature. To be able to de-conflict the needs and to determine who has the priority to use certain airspace, rules of engagement are required. The rules of engagement shall be established beforehand by means of negotiation between all stakeholders and will be based on the standard demand for airspace. The result of the negotiation shall be agreed by Level 1. Due to the nature of the airspace design and local aspects, there may be a different need for rules per area in the FABEC. Once agreed by Level 1, the rules of engagement will be published as an Annex to this document.



The figure above shows the process to prepare an Annex. In the end. the Annex will consist of a set of priority rules and if applicable an overview of agreed slots per day where civil use of airspace will have priority over military use due to civil constraints and the rules for application of the agreed slots – based on the nominal situation. A detailed description on how to prepare an Annex is described in Chapter 3.

2.6 Planning Process

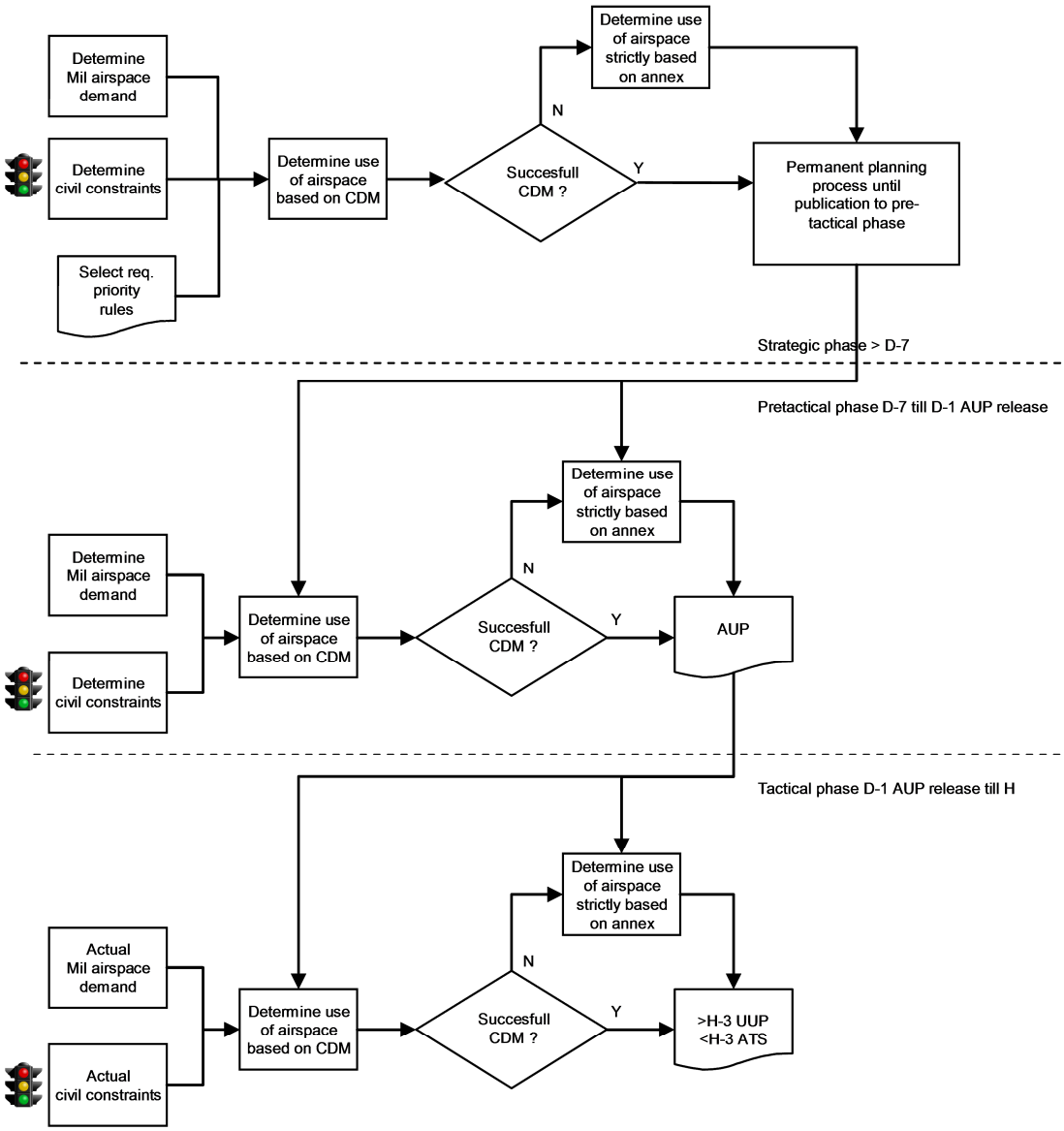
Once the Annex is agreed by Level 1, it will serve as an enabler for decision making during the planning process. The airspace planning process is divided into 3 phases: Strategic, Pre-Tactical and Tactical.

The Strategic Phase is the period of at least one year until 7 days before the day of operation. However, as the Strategic Phase is applicable until D-7, changes may occur. Based on the known airspace demand, the nominal situation may be adjusted to meet the latest needs. The method to determine civil constraints is described in paragraph 3.5. Conflicting needs for airspace will be negotiated based on CDM. Whenever CDM does not lead to an acceptable result, the airspace assignment will be based on the applicable priority rules which are laid down in the Annex. In exceptional cases, escalation to Level 1 is still possible.

The output of the Strategic Phase will be the input for the Pre-Tactical Phase. The Pre-Tactical Phase covers the period from D-7 to D-1 until the AUP is released. The process used for airspace assignment is also used in the Pre-Tactical Phase.

The Tactical Phase starts after publication of AUP (final product of the Pre-Tactical Phase) and covers the day of operation. Civil constraints are also determined in the Tactical Phase by applying the same method used in the Strategic and Pre-Tactical Phases.

The figure below provides an overview of the process:


Determine Mil airspace demand
Determine civil constraints
Select req. priority rules
Determine use of airspace based on CDM
Succesfull CDM ?
N
Y
Determine use of airspace strictly based on annex
Permanent planning process until publication to pre-tactical phase
Strategic phase > D-7
Pretactical phase D-7 till D-1 AUP release
Determine Mil airspace demand
Determine civil constraints
Determine use of airspace based on CDM
Succesfull CDM ?
N
Y
Determine use of airspace strictly based on annex
AUP
Tactical phase D-1 AUP release till H
Actual Mil airspace demand
Actual civil constraints
Determine use of airspace based on CDM
Succesfull CDM ?
N
Y
Determine use of airspace strictly based on annex
>H-3 UUP <H-3 ATS

3 Annex Preparation

3.1 General

The Annex facilitates decision making on the use of the manageable airspace concerned at all FUA levels.

3.2 Airspace Structure

The basic airspace design as published in the AIP shall be the starting point. When during the Annex development process it is identified that an optimization is necessary, then a request for change has to be done via the proper channels. This approach to the definition of airspace provides a solid basis for facilitating the daily "standard" operations and adequate segregation.

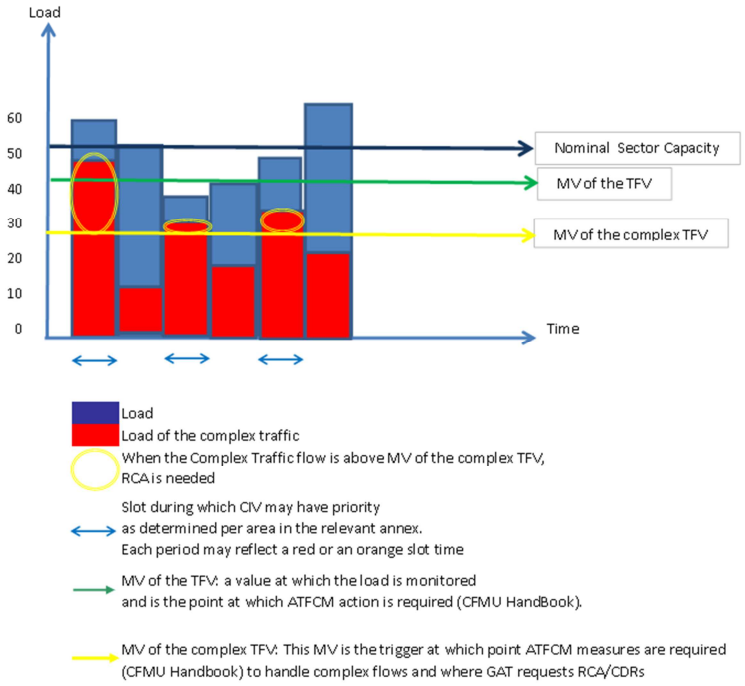
3.3 Determination of Civil Constraints (GAT)

The airspace request for GAT is based on the GAT constraint calculation. The methodology described in this document is used to determine the GAT constraints during the preparation of the Annexes and all planning phases and to determine when and where a specific portion of airspace—e.g., vectoring area, RCA and CDR—may be used for GAT.

3.4 Application of Slots

The application of time slots for each area shall be laid down in the relevant Annex of and shall be approved by the Level 1 body.

3.5 Identification of GAT Constraints



The following steps shall be carried out in order to prepare the Annex for each area before the Level 1 approval:

1. identify the relevant military training areas where GAT constraint calculation might be necessary (include dimensions, subdivisions, etc);
2. identify the relevant civil elementary sectors that might be impacted by the activation of the identified military training areas;

3. identify the traffic flows which contribute to the constraint in the sectors concerned;

4. build a Traffic Volume (TFV), if required, or use an existing TFV to count and monitor the demand and/or the complex flows impacted by the activation of military areas.

   Example 1: Traffic Volume X, with reference location A in which traffic entering a specific airspace (sector) is counted.
   Example 2: Traffic Volume Y, with reference location B in which traffic to/from one or more defined airports is counted.
   Example 3: Traffic Volume Z, with reference location C in which traffic overflying a specific waypoint is counted;

5. determine the Monitoring Value (MV) for the TFV concerned. This MV is the point at which ATFCM measures are required to handle constraining flows. The MV depends on steps and period of counting (e.g. per 20 min, per hour). The calculation method used to define the MV may differ by ANSPs.

6. count the traffic in the relevant TFV, based on the most accurate prediction data—i.e., without regulations and without military activity, as provided by CFMU or ANSPs—of the reference day and visualize per time interval—e.g. 20 minutes, 15 minutes or even per minute;

7. conduct in-depth analysis of the constraining flows in function of the TVF MV;

8. Determine the periods where the constraining flows could be alleviated by asking for priority for GAT. This result will be the input for negotiation with military partners.

3.6 Evaluation of Military Needs

To prepare the negotiation, the military needs will be based on:

- The defined manageable areas as published in the AIP
- The yearly military training and exercise program

These military needs are analyzed by relevant military experts in order to determine the restrictions acceptable to the military users (to enable alleviation for GAT constraints).

3.7 Comparison of OAT and GAT Needs and Translation to Annex

During the Annex development phase, the civil and military experts compare their respective needs and constraints and, through negotiation, develop an acceptable proposal by defining the Traffic Light Color Scheme (TLS) for the particular area. The TLS described in this document is an indication of the GAT constraint for a particular area, as follows:

Green no particular GAT constraint.
Orange GAT has constrains however GAT has no priority but may ask for priority based on CDM. If CDM fails. Priority remains to MIL.
Red GAT has constraints and will have priority during the slots defined in the relevant Annex of this document and agreed at Level 1.

The display of TLS is in accordance with the optimum strategy of the sector configuration. This means that a military activity shall not be constrained by a shortage of civil controllers.
The final draft of the Annex will be sent to Level 1 for endorsement. The approval by Level 1 concludes the Annex development phase.
The Annex contains:

- Description of the manageable area as per AIP
- Interfering civil sectors
- Interfering CDRs
- Specific constraining flows
- Civil Pre-Tactical priority according to the Traffic Light Scheme for area management.

- Selected CIV/MIL priority rules.

Once approved by Level 1, the Annexes shall be used by all ASM and ATFCM actors during all planning phases.

3.8 Priority Rules

3.8.1 General

The definition of priority rules is generic. Due to the general nature, the conventions may be adapted as required within the Annex. The application of these priority rules is optional and shall be evaluated by the relevant experts. Every relevant selected priority rule will be added per area within the Annex. For each manageable area, priority rules shall be reviewed when necessary to remain consistent with sector design modifications, changes in traffic flows, military training modification or any other parameter likely to impact airspace allocation balancing.

Many factors are important when introducing priority rules. The list is far from complete, but the following assumptions need to be considered:

- Civil users shall be accommodated within airspace primarily designed for civil use. Those airspaces are published in AIP or by NOTAM or AIP SUP. Military users (in relation to training) shall be accommodated within the airspace designed for military use. Those airspaces are published in AIP or by NOTAM or AIP SUP.
- Civil aviation operates 24 hours a day, 7 days a week. A shift in flight schedule would be, in principle, undesirable for efficiency reasons and network requirements of an airline and ANSP.
- Major Military exercises or special events that have a regional, national or international scope and that have already been agreed by relevant units cannot be shifted.
- The MIL units are tied to their "annual exercise program". A pilot or unit can only be deployed when the exercise program is completed satisfactorily. There is no possible compromise about the total exercise time needed per year.
- Availability of airspace or capacity on behalf of civil aviation does not depend on the demand only, but also on the potential contribution to flight efficiency and environmental standards (for emissions and noise).
- When possible and if justified, airspace partitions allow better sharing of the airspace.
- The rules and planning processes shall ensure an unambiguous and reliable allocation of airspace in order to allow safe handling of CIV flows and the safe, flexible use of segregated and temporarily reserved airspace.

3.8.2 Strategic Phase Rules

Rule S1 Military exercises.

- To be able to plan a complex military exercise, the dimension of the airspace necessary for the exercise is required. When planning major military exercises that may have an impact on the civil airspace user, periods of high demand for civil aviation should be shared and/or coordinated in advance with units concerned —e.g. planned NATO exercises need to be performed according to military requirements.
- Generally, exercises shall be planned within airspace specially designed for military purposes. For those exercises that cannot be accommodated within this airspace, airspace structures shall be created on a temporary basis subject to Level 1 decision and then published by NOTAM and/or AIP SUP.

Rule S2 Special events.

- Special events include all events, except military training. Military training is covered in rule S1. A special event is an event that will have effect on the standard airport,

approach and/or area control operations and military training. A special event shall be requested in accordance with the rules described in the AIP (for those countries were applicable).
- The request of airspace for special events shall be considered at Level 1 and be accompanied by a prioritization and may take into account GAT constraints when possible.
- Depending on special events needs, airspace structures shall be created on a temporary basis and managed according to Level 1 decision and then published by NOTAM and/or AIP SUP.

Rule S3 Escalation.

- If the application of the CDM process and the implementation of the decision rules do not lead to a solution, the matter will be escalated to Level 1. Level 1 shall make the final decision.

The Strategic Plan will be presented to Level 1 for approval. After the formal approval by Level 1, the long term booking of events, as special events or major exercises shall not be shifted or modified, except under extreme circumstances. This means that the AMC will prepare the Pre-Tactical plan based on these inputs as none negotiable airspace requests. The preferred strategic time period may be the IATA 6-month summer and winter schedule.

3.8.3 Pre-Tactical Phase Rules

Rule P1 Starting position.

- The Strategic Plan determines the starting position.
- All rules valid for the Strategic Phase are also fully applicable in this phase.

Rule P2 Airspace priorities where TLS is not applied

- Priority for airspace not linked to the TLS Method shall be defined.

Example 1 -outside MIL operating hours, priority is granted to GAT

Example 2 - during MIL opening hours, MIL shall have full priority

Rule P3 Non-allocated airspace.

- Non-allocated airspace or returned airspace reservation will be released by the AMCs for civil or military use.

Rule P4 Pre-Tactical deviations

If disturbances occur to unforeseen circumstances—e.g., meteorological conditions, technology, staffing issues (pandemic) etc.—which lead to the forecast allocation of airspace not being used, the AMC should propose an alternative based on CDM.

3.8.4 Tactical Phase Rules

Rule T1 Starting position.

- The AUP and the information published in the EAUP shall determine the use of airspace.

- The following rules valid for the Pre-Tactical Phase are also fully applicable in this phase: Rules P1, P3.

Rule T2 Permitted exceptions.

- Exceptions are permitted in accordance with national law and ICAO provisions—e.g., Security flights, Helicopter Emergency Medical Service (HEMS), SANEVAC and Police Department.

Rule T3 Ad hoc changes to military activity.

In the event that a military mission can not be executed due to unforeseen circumstances, as described in the Annex per area, the planners should find an acceptable alternative. In this case the following rules shall be applicable:

- What has been agreed (and ratified by Level 1) in the Strategic Phase on the allocation of airspace or routes can not be modified except under extreme circumstances.
- What has been negotiated via CDM and agreed in the Pre-Tactical Phase can not be modified, except in those special circumstances as mentioned in the Annex for each area.
- The following rules relate to potential changes due to ad hoc requests for which no ratification took place at Level 1. This means that changes to the agreements made within the Pre-Tactical Phase are subject to the following rules according to what has been described in the Annexes:
  - An airspace change request more than 3hrs before the execution of an OAT flight shall lead to priority for the OAT flight in those areas that are mainly designed for military use, provided the specific rules as described in the Annex for that area do not grant priority to GAT.
  - Where possible, additional commitments made in the Pre-Tactical Phase shall be taken into account.
  - A request for use of airspace designed for military use less than 3 hours before activation of the military area, may lead to GAT having priority on the planned ATS routes—including CDR 1, CDR 2 and vectoring areas in the airspace designed for military use—as agreed in the Pre-Tactical Phase. OAT may still be permitted to use the area coordinated taking GAT into account.

Rule T4 Coordinated Tactical deviations.

- ACC and military Supervisors may deviate from all previously established agreements by CDM.

Rule T5 Ad hoc Changes to Civil ATFCM Plan

- When it is clear that the civil ATFCM daily plan (including the airspace usage) cannot be executed due to unforeseen circumstances, the appropriate authority (e.g. AMC, Military authority, etc.) should endeavor to find solutions for alleviating capacity shortfalls by adapting, where possible, the planning for the airspace usage.

Rule T6 Release of airspace
Any reduction or cancellation of military utilisation of airspace shall be reported through the relevant MIL unit / MIL Supervisor as soon as possible to ACC supervisor.

4 Airspace Request & Booking

4.1 Phases of Airspace Booking Process

The process for requesting airspace is subdivided into 3 phases as described below.

4.1.1 Phase 1 (Strategic Phase)

Strategic booking: from the day of the event (D) minus 1 1/2 years until D–7. During this phase, military and civil requests for airspace and any other relevant information related to ATM constraints shall be made available to the ASM and/or ATFCM Units for coordination as soon as they are known. Specific announcement deadlines should be published locally.

Some examples of relevant information are listed as follows: (this list is not exhaustive)

- Major military exercises,
- Special events (CIV or MIL),
- Other events which could have an impact on ATC capacity (operational and or technical) or military demand (e.g. new equipment, additional aircraft, temporary aerodrome closure, etc).

These events shall not be shifted or modified once the Strategic plan has been approved by Level 1.

4.1.2 Phase 2 (Pre-Tactical Phase)

This phase covers the Pre-Tactical period from D-7 until AUP release on D-1, as follows:

- From D-7 until D–1 at 12:00LCL: MIL and CIV requests shall be made available to relevant ASM and ATFCM functions (not later than D-1 at 1200LCL)
- From D–1 at 12:00LCL until the time of AUP release: AMC manages CIV-MIL de-confliction first using CDM and, if CDM fails, by applying the procedures and priority rules laid down in the Annexes

Timelines may vary subject to coordination between the units concerned.

4.1.3 Phase 3 – (Tactical Phase)

The Tactical Phase is subdivided into two additional sub-phases:

- Phase 3-1 – Tactical planning Phase - from the time of AUP release until 3 hours before airspace activation (H-3).
  - Any reduction/cancellation of military activity will be reported to the responsible ASM entity for appropriate action.
  - Any supplementary request for manageable areas from airspace users shall be addressed to the responsible ASM entity through the relevant unit as soon as possible. If this would lead to a new activation, extension of area module and/or an extension of the period of activation, the responsible ASM entity shall coordinate with relevant ATC/ATFCM units, first using CDM and, if CDM fails, by applying specific Tactical priority rules as defined in the respective Annex for that area.
  - When GAT traffic demand is expected to be higher than the demand indicated in the Strategic and/or Pre-Tactical analysis, the ATC/ATFCM unit may request a reduction of military activity (in time or airspace). The responsible ASM entity shall then coordinate with relevant MIL unit first using CDM. If no agreement can be reached, apply specific Tactical priority rules as defined in the respective Annex for that area.
- Phase 3-2 - Execution Phase - from H-3 until the time of airspace activation.
  - New bookings are possible subject to CDM. If CDM fails, CIV or MIL may have priority depending on the Annex.
  - Any reduction or cancellation of military activity will be reported through the responsible MIL unit (e.g. CRC) as soon as possible to relevant ATC/ATFCM units who shall alleviate ATFCM measures in order to optimize routes, profiles and punctuality whenever possible.

4.2 Negotiation Procedures

4.2.1 TLS Color Scheme methodology

The TLS color scheme methodology should be used to determine and report the civil constraints during all phases. The ATFCM Unit shall complete the following steps:

1. count the traffic in the relevant TFV as defined in the Annex, based on the most accurate prediction data—i.e., without regulations and without military activity, as provided by CFMU or ANSPs—of the reference day and visualize per time interval—e.g. 20 minutes, 15 minutes or even per minute;

   Note: The reference day is generally the same day in the previous week or a relevant day in case of a special event.
2. Conduct in-depth analysis of the constraining flows in function of the TFV MV;
3. determine the periods where the constraining flows could be alleviated by asking for priority for GAT as agreed in the respective Annex. This result will be the input for negotiation with military partners.

After completing the steps above, the ATFCM function shall create a table containing the periods (slots) when RCAs or CDRs available to GAT would reduce the constraint of the flows concerned and increase the capacity. The table should contain information for each area, subdivision and/or CDR, and then be forwarded to the relevant AMC for further consideration and to form the basis for CDM. ASM/ATFCM Unit shall apply CDM procedures and in case of failure CDM process, the rules as described in the Annexes shall be applied.

DATE:

TSAXXX		TLS	TSAXXX Restrictions
08:00	08:15		TSAXXX B
08:15	08:30		
08:30	08:45		
08:45	09:00		
09:00	09:15		
09:15	09:30		
09:30	09:45		
09:45	10:00		
10:00	10:15		
10:15	10:30		
10:30	10:45		
10:45	11:00		TSAXXX C
11:00	11:15		
11:15	11:30		
11:30	11:45		
11:45	12:00		
12:00	12:15		
12:15	12:30		
12:30	12:45		
12:45	13:00		
13:00	13:15		on CDM: TSA XXX C
13:15	13:30		
13:30	13:45		
13:45	14:00		
14:00	14:15		
14:15	14:30		
14:30	14:45		TSAXXX B
14:45	15:00		
15:00	15:15		
15:15	15:30		
15:30	15:45		
15:45	16:00		
16:00	16:15		
16:15	16:30		
16:30	16:45		
16:45	17:00		

X slots/Total agreed

Night Flights			TSAXXX Restrictions
17:00	17:15		TSAXXX B
17:15	17:30		
17:30	17:45		
17:45	18:00		
18:00	18:15		
18:15	18:30		
18:30	18:45		
18:45	19:00		
19:00	19:15		
19:15	19:30		
19:30	19:45		
19:45	20:00		
20:00	20:15		
20:15	20:30		

X slots/Total agreed

Best regards: ATFCM Unit

4.2.2 Military Needs

Military airspace demand for the annual training and exercise plan is dependent on type of mission/operation, timed coordination with other forces, availability of other resources (e.g. bombing range), equipment, weather condition, distance to/from exercise area. Due to military security interests not all the information can be shared.
Closer to the day of operation more detailed planning information becomes available and will support the negotiation. Military airspace request shall be appropriate for the type of mission.

4.2.3 Negotiation

Flexible and collaborative management, based on the collaboration between the units concerned, should allow optimum use of airspace for the benefit of each activity, as well as the sharing of constraints, when necessary. The complete transparency of the activities of each unit should be ensured by information exchange and co-analysis of specific indicators.
Depending on the different degrees of constraint and potentially, the priority rules specified in the Annexes and the negotiation prior to the allocation of manageable structures through the promulgation of the AUP should permit the most penalizing situations to be avoided.
The following measures may be considered during the negotiation process:
For the military by:

- rescheduling of activities;
- adjustment of the volume booked, modifying lateral and or vertical limits;
- moving the activities to another area;
- in certain exceptional circumstances, the partial or total absence of military activities in all or part of the airspace.

For civil aviation by:

- staffing management;
- adaptation of sector capacities;
- optimization of sector configurations;
- implementation of ATFCM measures, such as
- re-routing scenarios
- level-capping single flights or flows
- CASA regulation.

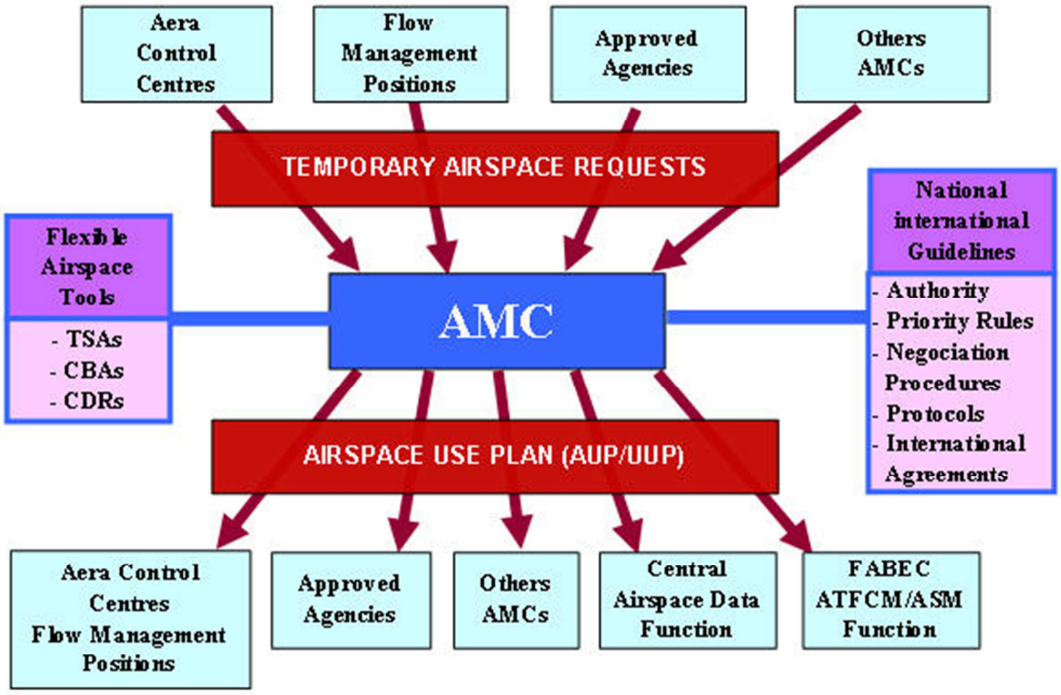
Note: this list is not exhaustive

4.3 Airspace Booking Process

All airspace requests shall be addressed to the relevant national authority/unit (e.g. AMC) as soon as possible and in accordance with national regulations. The national authority/unit shall be responsible for forwarding or coordinating the request with all parties concerned.

4.4 Airspace Allocation by AMCs

The airspace allocation procedures defined in this document including the Annexes shall be applied. These units shall conduct Pre-Tactical airspace allocation and management operations in a decisive, timely and efficient manner and resolve conflicting airspace requests and Level 2 problems.



4.5 Content of airspace requests

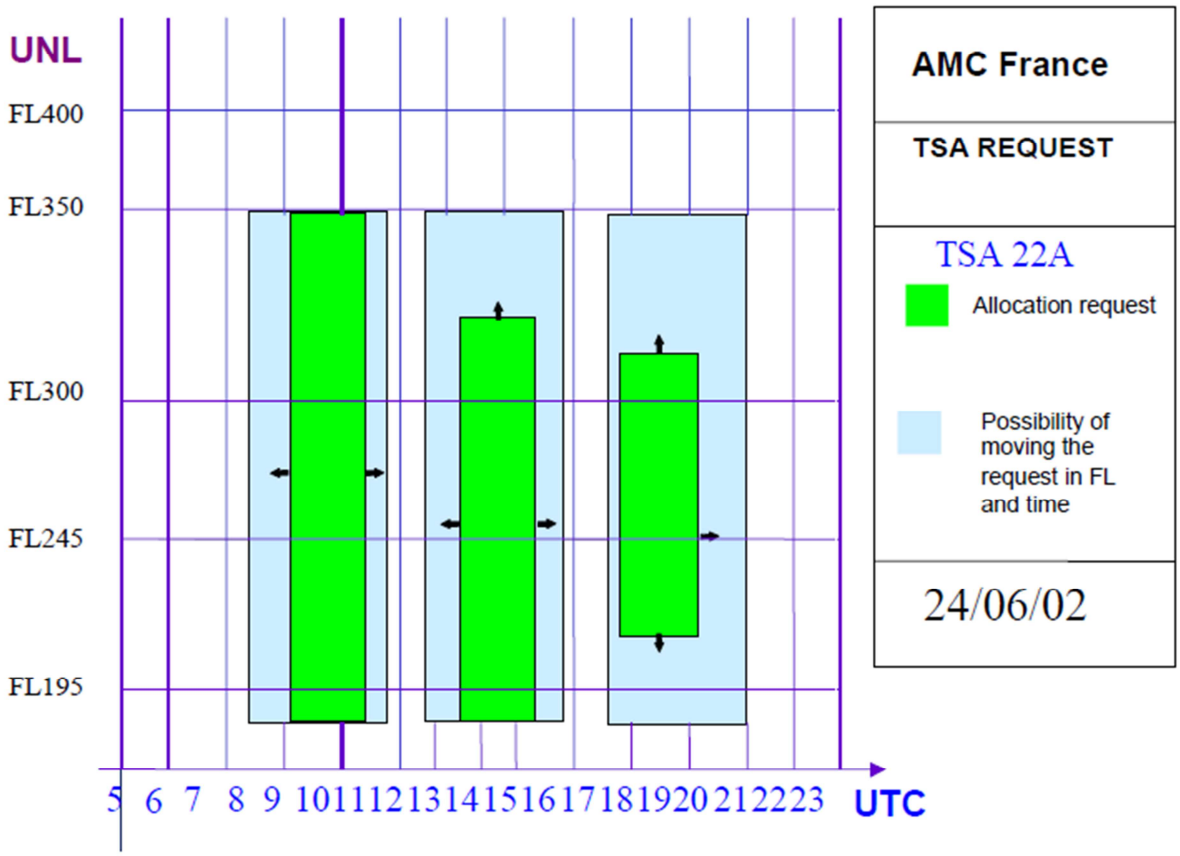
Requests for airspace booking shall include:

- name of requesting unit or organization
- area designation
- required volume of airspace
- flight level/altitude
- type of activity
- event time

The following items are optional:

- Dep/dest
- Controlling unit
- Contact phone and/or fax number and e-mail address
- Mission/event priority
- number and type of participating aircraft

TSA/TRA/CBA requests could be presented as a block of airspace required during a specified period of time with the possibility of moving the request in time and flight level. An example of such TSA/TRA/CBA requests is shown below.


UNL
FL400
FL350
FL300
FL245
FL195
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC
AMC France
TSA REQUEST
TSA 22A
Allocation request
Possibility of moving the request in FL and time
24/06/02

5 System support

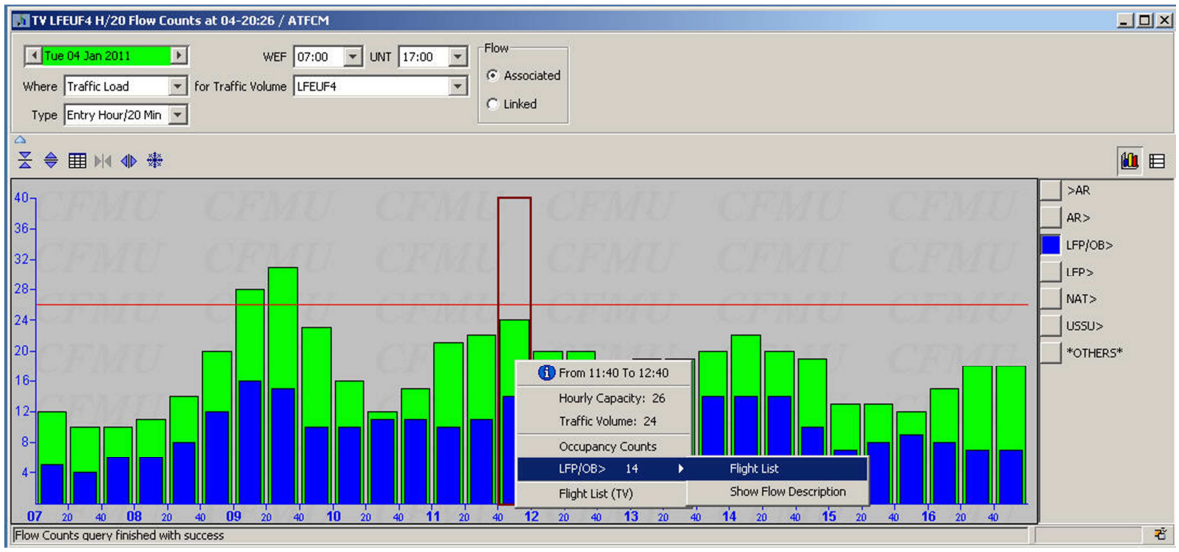
5.1 Information Exchange

It is recognized that the national processes and how the information related to airspace planning and status in all phases is handled varies among partners. In consideration of the existing situation in the FABEC area, the planning data and/or factual activation/deactivation of the airspace may be exchanged among the partners concerned by ASM (e.g. CIAM, LARA, STANLY, DIANE, NOP) and ATFCM tools (e.g. CHMI, NOP, etc.).
The decision on how airspace status is to be provided should be based on the principle of minimal changes—i.e., the process should be built up on existing national processes. The key implementation requirement is to ensure an adequate system support that enables airspace data exchange.
Authentication of the source of information is paramount in order to prevent corruption of the information.

During the tactical execution phase the activation and de-activation of airspace should be communicated as directly as possible to the end users.

5.2 TLS Color Scheme

To enable the TLS application system support may be required. Following systems are already available: SAAM, PREDICT, SIMEX, CHMI, NEVAC, etc.
Note: the method and system support required to build TFV can be found in the Eurocontrol document “ATFCM procedures for ATFCM Unit”.
The figure below shows an example of the CHMI:



6 ANNEX TEMPLATE

Annex 1 – TEMPLATE

1 Annex (n) : (Area XX)

1. Description:
   - Area XX design and its partitions as described in AIP.
   - Predefined possible partitioning
     Area XXa: (description)
     Area XXb: (description)

…….

2. Interfering sectors:

Within LF**-ACC, interfering sectors are: tbd Within ED**-ACC, interfering sectors are: tbd Within EH**-ACC, interfering sectors are: tbd Within ……..

3. Interfering CDRs:
   CDR 1: (list and description of CDR 1 interfering segments)
   CDR 2: (list and description of CDR 2 interfering segments)
   CDR 3: (list and description of CDR 3 interfering segments)

4. Specific constraining flows

(list of specific flows -traffic volumes TFV- Monitoring Value) which have to be considered for CDM process and determine GAT constraints) TFV1 = (define list of flows included) TFV2…. TFV3….

5. Civil Pre-Tactical priority according to the Traffic Light Scheme for area management (describe priority rules agreed for Area XX management, complying with general principles stated before) If TFV1 > x acft, restricted military activity with allocation of area XXa.

If TFV2 > y acft, restricted military activity with allocation of area XXb. ……. If TFV1 > x and TFV2 > y, restricted military activity with allocation of area XXc …….. Area XX will be restricted to XXa no more than x hours per day (possibly splitted) A minimum duration will be defined between two restrictions

6. Selected CIV/MIL priority rules

7. Remark

e.g. Lead AMC

Annex 1 – TSA200 (example)

1. Description:

Area TSA200 design and its configurations as described in AIP FRANCE ENR 5.2
4 Predefined configurations:

- Area TSA200A
- Area TSA200W
- Area TSA200E
- Area TSA200C

1.1 Area TSA200A

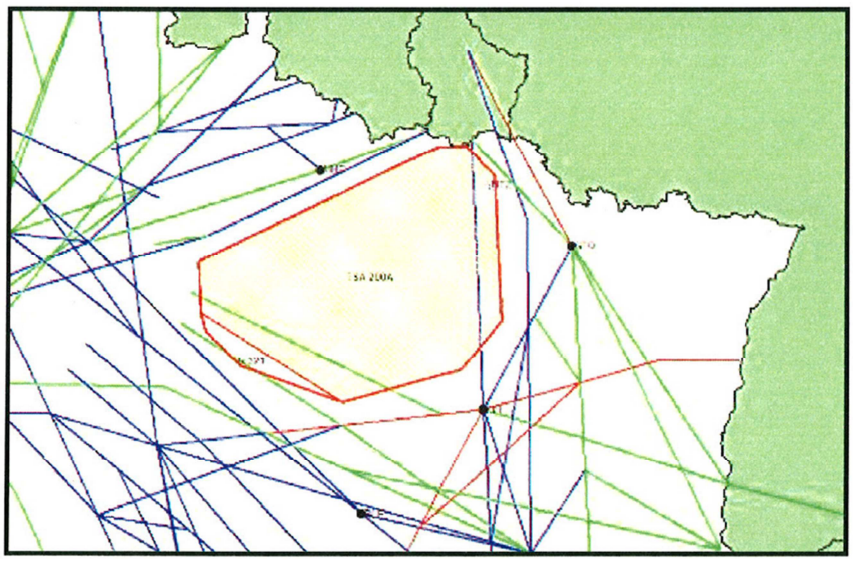
TSA200A is relevant for missions 70NM x 50Nm.

1.1.1 Lateral limits

TSA 200A
49° 27' 06"N, 005° 54' 23"E – 49° 26' 47"N, 006° 04' 46"E
49° 18' 38"N, 006° 15' 00"E – 48° 41' 26"N, 006° 13' 30"E
48° 29' 44"N, 005° 56' 32"E – 48° 23' 22"N, 005° 10' 09"E
48° 48' 34"N, 004° 17' 17"E – 49° 01' 44"N, 004° 17' 17"E
49° 25' 52"N, 005° 48' 40"E – 49° 27' 06"N, 005° 54' 23"E.

1.1.2 Vertical limits
FL195/UNL

TSA 200A



1.2 TSA200W and TSA200E

TSA200W and TSA200E are relevant for missions 50NM x 40Nm.

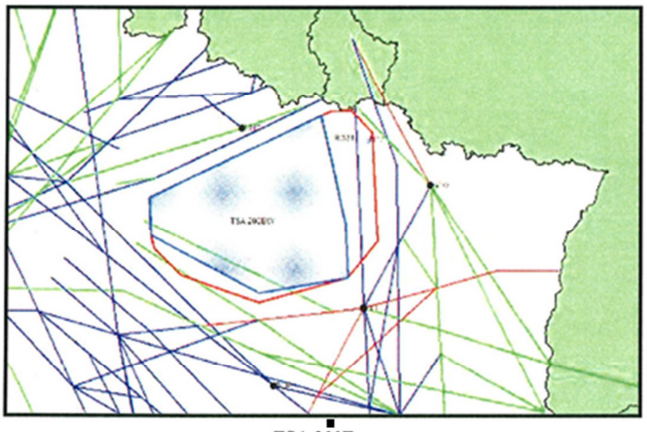
The choice for using TSA200W or TSA200E depends on agreed slots (see ANNEX 1 chapter 5 below).
1.1.1 Lateral limits

TSA 200W
49° 25' 52"N, 005° 48' 40"E – 48° 48' 20"N, 005° 57' 27"E 48° 29' 44"N, 005° 56' 32"E – 48° 26' 46"N, 005° 10' 42"E 48° 48' 34"N, 004° 17' 17"E – 49° 01' 44"N, 004° 17' 17"E 49° 25' 52"N, 005° 48' 40"E.

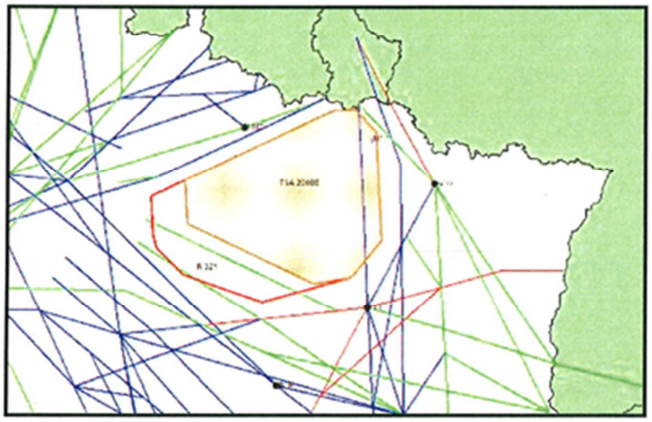
TSA 200E
49° 27' 06"N, 005° 54' 23"E – 49° 26' 47"N, 006° 04' 46"E 49° 18' 38"N, 006° 15' 00"E – 48° 41' 26"N, 006° 13' 30"E 48° 29' 44"N, 005° 56' 32"E – 48° 28' 32"N, 005° 36' 58"E 48° 51' 41"N, 004° 35' 15"E – 49° 06' 29"N, 004° 35' 15"E 49° 25' 52"N, 005° 48' 40"E – 49° 27' 06"N, 005° 54' 23"E.

1.2.2 Vertical limits
FL195/UNL

TSA 200W



TSA 200E



1.3.TSA200C

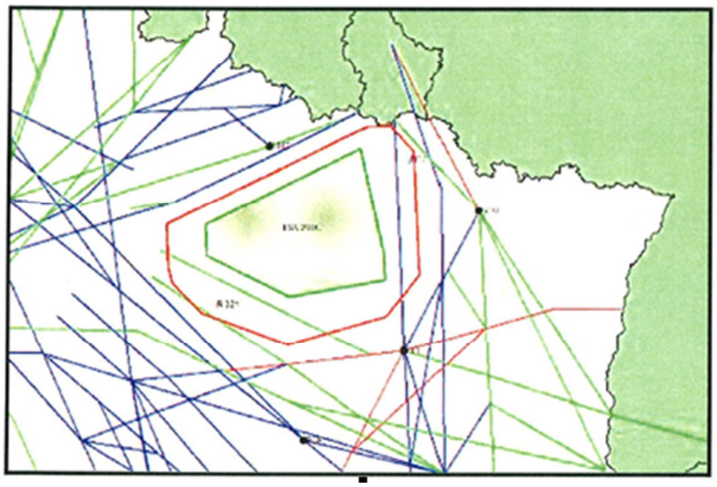
TSA200C is relevant for missions 30NM x 30Nm.

1.3.1 Lateral limits

TSA 200C
49° 20' 52"N, 005° 49' 50"E – 48° 48' 20"N, 005° 57' 27"E 48° 40' 47"N, 005° 57' 05"E – 48° 37' 52"N, 005° 12' 05"E 48° 51' 41"N, 004° 35' 15"E – 49° 01' 08"N, 004° 35' 15"E 49° 20' 52"N, 005° 49' 50"E.

1.3.2 Vertical limits
FL195/UNL

TSA 200C



2. Interfering sectors:

Within LFFF-ACC, interfering sectors are: TM, TL, AP
Within LFEE-ACC, interfering sectors are: UE, XE, KE, UF, KF, UR, XR, KR, HR

3. Interfering CDRs:

- UL15 CDR1 WE and night. Not usable in of case of military activity.
- UY9 CDR1 (summer 2300-0400 UTC / winter 2200-0500 UTC). In case of military activity, circumnavigate via UL613.
- UL161 CDR1 WE and night / CDR3 out these periods. In case of military activity, circumnavigate via BUBLI-LUVAL-EPL.
- UM624 CDR1 (summer 2300-0400 UTC / winter 2200-0500 UTC). In case of military activity, circumnavigate via UN 853 via GIVOR.

4. Specific constraining flows:

List of specific flows -traffic volumes TFV- Monitoring Value which have to be considered for CDM process and determine GAT constraints.

4.1 TFV1 = Constraining flows south of TSA200A

Monitoring Value: 20 per hour
Departure from LFP., LFOB via BUBLI/LASIV
Destinations LSZH, LSZB, LFST, LFSB via GELTA.
Departure LFST via KOTUN
Departures LFST/EDDS via LUVAL

4.2 TFV2 = Constraining flows between TSA200A and TSA22

Monitoring Value: 25 per hour
Destinations EB, EL, EHEH, ETNG/AD/SB, EDDL/DK/DF/LV/LW/DG/LP/FH/LN via DIK
Departures LFST/SB, LSZB/ZH/GG via DKI
Departures LFL, LSZH/GG, LFSB via GTQ
Departures EB, EL, EDDK/DF/FH/LN, ETAD/SB via GTQ

5. Civil pre-tactical priority according to the Traffic Light Scheme for area management

If TFV1 > 20 acft, restricted military activity with allocation of area TSA200E.
If TFV2 > 25 acft, restricted military activity with allocation of area TSA200W.
If TFV1 > 20 and TFV2 > 25, restricted military activity with allocation of area TSA200C.

5.1 From 0900 am local time to 1800 pm local time:

Area TSA200 will be restricted to TSA200E, TSA200W, TSA200C no more than 3 hours per day.
The restriction to TSA200C is limited to one hour per day.
The three hours of restrictions could be splitted:

- with a minimum duration of 45 minutes.
- Maximum of three slots except from 14th of July till 31st of August
- Maximum of four slots from 14th of July till 31st of August

A minimum duration between 2 restrictions is one hour.

5.2 From 0600 pm local time to 0930 pm local time:

The restriction to TSA200E or TSA200W is limited to 1h30.

6. Selected CIV/MIL priority rules:

6.1 Strategic CIV/MIL priority rules:

S1, S2, S3,

6.2 Pre-Tactical CIV/MIL priority rules:

P1
P2:

- before 0900 am local time, priority for GAT.
- from 0900 am local time until end of military opening hours and outside the restrictions (described in ANNEX1 chapter 5), from Monday to Friday, priority for Mil for using TSA200A.

P3

6.3 Tactical CIV/MIL priority rules:

T1, T2

T4 Coordinated tactical deviation.

- From the time of AUP release until 3 hours before AMS activation (H-3):

  Any supplementary request shall be addressed to the AMC France through the CRC. If this would lead to a new activation of TSA200 or different configurations of TSA200 and/or an extension of the period of activation, the AMC France shall coordinate with Reims FMP. If no agreement can be reached, revert to last released AUP/UUP.

- From H-3 before AMS activation onwards:

  Any supplementary request shall be addressed to Reims ACC supervisor through the CRC. This may lead to a new activation of TSA200 or different configurations of TSA200 and/or an extension of the period of activation. If no agreement can be reached, revert to last released AUP/UUP.

T5 Ad hoc changes to CIV ATFCM Plan.

- From the time of AUP release until 3 hours before AMS activation (H-3):

  When actual GAT traffic load is anticipated as getting higher than expected in Pre-Tactical analysis, Reims FMP may request to AMC France a reduction of military activity (in time or airspace). AMC France shall then coordinate with relevant CRC. If no agreement can be reached, revert to last released AUP/UUP.

- From H-3 before AMS activation onwards:
  When actual GAT traffic load is anticipated as getting higher than expected in Pre-Tactical analysis, Reims Supervisor may request to CRC a reduction of military activity (in time or airspace). If no agreement can be reached, revert to last released AUP/UUP.

T6

Any reduction or cancellation of military activity shall be reported through the CRC as soon as possible to Reims ACC who shall alleviate ATFCM measures in order to optimize routes and profiles whenever possible.

7. Remark

The different configurations of TSA200 are managed by AMC France (CNGE) taking into account constraining flows sent by Reims FMP (TLS sheet) and military requests sent by French military booking Cell (CDPGE).

FABEC Implementation Phase

FABEC ATFCM/ASM Live Trial Closing Report

EC Information

Attachment M.2

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

DOCUMENT SUMMARY

Objective :	*This Closing Report Part I shall provide to the decision bodies of FABEC (SC OPS and ASB) and any other interested party in FABEC all factual findings and conclusions from the ATFCM/ASM Live trial regarding the operation of a FABEC Function ATFCM/ASM.*	
Origin :	*ATFCM/ASM Live Trial Project Team (LTPT)*	**Audience** : LTPT, *SC OPS, ASB*

Title :	FABEC 2011 *ATFCM/ASM Live Trial Closing Report*
Reference :	D9 - FABEC_LTPT_2011-ATFCM-ASM-Live-Trial-Closing-Report_V1-0 - Part I.doc

Version : 1.0	**Date** : *17/01/2012*	**Status** : ☐ Draft ☑ Released	**Classification** : ☐ Public ☑ FABEC limited ☐ Addressees limited

DOCUMENT CHANGE RECORD

Version	Date	Reason for changes	Author of changes
0.1	20/09/2011	Initial draft of document structure	L.Koenig, J.Wiesner
0.7	17/10/2011	New draft proposal: includes editorial changes, consolidation of inputs from LTPT members, removal of abbreviations not contained in the document and reorganization of the entire document structure.	D. Genao
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REFERENCES

List of References			
Ref. Nr.	**Title**	**Version**	**Release Date**
[1]	FABEC Feasibility Study Report	2.0	18/09/2008
[2]	FABEC 2009 Field Trial Closing Report – D3	1.0	26/01/2010
[3]	D4.1 Description of FABEC and Local Functions: roles, responsibilities and tasks during the Live Trial	3.0	10/03/2011
[4]	FABEC ATFCM/ASM Live Trial – Future Options	1.0	17/01/2012
[5]	The ASM Handbook	3.0	15/06/2010
[6]	D4.3 (shift plan)	6.0	09/05/2011
[7]	FABEC ATFCM/ASM Live trial – 02/05/ – 31/07/2011 – Closing Report Part II	1.0	17/01/2012

EXECUTIVE SUMMARY

The notion of a centralized flow and airspace management unit at the FABEC level originated several years ago during the development of the FABEC feasibility study (Ref. [1]). At the time, the idea of a centralized unit made sense given the enthusiasm surrounding the creation of a Functional Airspace Block in the core area of Europe and the perceived benefits that could be achieved by having all the FABEC partners working together as one. The FABEC ATFCM/ASM Live Trial was a logical step and an attempt at making this idea a reality. With the NM IR the conditions have changed since then and a reflection on this is provided in [4].

A key driver for the trial was the need to move from the conceptual description of the ATFCM/ASM pre-tactical plan process towards identification of actual improvements through practical experience. The ATFCM/ASM rehearsal conducted at the end of 2009 served as the baseline (Ref. [2]) from which most of the procedures and operational requirements were developed.

Goals and Objectives of the Live Trial

The FABEC ATFCM/ASM Live Trial was undertaken at the DNM premises from 2 May – 31 July 2011. The objective of the trial was to validate operationally a FABEC ATFCM/ASM function (FABF) that provides air traffic flow, capacity management and airspace management services at the FABEC level. The goals of the trial were to

- enhance civil/military coordination
- optimize the network through more efficient use of airspace
- reduce network delays through the application of network delay attribution (NDA) procedures
- provide a regional FABEC Pre-Tactical Outlook
- harmonize tool functionality

The main challenges of the trial

The first three weeks of the trial showed that theory and practice do not always go hand in hand. Many of the procedures, timelines and task distributions that were developed during the preparation phase had to be adjusted during the first days of the trial in order to balance the workload. This was a very critical period, as the FABF staff also struggled to master the DNM tools. But by staying committed and maintaining a positive attitude, the FABF staff prevailed and the internal work process improved. Of course, this wouldn't have been possible without the continued support of DNM staff, who especially during the first four weeks of the trial assisted the FABF staff with use of the tools and provided critical airspace knowledge.

Despite these constraints, the FABF/ATFCM and /ASM staff performed in a highly professional manner under less than ideal conditions. Not only did the FABF staff have to deal with a steep learning curve, but they also had to cope with the fact that some local units did not adapt their local procedures to the full extent of what was required by and described in D4.1 (Ref. [3]). On the other hand, the individual skills of the various FABEC partners and the advanced preparation by some of the local units were key factors in the successful execution of the trial.

Achievement of Live Trial Objectives

The experience gained from the Live Trial clearly demonstrates that a centralized FABEC ATFCM/ASM unit can in fact serve the pre-tactical needs of FABEC partners. In the opinion of some experts who worked as FABF staff in the trial, the level of ATFCM service provided by the FABF staff during the latter part of the trial was comparable to that provided by NMC staff. In this sense, the objective of the trial was met. However, the expected benefits for capacity/delay of having a separate ATFCM/ASM unit operating as an additional layer between the NMC and the local functions never materialized for reasons outside the control of the experts involved in the trial.

Concerning a strategy to evolve towards a FABEC level ATFCM/ASM function the experts have provided their thoughts based on the findings reported here. These are documented in [4].

New FABEC Booking Principles and priority Rules could not be applied, as they are not yet approved.

The NDA, considered as quick-win, could not be tried under the umbrella of the FABEC for reasons described in chapter 3.8. Anyway the trials conducted by CFMU – partially falling into the time frame of the Live Trial – indicate some benefit. A final report by CFMU is still expected.

Lessons Learned

Also the lessons learned from the trial and the work carried out by the Live Trial Project Team, in terms of procedures and tool functionality, will be very useful if and when further steps are taken. For example, some units were receptive to the idea of conducting a detailed post-ops analysis, which could lead to improvements in the overall ACC or sector situation. The FABEC Pre-Tactical Outlook document was produced and published daily by the FABF and provided an overview of the next day's network situation within the FABEC region, except for the South-West axis. Last but not least, the functionality provided by the Airspace Monitoring Tool, which was adapted for the purpose of the trial, could be a great benefit to any future centralized ASM unit, if the experiences made during the Live Trial would be used for further improvements.

Conclusion

The FABF staff involved in the preparation, execution and operation of the Live Trial unanimously agreed that a separate FABEC ATFCM unit that runs as an additional layer between the NMC and the local functions does not add value to the pre-tactical process. The reasons for this decision are highlighted in the Conclusions section of this report.

The experts also agreed that an enhancement of NMC work by especially local and regional knowledge, applying also best practices and lessons learned from the trial, organized on a regional basis with dedicated staff to support the needs of FABEC is a much better solution than creating a separate ATFCM unit. The aim is not to dictate to the DNM how the NMC should be organized, but rather to offer the best solution possible on how to improve the pre-tactical process in the future.

With respect to the centralized ASM unit, all FABEC partners agreed that a centralized ASM unit is necessary, but not all agreed that a network-wide ASM unit is the best solution. Some experts proposed a FABEC ASM unit that is specifically dedicated to FABEC, whereas the majority of the experts proposed a solution for a network-wide ASM unit that could also serve the specific needs of FABEC.

1 INTRODUCTION

This Closing Report Part I shall provide to the decision bodies of FABEC (SC OPS and ASB) and any other interested party in FABEC all factual findings and conclusions from the ATFCM/ASM Live trial regarding the operation of a FABEC Function ATFCM/ASM.

It describes the preparation, execution, observation and evaluation of the FABEC ATFCM/ASM Live Trial, carried out from 2nd of May to the 31st of July 2011.

For those being interested in the detailed results from the Live Trial evaluation, like e.g. future project teams addressing ATFCM/ASM at FABEC level there is a Closing Report Part II (see [7]) available as separate document providing just these detailed results.

Further, as defined by SC OPS, the Live Trial Project Team provides in a separate "Future Options Document" (see [4]) the collected expert opinions on future options for the development of ATFCM and ASM at FABEC level.

This introductory chapter presents the objectives of the trial and describes the spirit of cooperation that was prevalent during the preparation and execution of the Live Trial. The further parts of this chapter explain the purpose and structure of this document.

Note: *All times in this document are provided in UTC. The Live Trial took place in summer.*

Objectives of the Live Trial

The initial idea of a centralized flow and airspace management unit at the FABEC level was developed during the FABEC feasibility study (Ref. [1]). The trigger for the Live Trial was the need to move from the conceptual description of the ATFCM/ASM pre-tactical process, which was initially described and tested in the 2009 field trial (Ref. [2]), towards identification of concrete improvements. In other words, there was a need to put theory into practice, and the only way to accomplish that goal was through the execution of a FABEC-wide Live Trial.

The objective of the trial was to validate operationally a FABEC ATFCM/ASM function (FABF) that provided air traffic flow, capacity management and airspace management services at the FABEC level. In detail this should include to:

- prove its applicability in real operations
- provide an analysis of the achievable benefits that is required as a base for the application to finally implement a FABEC ATFCM/ASM function
- offer more insight on the strategy of how to evolve towards an ATFCM/ASM model E (co-located FABEC ATFCM and FABEC ASM functions)
- apply generic booking principles and priority rules in order to optimize CIV/MIL cooperation and the use of airspace for all users
- implement quick-wins identified in the previous field trial, e.g. the application of network delay attribution (NDA) procedures

These objectives were reinforced by SC OPS in January 2011 as follows:

The strategic objective of the LT is to demonstrate the feasibility of the FABEC function, build trust between parties and to demonstrate the requirement to take additional steps in harmonizing pre-tactical planning between D-7 and D-1.

The expected benefits of the trial were

- to enhance CIV/MIL coordination,
- to optimize the network through more efficient use of airspace,
- to reduce network delay through the application of network delay attribution (NDA) procedures,

- to provide a regional FABEC Pre-Tactical Outlook
- to foster harmonization or at least interoperability of the ATFCM and ASM tools within FABEC.

Spirit of Cooperation

The need for cooperation between the FABEC partners was recognized at a very early stage during the Live Trial preparation phase. Regarding the spirit of cooperation it was clear that the success of the trial would greatly depend on the following factors:

- willingness of all participants – namely FABF staff, FMPs and AMCs, DNM – to fully engage in the Live Trial
- commitment to the application of adapted pre-tactical procedures

While the enthusiasm and spirit of cooperation was clearly evident amongst the ATFCM and ASM staff manning the FABF, most of the local units and DNM, the same could not be said of some local units which did not show the same level of commitment. The professionalism and spirit of cooperation displayed by the FABF staff was very motivating and showed what can be achieved through teamwork. Further the support provided by MILO and AOLO during the execution of the Live Trial was also very helpful.

Purpose of the Document

The primary purpose of this document is to present the results of the activities conducted during the FABEC ATFCM/ASM Live Trial 2011. It also describes the initial preparation carried out by the members of the LTPT, the challenges faced during the preparation and the execution phase, the tools used and the potential operational improvements that could have been realized by the FABF if all the success components had been in place. Last but not least, the Conclusions section presents the conclusions derived from the observations and results of the Live Trial.

Note: *From these conclusions some common and some differing opinions were developed about the future of ATFCM and ASM at FABEC level. These are aggregated in a separate document (Ref.* [4]*)*

Structure of the Document

Introduction	Defines the goal and objectives of the trial and the purpose and structure of this document.
Part I: The Live Trial report for decision bodies	
1. Executive Summary	Summarizes in short chapters 2 to 6 as a quick overview.
2. Live Trial Preparation	Describes the efforts undertaken to prepare for the execution of the trial, the constraints encountered and the compromises made to fulfill the mandate assigned to the Live Trial Preparation Team (LTPT) as well as the roles and responsibilities of the participating units.
3. Live Trial Execution and Main Observations	The Live Trial execution and main outcomes section provides a detailed description of the actions taken during the trial, the operational constraints encountered and the positive and negative impact of the trial on the pre-tactical process.
4. Results	Any measurable or factual results of the Live Trial are described here.
5. Trial Evaluation	This section defines how the trial was evaluated and presents the feedback received from all parties concerned
6. Conclusions	This section summarizes the findings of the trial and highlights the conclusions drawn by the ATFCM and ASM experts involved in preparation, execution and evaluation of the Live Trial.

As a separate document:
Part II: Detailed evaluation for use by future Working Groups

2 LIVE TRIAL PREPARATION

The preparatory work for the FABEC ATFCM/ASM Live Trial took approximately 15 months to complete and it established the foundation for ensuring that the primary objective of the trial was met. The activities undertaken during the preparation phase of the trial included:

- defining the geographical scope of the trial and the role of the participating units
- developing adapted pre-tactical procedures
- organizing the set up of the Live Trial
- identifying training requirements for local units and trial participants
- defining the relationship between the ATFCM/ASM functions, and
- ensuring that local units were well prepared
- adapt/develop technical tools

2.1 Geographical scope and time frame

The geographical scope of the Live Trial should encompass the complete FABEC airspace. However, expecting the major benefits of CIV/MIL cooperation in the core area the project team initially decided to focus the FABF/ASM work on this part of the FABEC airspace. The Flying Window procedure remained in place for Belgian airspace which significantly reduced the options in the core area. Therefore it was finally decided that the FABF/ASM should work on the whole FABEC airspace with special attention to the Paris-Munich city pair.

In order to keep the network perspective the FABF/ATFCM should address the whole FABEC airspace.

Initially there were 3 options discussed for the duration of the Live Trial, ranging from 2 weeks to 6 months. Finally it was decided by SC OPS to carry out the Live Trial for 3 months to allow for the learning curve on the one hand and the limited resources on the other hand.

The Live Trial was scheduled to the months of May to July, as more civil traffic was expected during that time accompanied by corresponding capacity bottlenecks which should be addressed by the FABF.

2.2 Role and responsibilities of participating units

The traditional role of the local units during the trial remained unchanged (for more background information see [7] chapter 7). However, the specific tasks carried out by these units were complemented during the preparation phase to bring them in line with the pre-tactical procedures described in the Live Trial work plan—the D4.1 document (Ref. [3]).

2.2.1 FABEC Function

The FABF was responsible for coordination and moderation of ATFCM and ASM issues in the FABEC area. For the purpose of the trial, the organizational structure of the FABF consisted of two working positions dedicated to ATFCM and one co-located position serving as the central ASM unit for the FABEC area. This type of organization enabled the FABF to serve as a layer between the local units (AMCs/FMPs) and the NMC and to enable close coordination between ATFCM and ASM at FABEC level.

The general tasks defined for the FABF included:

- optimizing the FABEC Pre-Tactical Plan based on simulations and the local expert knowledge present at the FABF
- ensuring appropriate network coordination (ATFCM/ASM) within the FABEC area
- consolidating planning information from all functions applicable to the FABEC pre-tactical
- preparing the FABEC Pre-Tactical Outlook (as an example see [7] chapter 13)
- delivering the FABEC Pre-Tactical plan to NMC for integration into the D-1 network plan

The FABF was entitled to start CDM processes to address the first 2 bullet points listed above, but did not have decisional power as the final decision on measures to betaken remained with the local

functions FMP and AMC. One main reason for that was that the limited frame of the trial prevented providing at the FABF at the same time broad (whole FABEC area) and detailed local knowledge.

Figure 2.1 – FABEC ATFCM/ASM Function

2.2.2 Local ATFCM units

The local ATFCM units (FMPs) ensured the efficient management of flows and capacity at the local level. Further the FMPs provided the FABF with local knowledge, including any data or information necessary to carry out the ATFCM task.

The following general tasks were defined for FMPs to be carried out during the Live Trial:

- contribute to the FABEC Pre-Tactical Plan from D-6 onwards for a given date
- contribute to the FABEC post ops review by providing feedback

FMPs used the NOP and SIMEX as a technical means to keep up to date on the evolution of the pre-tactical plan and to transmit information to the FABF ATFCM position – see chapter 3.10.1.

2.2.3 Local ASM units

The role of the local ASM units (AMCs) did not change for the trial. They continued to operate in accordance with the airspace allocation priorities and negotiation procedures which were in effect before the execution of the trial as the FABEC Booking Principles and priority Rules were still under development and approval process during the Live Trial and therefore not applicable.

The following general tasks were defined for AMCs:

- Send Airspace Booking Data (ABD) for up to D-7 to AMT(s)
- act as the national day-to-day focal points for Level 2 ASM as without the Live Trial
- promulgate the airspace allocation by transmitting ABD and the AUP to adjacent AMCs (when lead AMC), the FABF, MILO and to AAs.
- provide – in copy – any information about temporary NOTAM-published changes of Mil airspace volumes (airspace name, kind of change and changed values) to the FABF/ASM by E-Mail)

The main change for the AMCs concerned the transmission of airspace booking data to the FABF/ASM in accordance with a predefined timeline and extended pre-tactical procedures.

2.2.4 Network Management Cell (NMC)

During the Live Trial the NMC continued to serve as the central ATFCM unit in the pre-tactical phase. The major change affecting the NMC concerned the interaction with the FABF and the FMP units in the FABEC area. The NMC staff also played a major role in training the Live Trial staff, providing airspace expertise and assisting the FABF/ATFCM staff with the DNM tools.

2.2.5 Relationship between NMC, FABF and local units

The following rules were established to clarify the relationship between NMC, FABF and Local Functions:

- NMC will usually not address FABEC area FMPs during the Live Trial but instead the FABF/ATFCM in case he wants to trigger treatment of network issues
- The only exception are conferences, like e.g. the axis conferences, within which the FABEC local functions represent themselves and interact directly with NMC, while FABF/ATFCM (and perhaps /ASM) only listen in to the conference (see also Note 1)
- FABF/ATFCM does not negotiate with countries/centers adjacent to FABEC airspace. Negotiations with countries/centers adjacent to FABEC airspace – as today – are carried out by the local functions. Only the outcome of such a negotiation shall be communicated to FABF/ATFCM then instead of to NMC
- If NMC has an issue that requires negotiation between a FABEC local function and a FABEC neighbor, then NMC will address the FABF/ATFCM, who in turn will trigger the local function. Reporting of the result will follow the same path in opposite.

Note 1: This decision mainly was due to the facts that

- *the axis areas spread beyond the FABEC area and the procedures devised for the Live Trial did not address cross-FAB cases to avoid too much complexity for the Live Trial*
- *the decision power concerning measures remained with the local functions, so the FABF staff was not empowered to represent solely the local FMPs within the axis conferences.*

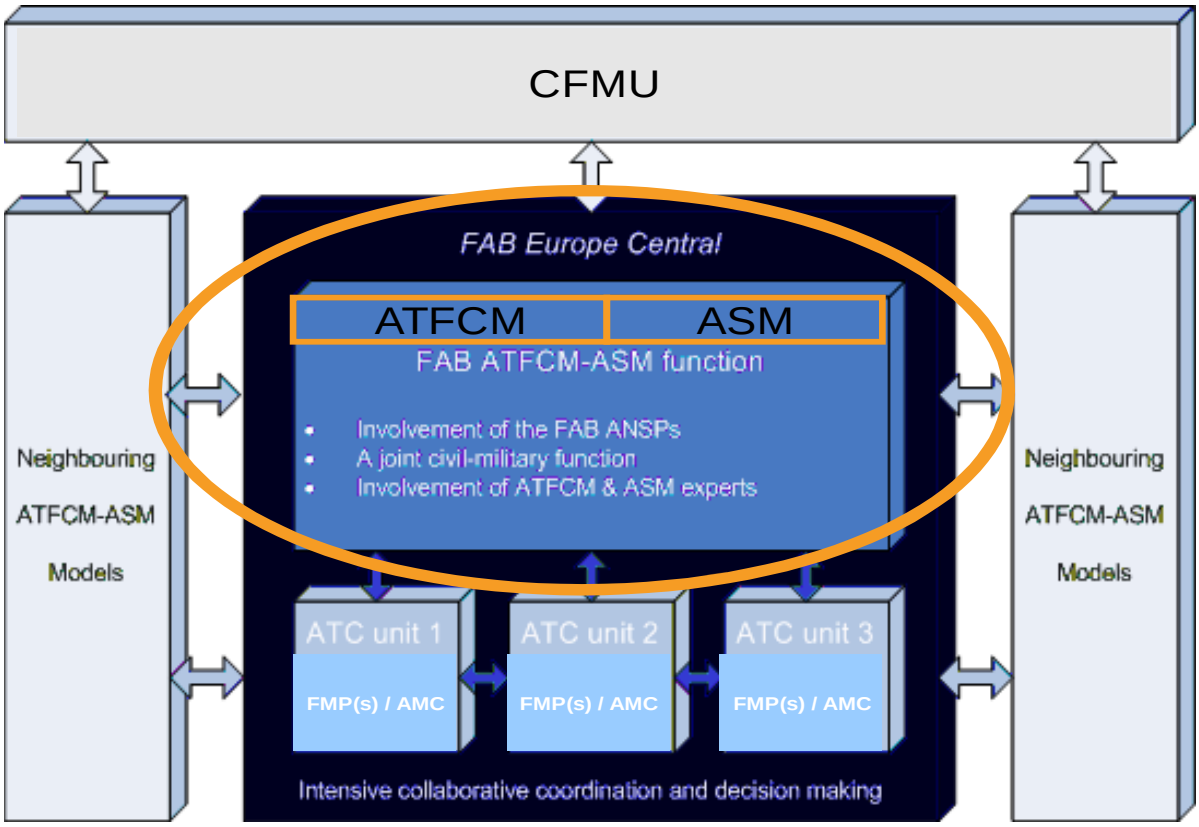

Figure 2.2 – Relationship between NMC, FABF and local units

2.3 Development of adapted pre-tactical procedures

The internal operating procedures and rules of the various FABEC partners vary from one State to the other. This means that in order to facilitate the cooperation between the FABEC partners and to create a common operational environment, internal procedures governing the activities and coordination between the partners needed to be adapted.

The adapted procedures developed during the preparation phase are contained in the D4.1 document—FABEC Preparation Phase Live Trial 2011 (Ref. [3]).

2.4 Local units preparation

The local units preparation requirements were limited to a description in the document D4.1 of those tasks being additional to the daily ATFCM tasks to be executed in accordance to the "ATFCM Operating Procedures FMP". The project team preparing the Live Trial assumed that the application of those ATFCM principles would be similar in all local units.

It was expected that these additional tasks could require additional workload. In some cases need for additional resources was identified and made available.

For some units the procedures developed for the trial were not easy to understand and led to increased workload. For example, FMP Zurich considered it necessary to translate the procedures into German for ease of understanding. Other units had to adapt their timelines for carrying out certain tasks in order to synchronize their activities with the new FABF requirements. This proved to be a challenge as the units avoided increasing their workloads during periods of heavy traffic.

The extended pre-tactical procedures which should have been started by each local function on D-7 met different conditions, as most of the FABEC units normally begin their pre-tactical activities on D-3 or D-2.

As described in chapter 3.10.1, the NOP functionality was specifically extended to facilitate the exchange of information between the local units and the FABF. Inevitably, this required all the units participating in the trial to be properly trained on exchange of information procedures and use of the new NOP features.

Procedures also had to be developed for AMC units to ensure that the airspace booking data was correctly transmitted in the proper format to the FABF/ASM position. Some AMCs needed to manually transfer data, others to technically update their local booking tool to ensure the appropriate feed to the central FABF/ASM position.

2.5 Training of Live Trial staff

One of the most difficult challenges facing the LTPT from the outset was providing sufficient training to the Live Trial staff within a limited time period. The expectations were high, and the training of the Live Trial staff was one of the key areas identified during the early stages of the preparation phase, but due to resource limitations its actual preparation could be addressed only (too) late in the process.

The provision of training proved to be a very challenging task as the success of the trial was directly linked to the expertise of the FABF staff and their ability to master the complex DNM tools. Initially five days were allocated to training after negotiations with DNM support staff and after ensuring that operational staff could be released from their local units to attend the training sessions. Further discussions in the LTPT raised strong concerns that this would be by far insufficient to reach a necessary minimum – even though we had to accept to be limited due to the trial nature. So an escalation with SC OPS and renegotiations with DNM resulted in an 8-day training complemented by a 3-day familiarization stay at NMC for each FABF staff as preparation for the work at the FABF in the Live Trial. Most of the training days were superfluous for FABF/ASM staff, as they did not use PREDICT/SIMEX. Training on the AMT was 0,5 days.

Despite the efforts made to provide the best training possible within that time frame, it was clear up-front that of the planned training would not be enough to even partially master the complexity of the DNM tools and the network knowledge required. Correspondingly some LTPT members still were of the opinion that the trial should be postponed (see 2.10). So the issue was escalated to SC OPS and the decision was made to continue with the trial despite these concerns. SC OPS decided and reasoned as follows in its meeting #20 in January 2011:

LT will take place even if the document mentioned above (editors remark: a proposal by the Belgian Air Component to open up for negotiation of Belgian MIL airspace on D-1) will not be approved at BELANC. In this case the LT will be able to illustrate the effect of the ATFCM/ASM function on the performance with and without application of the new booking principles at D-1. The scope of the LT will not be changed, irrespective of the BELANC decision; all FABEC airspace shall be part of the trial. The strategic objective of the LT is still to demonstrate the feasibility of the FABEC function, build trust between parties and to demonstrate the requirement to take additional steps in harmonizing tactical planning between D-7 and D-1.

With respect to the training of staff at the local units, the DNM support staff prepared a CBT on how to use the NOP to exchange information with the FABF/ATFCM and /ASM positions.

The following subjects were treated in the training provided to the FABF, FMP and AMC staff involved in carrying out the Live Trial.

Staff	**Training Subject**
All FABF staff	Covered by 8 days block training: • Overview airspace know how of all FABEC airspace on main traffic flows and problem areas • FABF procedures, tasks and responsibilities • Basic tools usage of PREDICT/SIMEX, FABEC NOP page Covered by 3 days NMC familiarization visit: • Basic understanding of NMC's way of working
FABF/ASM staff specific	Covered by 0.5 day as part of the 8 days block training: • FABF/ASM specific tools usage of the AMT
FMP staff	Covered by local training in responsibility of each civil ANSPs: • FMP relevant aspects of FABF procedures, tasks and responsibilities Covered by a CBT provided by DNM: • FABEC NOP page usage
AMC staff	Covered by local training in responsibility of each responsible ANSPs: • AMC relevant aspects of FABF procedures, tasks and responsibilities Covered by a CBT provided by DNM: • FABEC NOP page usage
NMC staff	Addressed by DNM internal training: • NMC relevant aspects of FABF procedures, tasks and responsibilities • Other DNM specific training aspects addressed by DNM

Note: *However it is gratefully acknowledged that the FABEC ANSPs did do their utmost to provide the nearly 500 man days of Live Trial staffing plus the required 11+ man days per person for the training, and that also DNM and NMC under existing staff constraints did their utmost to provide the requested support for training preparation, training, familiarization and coaching during the Live Trial.*

2.6 Live Trial pre-tactical phase working methods

All tasks and procedures to be used during the trial required extensive coordination with the local units and the NMC. The aim was to align the FABEC activities and timelines with those of the NMC, as the FABF was introduced as an intermediate layer between local functions and the NMC and thus had to provide its products to NMC according to the given NMC deadlines. As a consequence of this it was also required that the planning activities of local units had to be scheduled to earlier points in time.

In order to enable collaborative decision making, the NMC D-1 conference was moved to 15:00, and a new FABEC teleconference was scheduled for 10:30. FMPs, AMCs and NMC were invited to participate with the FABF in this teleconference.

The main ATFCM/ASM tasks and timelines developed during the preparation phase are depicted in a procedure flow diagram in Ref. [3], chapter 3.4.4.

2.7 Live Trial location and tool support

In order to keep the overall effort for the Live Trial preparation within reasonable limits the FABEC Function made use of existing supporting tools wherever possible and only the absolutely necessary modifications were carried out. The majority of these tools were existing at Eurocontrol in DNM and CMAC. These tools were the NOP portal and the PREDICT/SIMEX of DNM, needed to support FABF/ATFCM work, and an Airspace Monitoring Tool (AMT) based on the LARA application developed by EUROCONTROL / CMAC complemented by a pre-processor to emulate interoperability with the local ASM tools; LARA as the main AMT, which was chosen to support the FABF/ASM work based on a selection process. To all 3 of them slight to moderate modifications were carried out by the corresponding Eurocontrol development teams and by MUAC (for the pre-processor) following requirements of the Live Trial Project Team.

As decided by SC OPS in addition DFS set up its STANLY_ACOS tool to provide in parallel the required support functionality for the FABF/ASM position. This was done and the tool was used exclusively for the purpose of a DFS internal tool evaluation by GAF and DFS staff.

The decision for the location was driven by the tools identified as absolutely necessary as well as the support by NMC identified as prerequisite by the project team. Therefore the FABF was located in the CFMU OPS room. This was not preempting on the location of a future FABEC function implementation.

The Live Trial Project Team as well as the FABEC Standing Committee operations appreciated the corresponding support by Eurocontrol.

2.8 Live Trial Resource planning Constraints

Preparation on staff planning started already in the initial phase of the project when the LTPT decided on tasks to be performed by the FABF and identified the number of experts necessary to perform these. It was decided to employ each day of the trial 4 ATFCM experts, furthermore during weekdays Monday till Friday 1 ASM expert and 1 Supervisor. A roster was drafted for FABF/ATFCM to support further planning accordingly, foreseeing ATFCM shifts of 4 days duty followed by 2 days off.

2 ATFCM experts, 1 in early shift starting 06:30 UTC, 1 in late shift ending 16:00 UTC, should take over tasks D-7 till D-3. The 2 other ATFCM experts, 1 on early and the other on late shift until 17:00 UTC, should be responsible for D-2 and D-1.

Note: This information detail is provided here because this arrangement was not suitable to the actual needs during LT execution and was modified (see 3.3.1).

It had to be respected that release of staff by ANSPs must have been organized in due time to allow consideration in the next year's staff roster. So the definition of requirements, followed by negotiations on SC OPS level, took place in summer 2010. At this time commitments were given to sufficiently fulfill the staffing requirements. However in the following months it became evident that in many cases there was no staff available for longer periods thus leading to a number of rather short individual tours of FABF/ATFCM. The concerns reflected by the LTPT in regard to the negative impact on the conduct of the trial by having continuously new and inexperienced staff on duty led only to few minor improvements.

18 different persons were planned to continuously man the 4 ATFCM working positions during the 3 months trial, 5 of them were employed during 8 days only. This has to be seen in the context that additionally each expert had to participate at 8 days of training.

The ASM working position was employed by AMC staff from The Netherlands, France and Germany sufficiently.

It was mutually agreed and successfully arranged to staff the SPVR position by supervisors with ATFCM background from French and German ACCs.

Find detailed information on roster and staffing in [6].

2.9 Information to AOs

In spring 2011 the dispatch representatives of 7 major airlines based in the FABEC area had been informed about the Live Trial, its goals and product. They were invited to provide feedback especially on the FABEC Pre-Tactical Outlook publication.

2.10 Considerations for postponement of the Live Trial during preparation

After 10 months of preparation, serious doubts and concerns were expressed by the majority of the experts taking part in the preparation of the Live Trial. To a large extent, the change in the expectations of the Live Trial Project Team occurred for several reasons (unsure if all countries would adopt the FABEC booking principles and priority rules, the shortened duration of the trial, lack of decision power, lack of training and experience compared to NMC, lack of metrics necessary to justify the creation of a separate FABF, etc, etc). Given these reasons, the members of the Live Trial preparation group could not feel optimistic about the outcome of the trial. After careful consideration questions were raised on whether continuation of the Live Trial preparation was justifiable considering the associated costs of running such trial. This concern was compounded by the fact that most of the experts also believed that a separate FABEC ATFCM/ASM unit was no longer a viable option. After escalation to the foster ANSP the Live Trial Project Team was tasked to come up with pros and cons for keeping the timeline for the execution of the Live Trial. The Live Trial Project Team concluded that by seeing the limited feasibility and thus effect of the possible mitigations one overall mitigation would be a postponement of the Live Trial. This would improve some of the pre-conditions (e.g. training quality regarding tools and network view; reduce staff rotation) and may find others solved in the meantime (Belgian Flying Window and implementation of common Booking Principles; Network Delay Attribution procedure approval). SC OPS decided that the ATFCM/ASM Live Trial shall be conducted and executed as planned during the period of May to July 2011. This would happen independent of a final decision on applicability of an opening of the Flying Window during the Live Trial. If there would be no opening then the Live Trial staff shall focus its ATFCM/ASM coordination work on the alternative area on the French-German border.

2.11 Safety Assessment

The Live Trial Project Team carried out a safety assessment according to option 1 of the FABEC safety risk assessment plan (SRAP) document. The safety process of DSNA was chosen and an EPIS_CA form filled with the support by DSNA safety experts. Finally an acceptable level of safety for the actually low to nearly non-existing safety impact could be proven.

3 LIVE TRIAL EXECUTION AND MAIN OBSERVATIONS

3.1 Introduction

The primary purpose of this chapter is to provide a detailed description of the Live Trial proceedings and to highlight the experience gained from the trial. Together with the Conclusion and Recommendations section of this document it provides decision makers with factual information on the proceedings of the trial.

This section describes the main operational issues and constraints identified during the trial and which had a positive or negative impact on the outcome of the trial. The observations included in this section are based on the personal feedback of FABF/ATFCM and /ASM staff, feedback received from the participating units and analysis of the data available at the time.

Throughout the execution of the Live Trial several adaptations to the way of applying the procedures were defined and published by Operational Instructions, see [7], chapter 18.

3.2 Impact of strategic phase

As the strategic phase was not part of the Live Trial, all events known in advance were prepared strategically by the involved national authorities and DNM. The resulting information was made available to everybody through the regular CFMU NOP portal.

As a consequence the required measures / scenarios were pre-defined, e.g. for the Tiger Meet exercise, and thus left no room for optimization by the FABF, for details see also chapter 3.6.

3.3 Operational constraints

3.3.1 FABF operation

From the beginning of the trial it became clear that the operational procedures developed during the preparation phase were not adequate to efficiently run the FABF. Many of the procedures, timelines and task distributions had to be adapted to the practical experience made during the first days of the trial in order to balance the workload. This was a very critical period, as the FABF staff also struggled to master the DNM tools. A summary of changes to the original tasks and procedures can be found in chapter 3.3.1.1, a detailed list in [7], chapter 12.

The amount of “administrative work” associated with the various tasks was clearly underestimated when the procedures were first developed. For example, most of the information uploaded by FMPs via the NOP portal had to be copied and then pasted into the Daily Plan and Outlook documents. In addition, the FABF/ATFCM staff also had to create the Outlook map, which proved to be very time consuming, see also chapter 0.

From the second week onwards, two ATFCM staff worked full time on the preparation of the D-1 FABEC Pre-Tactical Outlook, while the tasks of the other two staff, originally limited to D-7 till D-3 activities, were expanded to include the D-2 tasks.

To allow the D-1 tasks to start as early as possible, shift cycles were adapted to ensure that two early shifts covered the D-1 activities. The D-7 to D-2 tasks were performed by two late shifts. This was made possible by the fact that D-7 to D-2 information was rarely provided before 08:00 and there was no time constraint on those tasks. The FABF staff also agreed to let the late shift finalize the D-1 final FABEC Pre-Tactical Outlook and to publish it on the NOP.

Furthermore, in an attempt to further reduce the FABF/ATFCM workload, the responsibility for post-ops analysis was assigned to the FABF Supervisor. Although the use of post-ops data was often discussed among the FABF/ATFCM staff, and difference of opinion existed on the use of post-ops data, the new procedure was maintained for the duration of the trial.

The changes improved the functioning of the FABF/ATFCM working position considerably and over time allowed the ATFCM staff to concentrate on mastering the complex DNM tools and increasing their knowledge of the FABEC core area, as well as in some cases to carry out analysis and simulations as a prerequisite to fulfill their objective of optimizing the FABEC pre-tactical plan. It was

recognised that the staff over time became more and more familiar with the adapted procedures. It was observed, that this effect was even stronger with longer commitments to the FABF. FABF staff became aware of the impact on the network performance and enlarged their view to that respect. Thus FABF staff became a valuable coordination partner complementing the NMC with local knowledge and providing resources to support the FMPs with simulations.

The main problem which hampered the quality of the work done by the FABF/ATFCM was the lack of preparation done between D-6 and D-2 (based on post-ops) and the late delivery of D-1 Daily Plans by some of the local FMPs (see in [7], chapter 8).

Notwithstanding those changes, time pressure remained on the D-1 ATFCM staff to deliver a product of certain quality within the timelines defined in the Live Trial work plan (see [3]).

As a result of the continuous time constraint, the FABF/ATFCM:

- **was not able to thoroughly prepare for the 10:30 teleconference**, which was often not to the expectation of the audience. This is probably also the reason why more and more FMPs and AMCs dropped out as the trial progressed
- **found it very difficult to deliver the first draft of the FABEC Pre-Tactical Outlook to the NMC in a timely manner.**
- **was not able to make a proper analysis nor a FABEC network optimization**, as described in the objectives of the Live Trial

3.3.1.1 Summary of modified tasks and procedures due to practical experience

A small subgroup reviewed the tasks described in D4.1 (see [3]) for FABEC Function Live Trial 2011 in the light of the experience made during the trial execution. The conclusions of this workgroup were afterwards completed with the motivations why certain tasks were not or partly performed.

The detailed description is contained in [7], chapter 12. This paragraph is meant to give an overview of the essential points of this review.

D-7 tasks:

***For FABF/ATFCM**:*

As during the Live Trial no strategic data were available/delivered for D-7. the majority of the D-7 tasks as planned in the D.4.1 document could not be performed.

For FABF/ASM

The data delivery depended on the sending of the weekly planning. Due to strategic information not yet available on D-7 at FABEC/ATFCM, and due to incompleteness of the bookings at FABF/ASM before D-3 no action was taken before D-3.

D-6 tasks:

For FABF/ATFCM

Only a few FMPs delivered information of sufficient quality to perform the D-6 tasks. As a .result the D-6 tasks were limited to copy/paste of the relevant information

For FABF/ASM

The data delivery depended on the availability of the weekly planning. Due to data quality and/or lack of information at FABEC/ATFCM before D-3, and due to incompleteness of the bookings at FABF/ASM before D-3 no action was taken before D-3.

D-5 to D-2 tasks

***For FABF/ATFCM**:*

Simulations should have been conducted on D-2, but the PREDICT data was insufficiently prepared during D-5 till D-3. The preparation should have included cleaning out PREDICT data at the latest on D-3 using Post-OPS information and data delivery by FMPs. The absence of sector

configurations could have been compensated by using the "most probable" archived configurations derived from Post-OPS analysis.

The value of Post-OPS data was underestimated and D-5 till D-4 should have been used for an in depth analysis of Post-OPS data and PREDICT data preparation.

The main D-2 tasks should have been the conduct of simulations, analysing possibilities for optimization.

***For FABF/ASM**:*

For ASM data delivery depended on the delivery of the weekly planning. Due to data quality and lack of information at FABEC/ATFCM before D-3, and due incompleteness of the bookings at FABF/ASM before D-3 no action was taken before D-3.

D-3 till D-2 data quality was much improved and first requests from FMPs for ASM action arrived via the NOP and could be considered / discussed with AMCs.

D-1 tasks

***For FABF/ATFCM**:*

Notwithstanding the change of procedures during the Live Trial, the FABF/ATFCM remained under high time constraint to deliver the "draft FABEC Pre-Tactical Outlook" timely to the NMC (12:00 UTC).

The main cause for this time constraint was late delivery by key FMPs of their D-1 Daily Planning Sheet. As a result no time was left for conducting simulations, negotiations with both ~~local~~ FMPs and FABF/ASM and making recommendation for FABEC airspace optimization.

D-1 tasks were therefore limited to:

- publishing the inputs made on D-2 on the CHMI to make them visible to FMP through the simulation function;
- introducing the latest D-1 information received from the FMPs into PREDICT
- adding the latest version of the draft "FABEC Pre-Tactical Outlook" on the NOP as consultation document for the FABEC teleconference

The D-1 FABEC teleconference was used to broadcast the current status of the pre-tactical plan and to ask for comments. AMCs were never challenged and gained no added value out of the teleconference. Over time the attendance to the teleconference reduced (see 3.3.1.2).

Time permitting important inconsistencies or incompatibilities were discussed bilaterally with the FMP concerned, before the final draft was sent to the NMC.

***For FABF/ASM**:*

The following two tasks were not executed as planned:

- ***Review the final draft AUPs with AMCs prior to release***

  The motivation for not executing this task is the fact that AMCs are not obliged to send a final draft. For the Live Trial it was even considered as not being necessary.

- ***Participate in the final consultation of FABF/ATFCM with the NMC***

  This task was not required as during the Live Trial no military issue occurred that needed to be solved pre-tactically, due to low MIL training activity as a consequence of e.g. the Lybia mission. Also the only major exercise executed during the Live Trial had been prepared in the strategic phase.

3.3.1.2 Experience with the FABEC Function's teleconference

Provisions contained in D4.1.

The D-1 FABEC teleconference was considered as being part of the Collaborative Decision Making (CDM) process at FABEC level. The purpose, prerequisite and organisation were described in document D4.1. chapter 5.2, as following:

Purpose:

FABF/ATFCM in charge for D-1 (normally L2 shift) will organize one daily pre-tactical (including post ops) teleconference covering at least the day after and beyond, and further days as deemed necessary by current events. The primary purpose of such teleconference is to identify problem areas and use the lessons learned to improve future plans. FABF/ATFCM and FABF/ASM in close cooperation shall have done all necessary coordination bilaterally in advance.

Prerequisite:

Therefore FMPs shall have delivered their D-1 plans by 09:30, AMCs by 10:00 latest.

Organisation:

During weekdays Monday till Friday teleconferences shall be conducted generally at 10:30, at Saturdays, Sundays and common holidays only if deemed necessary and by individual invitation and if availability of a pre-tactical FMP is provided. Conference leader will be the FABF/ATFCM role in charge for D-1 (L2 shift).

As a basic rule participants should be:

- FABF/ATFCM staff representing all days up to D-7
- Representatives for all FABEC FMPs
- Representatives for all FABEC AMCs
- CFMU/NMC

Observations:

As stated at several occasions in this closing document, the tasks on D-1, especially the analysis of local Daily plans and optimization of the FABEC Pre-Tactical Plan, could only be executed in a very limited way due to late delivery of the D-1 Daily plan by some key FMPs.

This late delivery was the cause that only very little time could be spent on the preparation of the D-1 teleconference and the reason why bi-lateral negotiations could not be conducted beforehand, as planned in the Live Trial preparation.

The lack of preparation and the absence of prior bilateral coordination, degraded the D-1 teleconferences to a simple overview and crosscheck of the information received by the FABF/ATFCM at 12:30 LT.

At the beginning of the Live Trial, participation was very good. After a couple of weeks some FMPs decided not to participate anymore, as they considered the information provided during the teleconference not to contain added value. The low added value of the D-1 teleconference resulted in the majority of the FMPs not attending anymore at the end of the trial.

Important was also that, as they was no input required from AMCs and as possible AMC problems were not touched during the teleconference, it is not surprising that participation of AMCs dropped also as the Trial progressed.

Although NMC was intended as a required participant they only attended the D-1 teleconference, when special events were addressed, having a major network impact.

With regard to the organisation, it has to be noted that, due to the South-West Axis preparation, no D-1 teleconference was held on Friday and on Saturday. On Sunday, a teleconference needed to take place, covering the Daily Pre-Tactical Plan for Monday.

3.3.2 Lack of harmonization of local procedures

Adapted local procedures, identified to be a key factor for the success of a FABF, were assumed to be already in place during the preparation of the Live Trial, as the Live Trial team did not expect the existing local procedures to be as different as finally observed during the Live Trial.
So for example it was expected to receive local information from D-7 on allowing for a continuous optimization process at the FABF. In fact not all local units actually made an effort to fully adapt their procedures to the FABF requirements, especially with regard to the D-7 to D-1 delivery of local plan information (see [7], chapter 8). This impeded the FABF in carrying out its optimization tasks even until the D-1.
It also was recognized that there are good reasons why the way of applying ATFCM can not simply be harmonized for all centers respectively FMPs. Especially between centers with pure or predominantly

en route traffic, e.g. Karlsruhe, Reims and Maastricht, and centers with pure or predominantly terminal area traffic, e.g. Amsterdam and Paris, there are differences that require different measures in ATFCM.

As most of the FMPs did not start their pre-tactical activities before D-3 and no changes to those procedures were imposed by the LTPT, those FMPs did not deliver any valuable information before D-3/D-2.

The execution of D-2 tasks was hampered by the inability of the majority of the FMPs to have a clear idea of the available staffing and, as a result, the configurations that would be applicable on the day of operations. Without this crucial information, the FABF/ATFCM was never able to perform the analysis and optimization required by the established procedures.

Another factor that impacted the effectiveness of the FABF was the assumption by the LTPT that the trial would not have a major impact on the FMP units. Except for some additional tasks, it was taken for granted that no change of local procedures would be required. This assumption was even identified as a pre-requisite in the FABEC safety assessment. The fact that the impact of local procedures on the execution of the trial was not properly assessed led to many of the operational constraints encountered by the FABF/ATFCM staff during the trial.

Moreover, not enough consideration was given to the question of whether the FMPs were able to meet the information provision requirements and the timelines imposed on them. Only a small number of ANSPs adapted their pre-tactical working methods in line with the provisions of the D4.1 document and the published operations order.

Note: It must be noted that the opinions listed above are not shared by all Live Trial staff. The LTPT members were aware that no plan is ever perfect and that changes might be necessary after the trial started. It must also be said that the LTPT had no authority to impose decisions on any of the local units. Therefore, it was up to the units to comply with the established pre-tactical procedures.

3.3.3 Tactical handling of capacity constraints

Several of the FABF/ATFCM staff were of the opinion that the procedures used during the Live Trial (which were an extended copy of the procedures used by the NMC from D-3 to D-7), no longer met the requirements of contemporary ATFCM.

One of the problems highlighted by the FABF staff was the fact that many of the FABEC ANSPs—such as Skyguide, MUAC, and DSNA—have developed in-house tools to improve the accuracy of traffic prediction on the day of operation. In combination with adapted ATFCM procedures, these ANSPs have moved away from PREDICT-based pre-tactical regulations to a short-term concept based on occupancy—which is in line with current developments within Eurocontrol, and it is also addressed by SESAR in the WP 7.6.5 covering STAM. This was one of the main reasons why many of the units decided to handle capacity constraints tactically instead of relying on less reliable data provided by the FABF. Hence the value of the FABF was significantly reduced.

On the other hand, equipping the FABF with similar tools is not a solution either, given that these ANSPs have invested significant amounts of money on developing these planning tools and cannot be expected to abandon them for the sake of the FABF.

3.3.4 Lack of decision authority

Many ATFCM experts who worked in the FABF/ATFCM position concluded that in order to improve the effectiveness of the FABEC function, it must be empowered to have decision-making authority in the pre-tactical phase when CDM breaks down. This particular operational requirement was also identified during the Field Trial Rehearsal in 2009.

On several occasions, the FABF/ATFCM staff developed solutions to specific cases requiring new scenarios designed to off-load sectors which else would have required an ATFM regulation. However, if the required new scenarios were not in the scenario list on the NOP the corresponding solutions were always refused by the local units or disregarded by the affected AOs. Solutions not requiring new scenarios (re-routings, level-cappings) were occasionally accepted by local FMPs. Although the new scenarios would have improved the overall network situation, the FABF and NMC did not have decision power and thus were unable to enforce them.

Practical examples of the occurrences that happened during the Live Trial are contained in [7], chapter 11.

In other cases the optimization consisted of getting rid of unnecessary scenarios and/or ATFM regulations. The constraints encountered here were:

- the FMP not complying with the request made by the FABF/ATFCM
- the FMP agreeing to the proposal of the FABF/ATFCM in pre-tactical, but reverting back to the original plan in Tactical.

Although the FABF/ASM also had no decision authority on ASM matters, during the Live Trial most of the proposals by the FABF/ASM to AMCs were accepted by the operating units and implemented.

3.3.5 Experience of the FABF/ATFCM staff

The level of expertise (see [7], chapter 9) within the FABF/ATFCM was also a crucial element that was a cause for concern before and during the trial. The lack of experience and the limited targeted training caused the FABF/ATFCM staff to fall behind on their assigned tasks. As the trial progressed, however, the performance of the FABF staff also improved as more experienced staff started to do more analyses and capacity constraint mitigations. The frequent rotations of FABF/ATFCM staff in the second half of the trial prevented further progress and thus the effectiveness of the FABEC unit.

3.3.6 Coordination with the NMC

In the beginning of the trial coordination was reduced to cooperation with NMC focusing on corrective action and support regarding usage of the tools. (wrong syntax, naming conventions, and applying regulations in SIMEX). As experience was gained, discussions were improved and the provision of local knowledge, combined with exchange of visions, could be seen as an added value.

One of the main constraints in dealing with the NMC was the work organization and task distribution during the South-West Axis, see also chapter 3.7.

3.3.7 Coordination with the FMP functions

Coordination with the FMPs was difficult due to the lack of adapted procedures applicable at local level.

The non-adherence by some FMPs to the procedures related to the Live Trial made it very difficult for the FABF to address the network problems and led to significant time constraints on the FABF staff, especially on D-1 activities.

There were clear indications that local ATFCM work is influenced by targets set at center level, which in extremis may lead to measures in contradiction to the best solution from a network point of view.

Some issues with the usability of the PREDICT results were identified during the trial, which made it nearly impossible for some FMPs to take the right decisions based on the simulations provided.

The detailed feedback and the examples therein shows that the main reason for the non-usability of the simulation outputs for FMPs to judge their own measures were:

- Introduction/application of ATFCM measures by one FMP through NMC after the deadlines for the FABEC FMPs for their pre-tactical work, but still on D-1
- Very late introduction of FABEC FMP's measures so that there either was no time anymore for FABF to provide an updated simulation to the other FABEC FMPs or
  so that the updated simulation came too late for the other FABEC FMPs to judge and readjust their measures.

These issues led to the fact that decisions about regulations, or any other measure, were not taken before D-1 on which the information was consolidated and the full picture was available to the FMP.

3.4 Civil-Military coordination at FABF level

Enhanced civil/military coordination has always been regarded as one of the most important aspects of a co-located ATFCM/ASM. This is one area where the FABF could have shown tangible results.

But before the start of the Live Trial it was decided by the Belgian Air Component (BAC) not to participate to this trial as the trial only addressed D-7 to D-1. BAC continued to use the flying window principle at D-1 to create the AUP but updated by means of UUP1. The procedure of BAC is rather beneficial at tactical level, however this didn't fall within the scope of the Live Trial. The decision of the BAC strongly influenced the effectiveness of the FABF/ASM as the large majority of requests for availability of MIL airspace concerned the Belgian MIL airspaces. So CIV/MIL coordination proved to be one of the biggest disappointments of the trial as the FABF/ASM unit could only concentrate on solving local issues. These could have just as well been solved by the local FMPs and AMCs concerned without involvement of the FABF/ASM unit, if the local functions would have had access to the overall FABEC data.

Before the start of the Live Trial, it was decided by the BAC not to participate to this trial as the trial only addressed D-7 to D-1. BAC continued to use the flying window principle at D-1 to make the AUP but updated by means of UUP1. The procedure of BAC is rather beneficial at tactical level, however this didn't fall within the scope of the Live Trial. The decision of the BAC strongly influenced the effectiveness of the FABF/ASM as the large majority of requests for availability of MIL airspace concerned the Belgian MIL airspaces

However, some internal coordination improvements between the FABF/ASM and /ATFCM positions were noted as the FABF/ASM staff gained experience during the course of the trial. These improvements are reflected in the following examples:

- FABF/ASM initiated the idea of level caps in military areas to avoid cancellation of military activities in hotspot areas, which was picked up by AMC France. An example of effectiveness of TRA level capping is provided in [7], chapter 16, TRA305.
- Most requests for military airspace originated from Paris and Reims FMP, either addressing French or Belgian air space. The latter was not negotiable in pre-tactical.
  In case of the former the requests were treated as follows:
  When requested before D-1 10:00, if the area was already booked, the request was reported to the pilot who could accept or not and the answer was reflected in AUP. If the area was not yet booked, the request became like a constraint to avoid a new mission on this area.
- Else, due to the Belgian Flying Window procedure, the FABF/ASM was only able to optimize UM164/T107 (LFPG-EDDM). An example is provided in [7], chapter 16, TRA207.

The following cases further illustrated possible use / benefit of CIV/MIL coordination at FABEC level:

- Another case illustrated the necessity not to focus on the core area only but to include all FABEC areas to solve problems. See [7], chapter 11, and CURA (Civil Use of Released Airspace) data in [7], chapter 16, TRA208/308.
- The Live Trial showed that it is necessary for FABEC level ASM to obtain also information about FABEC CBAs and areas outside FABEC (e.g. visit of US President in UK; exercise in Irish sea).

It was further observed that during the Live Trial the MILO was a vital source of MIL information for areas outside the FABEC region.

3.5 Involvement of the civil airspace users

There was no involvement of the civil airspace users in the preparation of the FABEC Pre-Tactical Plan, although the FABEC Pre-Tactical Outlook produced daily by the FABF was addressing the airspace users as customers.

Cases were observed where civil airspace users waited until publication of the Pre-Tactical Plan/Outlook on D-1 evening and then took measures to avoid the ATFM restrictions, thus strongly reducing the predictability of the tactical traffic flows. Such behavior is also observed by NMC in its daily work.

Feedback received from airspace users is discussed in chapter 5.2.2.5.

3.6 Handling of special events

3.6.1 Tiger Meet Exercise

Tiger Meet is a major annual NATO exercise in the core area of Europe. The impact of this military exercise on FABF operations was very limited, given that the planning for this major event was undertaken before the start of the Trial in the Strategic Phase. The involvement of the FABF consisted of applying the pre-defined scenarios and no significant experience was gained from this exercise.

3.6.2 Cleared Flight Level (CFL) implementation in Zurich

The CFL implementation in Zurich highlighted one of the benefits of extended pre-tactical procedures. During the CFL implementation and the corresponding capacity reductions, the FABF/ASM was able to make arrangements with AMC Switzerland for additional airspace that otherwise would have only been available in the Tactical phase. Due to the advanced coordination by the FABF, the Zurich FMP was able to obtain the airspace well in advance and to offer a higher capacity rate. After the initial case this situation could be handled locally.

3.7 Southwest Axis procedures

Immediately before the start of the Live Trial NMC requested that – deviating from the so far planned process – NMC should handle the weekly pre-tactical preparations of the South-West Axis (SWA). This was agreed between LT lead and CFMU and corresponding arrangements were then defined and several times adjusted between FABF and NMC (see Part II, chapter 17: SW-axis procedure during the Live Trial). The fact that not the FABF handled the FABEC part of the SWA resulted in duplication of work for the local units, as they were required to provide the NMC with all the information for Friday to Sunday, and then the same information was provided to the FABF. Some units kept the rolling process through the weekend, and then notified the NMC via e-mail message about the planned measures. Under the prevailing conditions it would have been more practical to let the FABF handle the FABEC part of the SWA process. However, there were reasons for letting the NMC continue to run the SWA process (see note 1 in chapter 2.2.5), given the temporary nature of the live trial and the negative effects of interrupting such an important process in the middle of the peak traffic period.

3.8 Application of NDA procedures

Originally it was intended to apply the Network Delay Attribution procedure as part of the Live Trial. But the following circumstances prevented the FABF from applying it:

- late definition and approval of the high level principles,
- at the beginning of the Live Trial only a draft procedure definition existed,
- no area of application being completely located inside the FABEC area was identified (Marseille-Zurich which was used by DNM involved Milano center),
- a first applicable version of the procedure was available only by mid June, halfway through the Live Trial execution, so there was no training opportunity for the Live Trial staff. Also not all FMP were aware neither trained to apply the NDA procedure. Therefore the FABF staff was very reluctant to apply it.

3.9 FABF/ATFCM staff Live Trial experience

Most of the FABF/ATFCM staff believed the Live Trial was “an interesting event” for gaining personal knowledge. The spirit among FABF staff was excellent and they performed well as a team.

Working in the same place and on the same tasks with colleagues of other FMPs, with the ASM staff and with the NMC, proved to be a very rewarding experience. The exchange of ideas was very instructive, and contributed significantly to the successful change in procedures. To be able to share knowledge and getting an insight of the local capacity constraint and staff shortage mitigation solutions were important factors that led to the improved performance level of the FABF/ATFCM function.

The co-location with the NMC provided a good and very easy opportunity for providing local knowledge to the NMC, while on the other hand gaining knowledge of network management procedures and problem solving.

3.10 Tools and documents used in the trial

The software tools and document templates available to the FABF and local units facilitated the exchange of information and played a very important role in the achievement of the trial primary objective. A description of each tool is presented below.

3.10.1 FABEC NOP Page

The FABEC NOP page was a web-based application which was specifically developed to meet the needs of the Live Trial. It served as a communication platform to facilitate the exchange of information between the FABF, NMC and the FMP and AMCs. Access to the SIMEX tool and the FABEC Pre-Tactical Outlook was also provided via a specific restricted area on the NOP —see **Figure 3.1** below.

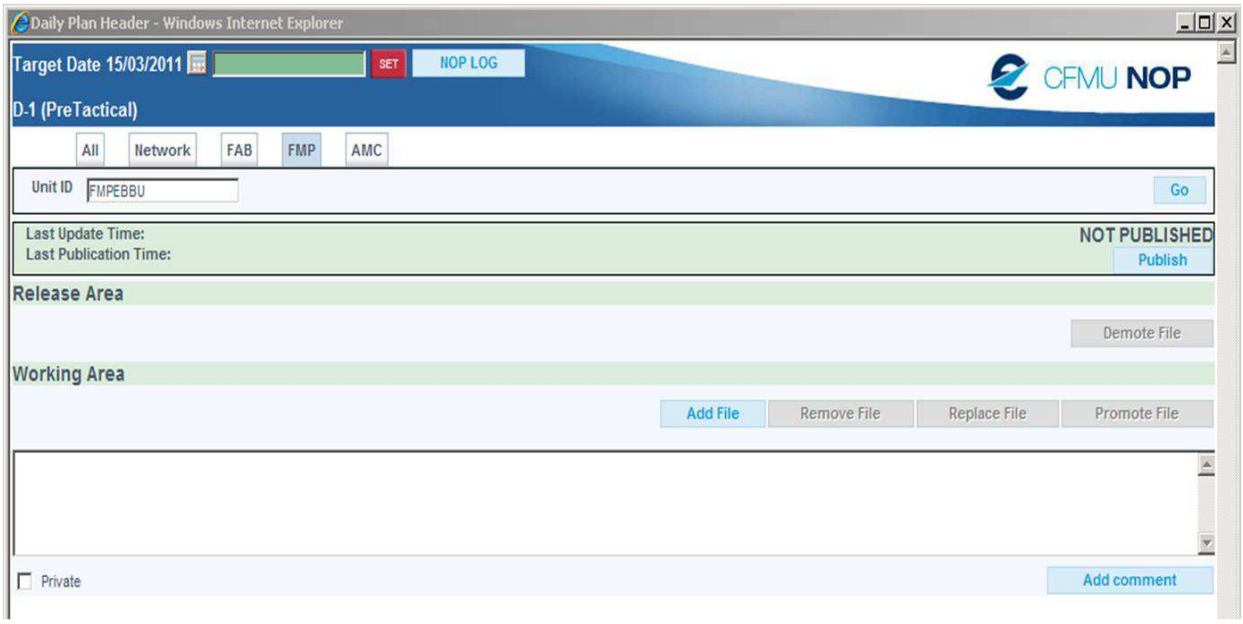

Figure 3.1 – FABEC NOP Page

3.10.2 PREDICT/SIMEX tool

The PREDICT/SIMEX tool was provided to the FABEC units by DNM. Some modifications were required not only to accommodate the needs of the participating in the live trial, but also for regular use within the CFMU. Some PREDICT/SIMEX functionality was provided to all FMPs as part of the CFMU #15 release.

The FMPs were reminded to update capacity values and sector configurations through their local access to PREDICT. The FABF used SIMEX for maintaining the FABEC plan and to carry out simulations, while NMC worked on PREDICT to maintain the overall network plan and on SIMEX for simulations. This separation was necessary to avoid concurrent access to the same data within one application. On D-1 the 2 data sets of NMC and FABF were merged by NMC in PREDICT.

The FABEC simulations were published in read-only mode to the FMPs.

3.10.3 LARA tool

The LARA tool was the official airspace monitoring tool (AMT) used at the FABEC ASM position to enable collaborative decision making and enhance situational awareness throughout the airspace management process. This AMT tool was fed with airspace booking data (ABD) provided by all local FABEC AMC units. A sample view of airspace bookings is depicted in **Figure 3.2** below.

In order to ensure that the ABD received from the local AMCs could be imported into the AMT tool, a data preprocessor was specifically designed for this purpose by a MUAC team. The preprocessor served as an interface between all AMCs in FABEC and the AMT. It converted the ABD into a format that could be read by the LARA tool. The data flow of civil and military data during the Live Trial is explained in [7], chapter 20.

The AMT was used by the FABF/ASM position to:

- collect all airspace booking data (ABD) from the FABEC AMCs
- display a tabular and graphical view of the airspace booking situation in the FABEC area in order to analyze the impact of airspace bookings on civil and military traffic
- perform what-if simulations on proposed changes to the airspace booking

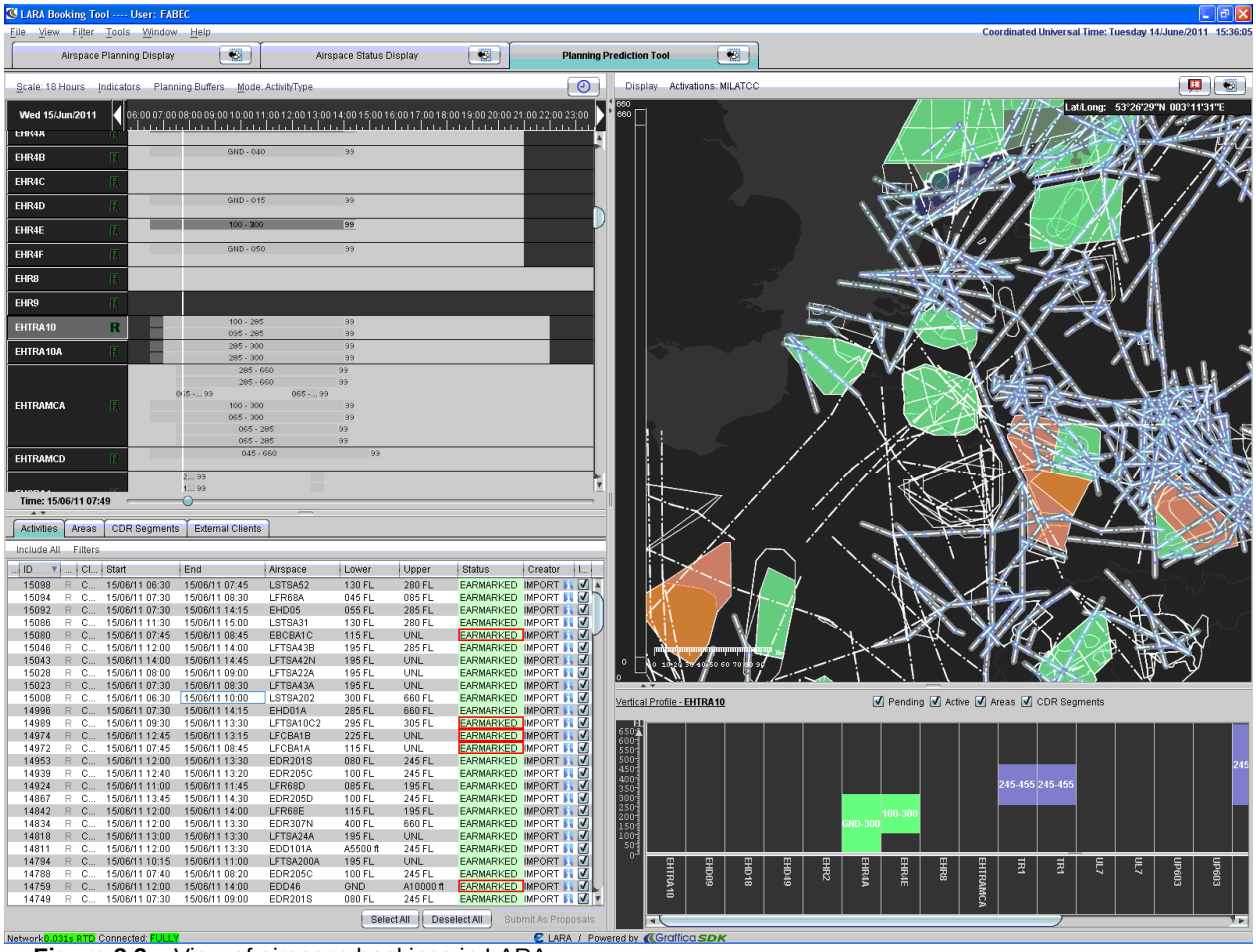

Figure 3.2 – View of airspace bookings in LARA

3.10.4 Evaluation of the STANLY_ACOS tool by DFS

The STANLY_ACOS was another airspace monitoring tool made available to German staff at the FABEC ASM position for their own internal evaluation. The use of this tool did not interfere with the data feed of the LARA tool, which was the official AMT for the trial. Some more details about the experience can be found in [7], chapter 15.

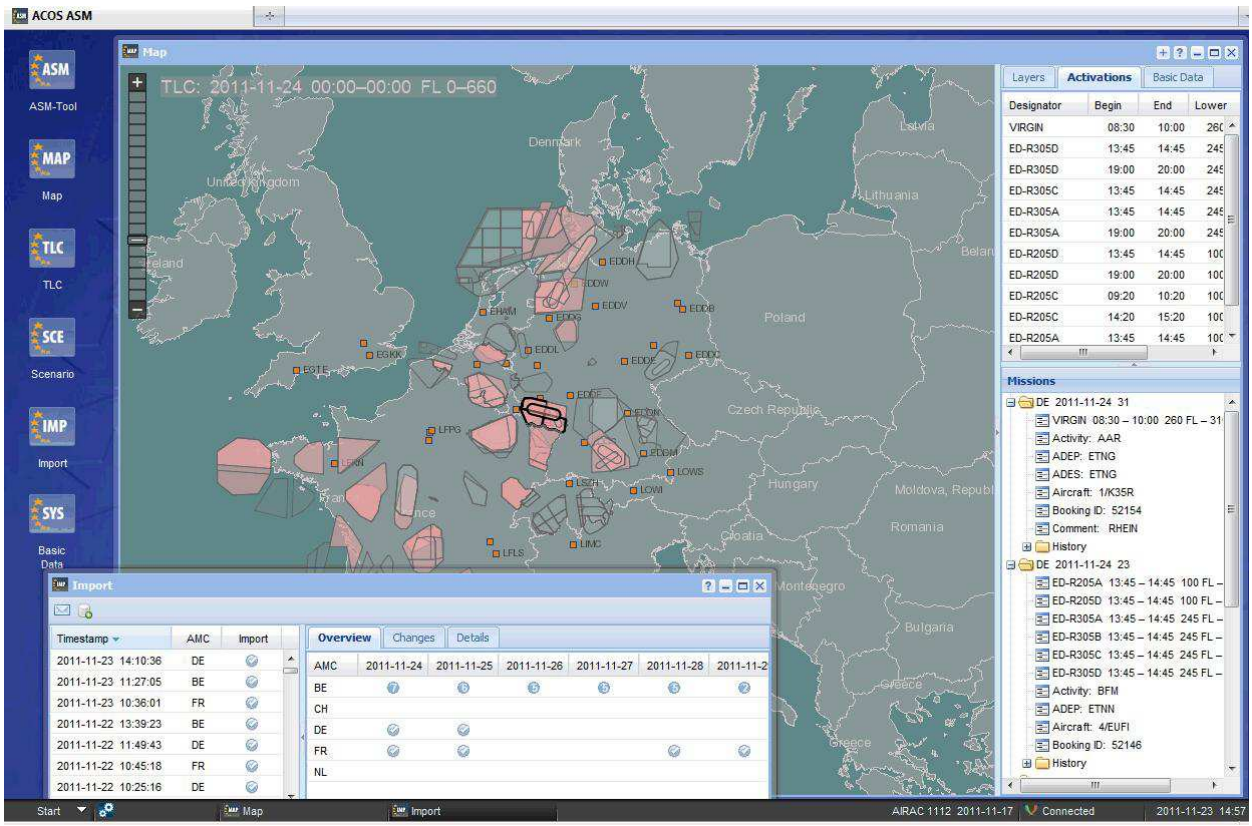

Figure 3.3 – View of airspace bookings in STANLY_ACOS

3.10.5 FABEC Daily Brief document

The Daily Brief template was not used to prepare the FABEC Pre-Tactical outlook due to template incompatibilities. FABF/ATFCM staff used the Pre-Tactical Outlook right from the beginning on D-6. ASM data was sent from AMCs directly into the AMT.

3.10.6 FABEC Pre-Tactical Outlook

The FABEC Pre-Tactical Outlook was used to publish public information for a particular day of operation. On the evening of D-1, it was published by the FABF/ATFCM via the NOP page.

Especially the copy-and-paste of the local information, uploaded by the FMP via the NOP Portal through the Daily Plan, into the draft FABEC Pre-Tactical Outlook as well as the creation of the Outlook Map proved to be very time consuming and little productive.

4 FACTUAL RESULTS

Regulation related delay figures for some of the FABEC ACCs were taken from the monthly CFMU reports for the months of the Live Trial (May to July 2011) and for comparison from the same months of the year before. The figures give no indication whatsoever for any effect of the Live Trial on delays in the FABEC area, for details see [7], chapter 19.

5 TRIAL EVALUATION

5.1 Introduction

The evaluation of the FABEC ATFCM/ASM Live Trial consisted of a systematic method for collecting, analyzing, and using information provided by key trial players to answer questions about the effectiveness and efficiency of the pre-tactical procedures and the overall provision of ATFCM/ASM at the FABEC level. It allowed the trial leaders to answer key questions about the viability of the FAB Function and whether the objectives of the trial were indeed met.

This chapter takes an in-depth look at the methodology used to monitor and assess the interaction between the participating units (chapter 5.2), the tools used for collecting information (chapter 5.2) and the feedback received from key stakeholders (chapter 5.3). The last subchapter 5.4 then describes the known cases where elements that were introduced for the Live Trial are kept or intended to be kept for their discovered value. The expert opinions on the question about the future of the FABEC ATFCM/ASM Function are presented in a separate document (Ref. [4]).

5.2 Live Trial monitoring and evaluation

5.2.1 Evaluation team tasks

The execution of the trial was monitored by selected members of the LTPT. This core group of evaluators was responsible for monitoring the execution of the trial, deciding on changes to the trial execution plan and triggering escalation procedures.

The areas to be assessed included:

- application of adapted pre-tactical procedures
- application of CDM
- network delay attribution procedures
- task dependencies
- human factors
- impact of FABF activities on the network
- improved tool functionality/automation

5.2.2 Reporting and information gathering

The evaluation team members had several means at their disposal to collect critical trial information. The means used to collect information are described below.

5.2.2.1 FABF daily event log

One daily event log had to be filled in each day by each FABF position staff (ATFCM1, ATFCM2, ASM and SPVR). These were uploaded each morning by the FABF SPVR to the Live Trial One Sky team folder for later analysis by the evaluation team. FABF/ATFCM did not have the time to log all their actions, while ASM and SPVR logged events of significance.

5.2.2.2 Questionnaires

The questionnaires used during the trial were prepared by the LTPT during the preparation phase. These questionnaires were distributed to FABF, FMP and AMC staff. One form was distributed to each Live Trial staff member to be filled out at the end of each of his duty periods. The detailed analysis of the questionnaires are included in [7], chapter 9, and in [7], chapter 10.

5.2.2.3 Visits to local units

Throughout the trial, members of the core evaluation team visited several local units to discuss problem areas, to obtain feedback on the progress of the trial and to find solutions to existing problems. These visits proved to be very useful in understanding the impact of FABF procedures on the local units.

5.2.2.4 End of trial debriefing session

The purpose of the end of trial debriefing session was to get all the key experts together under the same roof in order to discuss the results of the live trial firsthand and to find a consensus on the future of the FABEC ATFCM/ASM function. The two-day session included members of the LTPT, FABF staff, CFMU, FMP and AMC. The main outcomes are highlighted in the paragraphs below and the "Future Options document (Ref. [4]).

5.2.2.5 Feedback from customers / aircraft operators

Feedback on the FABEC Pre-Tactical Outlook was requested from the customers by questionnaires distributed to the dispatch units of a number of major airlines in the FABEC area.

Notwithstanding several reminders only 2 feedback sheets were returned, one by KLM dispatch, one by Condor dispatch.

No feedback was requested from the MIL airspace users, meaning the squadrons, as no direct coordination with the MIL airspace users in the pre-tactical phase was foreseen. AMCs were the coordination partners and provided feedback being represented in the project team.

5.3 Main results of the Live Trial evaluation

The indicators in brackets at the end of certain listed results or observations, e.g. (P1), indicate the ID of the question the answers to which provided that statement. The question can be found again in the corresponding chapters of [7].

5.3.1 Evaluation of the Questionnaires on FABF procedures

The Live Trial Evaluation Team extracted and combined the feedback contained in the questionnaires returned by the Live trial staff. 78% of the total of duty days at the FABF are covered by the returned questionnaires.

General results

- Overall no relevant additional benefits were generated by the FABF as a whole. No enhancement of coordination in the FABEC area through FABF/ATFCM was perceived. So the establishment of it as an additional layer would cost much more than it would generate in benefits even for the users. For the reasons see further items below.
- The FABF/ASM could have provided tangible benefits to airspace users in terms of delay reduction and/or flight efficiency if the Belgian MIL areas would have been negotiable in the pre-tactical phase, meaning if Belgian Air Force would have applied FUA2 principles like the other MIL FABEC partners.
- The FABF/ATFCM in some cases could have caused small additional benefits in terms of reduced network delay, if its proposals had been accepted respectively if it had had the decision power to make its proposals happen.
- The increased information exchange between FMP experts of different centers either by common tours of duty at the FABF or through the CDM processes triggered by the FABF/ATFCM increased mutual awareness of the FMPs.
- The FABF/ATFCM as an additional layer between NMC and FMPs caused relevant additional workload for both of these partners.
- Different local procedures are applied by the different FMPs.
- A trend was observed that methods like
  - STAM = Short Term ATFCM Measures (Reims, Marseille and Maastricht during LT),
  - dDCB = dynamic Demand Capacity Balancing, Occupancy Counts

  and in general a tendency of FMPs to handle cases, that are calculated to be small to medium (a few thousand minutes of delay) size in the pre-tactical simulations, only in tactical work as experience shows that then the traffic prediction is much more accurate and reliable than the pre-tactical simulation (remark: USA is working tactically only as a rolling process).
  The discussion of the experts shows that in practice there is no hard boundary between the pre-tactical and tactical phase.

  One contribution to the lower accuracy of pre-tactical simulations is observed to be that the AOs refile flight plans based on the pre-tactical plan, but seldom in a reasonably predictable manner.
- Performance target setting at different "levels" (network, FAB, ANSP, center) may generate conflicts and the outcome of the situation then relates to the attributed decision power.

From [7], chapter 8 "Delivery of input according to the described procedures D-7 to D-1"

- Out of the FMPs who applied pre-tactical measures a relevant part did deliver their inputs only very late (D-1) or not at all in time (before 10:30 UTC, see [3]) for use by FABF/ATFCM. No valuable simulation was possible without this data, so not before late on D-1.
  The observed main reasons were that some had not adapted their procedures to the requirements of the Live Trial, as described in [3], others could not adapt their procedures accordingly, e.g. due to staffing issues or dependency on NAT tracks prediction.

From [7]**, chapter 9.1.1 "FABF/ATFCM procedures feedback"**

- The FABF/ATFCM way of applying the procedures (shift schedule, task allocation) was adapted throughout the first 2 weeks of the LT based on practical experience requiring this, as the defined process did not work. We adapted to constraints of the real world (see e.g. [7], chapter 8 issues above). After that the effectiveness of the FABF was perceived to increase. Later on, also in relation to the ongoing staff rotation, no further increase was perceived. But the degree of effectiveness was not considered to be very high.
  (P1)
- Due to late data delivery from many FMPs the D-6 to D-3 work was severely impeded and was therefore strongly reduced in the task distribution during the Live Trial.
  (P1)
- Also, due to the above described constraints (P1), FABF/ATFCM would not have had the time to do CIV/MIL coordination.
  (P2)
- The logic of the workflows was rated rather as below average.
  The work flow and task allocation as defined in D4.1 did not fit reality. Therefore it was adapted during the first 2 weeks, as the timelines were too tight for FABF/ATFCM, especially on D-1. This was due to the cascading of tasks and related deadlines with now 1 more layer, insufficient tool experience and insufficient local knowledge of "foreign centers" (meaning centers currently not represented by experts at the FABF), but also due to late or missing delivery of data from FMP.
  (P3)
- The dependency on other partner's timelines was perceived as very high, see also statements above on late or no data delivery. This dependency disturbed/impeded severely the FABF/ATFCM work, due to bunching on D-1, in combination with inexperience with the SIMEX tool.
  (D1, D2)
- Operational influence on FMP work by FABF/ATFCM and /ASM was mainly considered as low. Reasons are:
  - Belgian Flying Window,
  - tight timelines,
  - no decision power and
  - FMPs treating more and more cases tactically (see also items above).
  (G1)
- Knowledge of local givens and specifics at NMC could be enhanced.
  (G2)

From [7]**, chapter 9.1.2 "FABF/ASM procedures feedback"**

- Effectiveness of the FABF procedures was considered as average. The main disturbing issue preventing meaningful results was Belgian Flying Window
  (P1)
- Being co-located improved cooperation with FABF/ATFCM, but else improvements were impeded by Belgian Flying Window as these areas were the ones most often requested for availability by FMPs.
  (P2)
- The FABF/ASM workflow was considered – after small timeline corrections – as logical and good.
  (P3)
- There was no high workload due to Belgian Flying Window, so no time problems.
  (P4)
- Implementation of the FABF procedures for FABF/ASM is partially regarded as feasible.
  (P5)
- The provision of strategic information to FABF/ASM was not organized, thus a high dependency existed on finding it from other sources, e.g. from MILO. Else dependency on other roles/systems was low due to low work requests (influence of Belgian Flying Window)
  (D1, D2)

- No negative circumstances were experienced, rather positive ones due to the – unplanned – but naturally provided information support from MILO.
  (H1)
- FABF/ASM decisions did not / could not impact local work at AMCs due to the Belgian Flying Window.
  (G1)
- The work process was not improved by the FABF/ASM, due to the Belgian Flying Window.
  (G2)

From [7]**, chapter 9.2 "FMP procedures feedback"**

General observations

- The procedures effectiveness is rated as rather average, as too much additional work was created and no results were achieved in the pre-tactical phase. The FABEC teleconference was not useful the way it was conducted. On the other hand more communication between local experts took place creating improved mutual understanding.
- Some FMPs have more advanced processes in place, therefore at current traffic levels do not need pre-tactical measures.
- Further there are different types of centers regarding traffic properties, which results in different approaches to ATFCM. Explicitly the difference is between lower and upper airspace respectively between Terminal and En Route centers.
  Terminal centers work with more fixed airport related structures, while En Route centers have more flexibility (e.g. rerouting, level capping).
- Coordination in the FABEC area was not improved, as SW-axis handling was complex and confusing because of changing coordination responsibility and process. With regard to ASM there was no full FUA2 applicable, meaning the Belgian Flying Window impeded pre-tactical solutions.
  (P2)
- The logic of the workflows was slightly positive from a FMP point of view, but the FABEC teleconference was useless. Further all FMPs have to contribute to the pre-tactical process within the given timelines to generate some added value out of it for FMPs.
  The FABEC telephone conference the way it was conducted did not offer any added value as
  - most of the time no analysis results were presented due to lack of time to create them, see also above,
  - no FMP requests to ASM were placed

  for its participants, or offered added value was denied.
  The FABEC teleconference when compared to the NMC CENTRA conference was based on mandatory participation in face of an immature draft plan which could not be visualized, and due to time constraints in the preparation phase could not provide and discuss new solution options.
  NMC – although invited – did not participate to it except for larger events.
  (P3)
- Implementation of FABF/ATFCM procedures seems feasible, but no improvement was perceived. pre-tactical work could – if all contribute – start perhaps at D-2 or even D-3, but realistically not earlier.
  (P5)
- There was a high dependency mainly on the timely and full availability of data input by all FMPs to the simulation (PREDICT/SIMEX).
  (D1)
- FMPs were practically not prevented doing their regular tasks, although the workload increased.
  (D2)
- From FMP point of view there were no really disturbing circumstances, although pre-tactical work in some cases was organized to be carried out only on workday office hours.
  (H1)
- Increased workload but no positive impact on local functions work was perceived.
  (G1)

- There could have been positive impact if not for the Belgian Flying Window, and if more simulations with meaningful data base would have been made and published.
  (G2)
- The FMP visit (5 out of 14 were visited) feedback did not provide any other or deviating results and otherwise support the results listed above.

From [7]**, chapter 9.3 "AMC procedures feedback"**

- AMC procedures could not be used for the Belgian Flying Window, else they were effective as ever.
  (P1)
- FABF/ASM work and contacts helped understanding the neighbor better, else no coordination enhancement was achieved due to the Belgian Flying Window.
  (P2)
- The workflow was considered as partially logical, as the pre-tactical FABF/ASM work ended at 10:00 and the AUP was published at 14:00.
  (P3)
- For AMC the FABF created some additional workload for the data delivery, but else it was no problem. But there was no real gain.
  (P4)
- No benefit was created in face of additional workload. But if in future the Belgian MIL airspace might be negotiable in the pre-tactical phase (before and up to D-1) there would quite possibly be more benefit. And then an implementation of a FABF/ASM would be feasible.
  (P5)
- The national deliveries of Airspace Booking Data was always on time. Considered as more critical is the availability of cross-FAB-border information.
  (D1)
- Apart from a few software issues – which could be solved during the Live Trial – there were no disturbing circumstances.
  (H1)
- Due to the Belgian Flying Window there was no impact of FABF/ASM on the current AMC work environment.
  (G1)
- No improvement of the AMC work process was perceived.
  (G2)
- The AMC visits (4 out of 5 were visited) feedback did not provide any other or deviating results and otherwise support the results listed above.

5.3.2 Evaluation of the Questionnaires on FABF tools

For the detailed analysis see [7], chapter 10.

- NOP for ATFCM role:
  - was useful
  - was user-friendly but improvements should be considered, see conclusions, chapter 6.
- NOP for ASM role:
  - was not used much, as data was directly sent to AMT
  - diverging opinions on user-friendliness, so improvements shall be considered, see conclusions, chapter 6.
- NOP for FMP:
  - useful but improvements should be considered, see conclusions, chapter 6,
  - user-friendly but improvements should be considered, see conclusions, chapter 6,
- NOP for AMC:
  - not used much, as data was directly sent to AMT
  - user-friendly but improvements should be considered, see conclusions, chapter 6,

- SIMEX for ATFCM role:
  - the Live Trial confirmed that a "What if" tool for a FABF is required. SIMEX for instance fulfilled the needs.
  - only a small part of the tool's functionality was used
  - the expectations were confirmed that the tool is very complex and needs much more training and experience and time in OPS to make beneficial use of its capabilities.
- AMT/LARA for ASM role:
  - was useful and user-friendly, and provided a good overview of bookings in Gantt chart form, while the map layout could be improved
  - full automation of the integration of local ASM data would be welcome

Other remarks on tools:

- FABF/ASM staff should also have knowledge about SIMEX
- In general the data quality in the simulation is not sufficient.

5.3.3 Airspace users view

The scarce feedback received from the airspace users reflected a lack of understanding of the role and responsibility of the FABF. For example the expectation of what the FABF could deliver was unrealistic, such as the expectation of more availability of military airspace in hotspot areas and more flexibility in negotiating en route capacity tactically based on aircraft operators' needs. The fact is that the FABF had no authority to impose restriction on military units nor to extend its activities into the Tactical phase. Certain limitations were also unfairly blamed on the FABF:

- Increased disruption of civil traffic due to military activity. These disruptions were due to the Tiger Meet exercise, not to inefficiency of the FABF.
- Increased level-capping scenarios in the Karlsruhe area. In fact, these scenarios had been applied by Karlsruhe ACC several months before the start of the trial. The reason for the level-capping restrictions was the introduction of P1/VAFORIT in Karlsruhe and then lack of staff in that sector group (EBG), not inefficiency of the FABF.

The Live Trial showed that civil airspace users anticipate on scenarios that could or will be in effect. AO’s have the tendency to wait until the ATFCM plan is published and then adapt their plan. Many times it was impossible to detect if traffic that was expected did not appear because of an inaccurate prediction or due to the fact that the AO’s anticipated on scenarios and rerouted their flights. The trend is that civil users will more and more wait until the tactical day with filing their FPL leading to less realistic traffic demand predictions.

5.3.4 Resulting statements of the end of trial debriefing session

The resulting statements listed below were obtained from the trial evaluation and reflect the experience gained by some FABEC units during the trial. However, these statements can not be necessarily attributed to the existence of the FABEC function; they only reflect the view of the experts with regard to the pre-tactical process. It is also important to note that not all ANSP representatives shared the value of these statements.

The following general conclusions were reached by trial participants:

- pre-tactical coordination amongst FABEC partners is useful
- adherence to adapted, meaning more harmonized, procedures in the context of FABEC can be beneficial
- in order to achieve network optimization, overall network performance should take precedence over national performance target achievement
- harmonized booking principles and priority rules are required to enable efficient decision making
- aircraft operators should be more involved in the pre-tactical process
- the live trial created pre-tactical awareness of dependencies
- establishing a centralized ASM function can provide benefits
- FMP and AMC working more closely with a centralized ASM in a harmonized framework can provide benefits
- the NDA procedure remained unclear to FABF ATFCM staff and lack of network experience

prevented its application outside the South-West Axis
- the NDA procedure could be an added value, if all parties commit to its application
- local expertise at the coordination function (whether FABF or NMC) is a benefit
- the FABEC pre-tactical outlook provided added value
- PREDICT data are not accurate enough to conduct a proper analysis. Data needs to be complemented with post-ops and daily plan updates
- the SIMEX/PREDICT tool is a prerequisite for any network function.
- access to SIMEX tool simulation results is of added value for FMPs
- the Airspace Monitoring Tool (AMT) was useful and should be kept and developed further

5.4 What remained after the Live Trial

During the preparation of the LT, no process for "quick wins" (collection, discussion, implementation) was set up. The following 2 chapters describe reported cases where local functions (FMP, AMC) keep or intend to keep certain modifications of their procedures which were introduced for the Live Trial, as they experienced them as beneficial for their local work independent of the existence of a FABF. The benefits could not be quantified.

5.4.1 ATFCM

ATFCM work after the Live Trial to nearly 100% returned to the procedures that were in force before the Live Trial.

ACC Reims stated:

We have modified our organisation during the LT, by implementing a dedicated staff dealing with pre-tactical and post ops from 10h to 18h local time, as it could be in a dedicated pre-tactical cell.
Despite a useless feeling of most of controllers involved in the local function, there is a clear interest of dimensioning daily local details of implementation for local and network benefits and for post ops analysis.

What we keep:

- Tactical FMP staff daily feedback on the configuration needed on D day, provided by them on an hourly basis to be used as post ops analysis, and re-use for the modeling of a FMP demand, e.g. for dimensioning the number of sectors needed per hour.
- The home made tool, guiding pre-tactical staff in doing what and when and providing links towards applications, thus to a certain degree automating the work.

Work to do:

- Towards our AMC: improving the quality of civil demand of use of airspace.
- Our advanced FUA 2 based on a daily civil proposition of airspace use can be improved by increasing the quality of the demand and a daily post ops. The time frame used during the LT is more accurate and efficient:
  post ops of yesterday and planning for D+6.
  We reached an informal agreement to do it during the Trial. Then we had to come back to the previous planning.
- We have identified the work to do to find new agreements. The feedback was discussed with the French AMC. But work is not yet done.

ACC Zurich stated:

It is the intention to improve the post-OPS process, but this is not so quick and easy to implement. It requires to modify tools and to remodel the whole process starting at the pre-tactical phase. For the internal FMP logbook an electronic page shall be developed to support documentation of measures, analyses and conclusions for use in the pre-tactical phase. The logbook further shall support automatic comparisons for ease of use.

5.4.2 ASM

For ASM, the ways of working and the structures did not change after the Trial. Because at local positions the national rules remain.

The pre-Live-Trial bi-lateral agreements are still in place.

The exchange process for mil airspace booking data remains the same as before the trial. However ABD exchange is continued by some partners on the base of working level arrangements and e.g. the German AMC in some cases uses them to improve the situation on the route Paris-Munich.

6 CONCLUSION

6.1 Summary

6.1.1 Concerning Live Trial Objectives

It can be stated that part of the objective of the Live Trial could be fulfilled:

The operational validation of a FABEC ATFCM/ASM function that provides air traffic flow, capacity management and airspace management services at the FABEC level showed that such a function can be set up and operated.

But concerning achievable benefits it clearly can be stated that under the current circumstances no relevant and measurable benefits could be demonstrated. Some pre-requisites, as listed later in this chapter, need to be fulfilled to enable visible benefits, but currently it is not possible to provide a reasonable prediction of the size of these benefits, as there are too many and interacting influences on the actual traffic situation and delay on the day of operations.

Concerning a strategy to evolve towards a FABEC level ATFCM/ASM function the experts have provided their thoughts based on the findings reported here. These are documented in [4].

New FABEC Booking Principles and Priority Rules could not be applied, as they are not yet approved.

The NDA, considered as quick-win, could not be tried under the umbrella of the FABEC for reasons described in chapter 3.8. Anyway the trials conducted by CFMU – partially falling into the time frame of the Live Trial – indicate some benefit. A final report by CFMU is still expected.

6.1.2 Main results of the Live Trial regarding the FABEC Function ATFCM/ASM

While a few benefits were achieved in terms of airspace availability, post-ops analyses and local knowledge available at the FABF, the additional effort of installing and operating the FABF, the coordination and the increased workload on NMC and the local units, FMP and AMC, far outweighed the benefits obtained. In the view of all the experts involved in the preparation and execution of the trial, including the feedback received from the local units, the FABF was regarded as an additional coordination layer that provided very little value to the pre-tactical process. This view is due to the fact that the tasks performed by FABF/ATFCM staff were not different from those performed by staff at the NMC. Thus the FABF staff involved in the preparation, execution and operation of the Live Trial unanimously agreed that a separate FABEC ATFCM unit that runs as an additional layer between the NMC and the local functions does not add value to the pre-tactical process.

The experts also agreed that an enhancement of NMC work by especially local and regional knowledge, applying also best practices and lessons learned from the trial, organized on a regional basis with dedicated staff to support the needs of FABEC is a much better solution than creating a separate ATFCM unit. The aim is not to dictate to the DNM how the NMC should be organized, but rather to offer the best solution possible on how to improve the pre-tactical process in the future.

With respect to enhanced civil/military coordination very little was achieved by the FABF/ASM in this area due to the non-negotiability of the Belgian Military airspace at the pre-tactical level. CIV/MIL coordination could have achieved more if some CDRs that run through the core area of FABEC had been negotiable in the pre-tactical phase.

Concerning a centralized ASM unit, all FABEC partners agreed that a centralized ASM unit is necessary, but not all agreed that a network-wide ASM unit is the best solution. German and French AMC experts proposed a FABEC ASM unit that is specifically dedicated to FABEC, whereas the Dutch and Swiss AMC experts proposed a solution for a network-wide ASM unit that could also serve the specific needs of FABEC.

The Live Trial created an increased pre-tactical awareness of dependencies between the participating FMPs as well as with NMC.

6.2 Detailed Conclusions

The following conclusions reflect the essence of the Live Trial results:

6.2.1 In general

- pre-tactical coordination amongst FABEC partners is useful.
- In order to achieve network optimization, network performance – here at FABEC level – should take precedence over national performance target achievement.
- The staff assigned to the FABEC function performed very well under the given circumstances and clearly demonstrated, at least in the latter part of the trial, that they were capable of meeting the pre-tactical needs of FABEC units.
- Aircraft operators should be more involved in and committed to the pre-tactical process to improve predictability of the traffic.
- Establishing an ASM function with a wider scope than lead AMC working closely with FMP and AMC can provide benefits in airspace availability.
- The NDA procedure could be an added value if all parties commit to its application, pending final report by CFMU.
- More local expertise at the coordination function (whether FABF or NMC) is a benefit.
- PREDICT/SIMEX data are not accurate enough compared to the actual traffic situation on the operations day in case of low and medium level delay predictions. Data needs to be complemented with post-ops, daily plan updates and involvement of the AO's.
- Changes in traffic and conditional routes availability triggered by CDM between FABF and the AO or AMCs are not taken on board of PREDICT, thereby reducing the accuracy of PREDICT and SIMEX calculations.
- To increase predictability of traffic reduce volatility of input data, e.g. by Airport CDM, FPL adherence. These are only tactical measures, but will also improve quality and reliability of post-OPS analysis results.
- Decrease dependency of centers on a network function where possible, which means:
  - for pure en route centers like e.g. Reims or MUAC a method of more independent preparation might work
  - for terminal centers, like e.g. Paris, more short term/tactical measures will fit, as dependencies can not be resolved earlier on.

6.2.2 Concerning operation of a FABEC Function ATFCM

- Adherence to more harmonized procedures where they are possible and reasonable is a prerequisite.
- In the applied FABF concept, as described in D4.1 (Ref. [3]), starting a pre-tactical coordination does not make sense before earliest D-3, and even that only makes sense if all contribute from that same point in time.
- A FABF – equipped with the required local expertise – would need more freedom in defining solutions and should not be limited to the existing set of scenarios.
- Although final agreement on the SW-axis treatment was reached by the end of the Live Trial, the FABF/ATFCM staff believed that a separation of network tasks within the same FAB was counterproductive. Thus a practically workable and less complex solution must be developed to address cross-FAB-boundary events, like e.g. the SW-axis. The aim must be to avoid changing coordination responsibilities and partners for the FMPs.
- Involvement of AOs in pre-tactical network planning is required, contributing and committing to a much more predictable traffic. It also has to be elaborated together what the – common – needs of the AOs concerning ATFCM are, and what can be provided by ATFCM.
- A full-fledged, NMC comparable training on tools and extensive local knowledge for the whole FABEC area is required, including OJT for initial experience gain, if a FABF/ATFCM shall be established.
- To reduce pure technical workload at the FABF/ATFCM an increase of automation is required, e.g. to develop the Pre-Tactical Outlook document.
- Change concept of the TelCo, e.g. participation not mandatory, but based on interest or being affected or explicitly invited. Provide sufficient time for the FABF/ATFCM to prepare the TelCo, which means earlier delivery of data from the FMPs.

- The timing of the FABEC teleconference was in conflict with other duties of some local units. The scheduling of this conference was judged by some involved units as too early to provide any useful information.
- The FABF/ATFCM provided additional resources to carry out simulations on behalf of FMPs

6.2.3 Concerning operation of a FABEC Function ASM:

- Harmonized booking principles and priority rules are required to enable efficient decision making
- FUA level 2 application shall be harmonized across the whole FABEC area
- Improve and automate ASM booking data exchange/collection and ensure sharing of the combined data between all ASM partners and also with ATFCM partners

6.2.4 Concerning Tools

- The SIMEX/PREDICT tool, more general a traffic analysis and simulation tool is a prerequisite for any network level coordination.
- Access to simulation results of the above named tool is of added value for FMPs, if and only if all concerned FMPs provide sufficiently reliable data at the time of the simulation.
  FMPs should get access rights to SIMEX that enable them to carry out simulations by themselves.
- The Airspace Monitoring Tool (AMT) was useful for a FABF/ASM function and should be kept and further improved by:
  - automated ABD sending from local ASM tools
  - automated collection of ABD covering the FABEC area
  - access to FABEC area ABD by all CIV and MIL partners
  - linking ASM and ATFCM data
- The following NOP improvements should be considered:
  - more automation of document/input aggregation should be provided
  - provide a chatroom function
  - an input notification should be given to the ATFCM function upon new FMP input
  - navigation in the NOP should be easier and need less user actions
  - improve HMI layout in cooperation with users
  - improve document location/organization in cooperation with users
- The "What if" tool needs much more training and experience and time in OPS to make beneficial use of its capabilities.

END of Part I

ABBREVIATIONS

- AA	- Approved Agencies
- ABD	- Airspace Booking Data
- ACC	- Area Control Center
- ADP	- ATFCM Daily Plan
- AMC	- Airspace Management Cell
- AMS	- AMC Manageable Structure
- AMT	- Airspace Monitoring Tool
- AOLC	- Airline Operator Liaison Cell
- AOLO	- Airline Operator Liaison Officer
- ASM	- Airspace Management
- ASMF	- Airspace Management Function
- ATC	- Air Traffic Control
- ATFCM	- Air Traffic Flow and Capacity Management
- ATM	- Air Traffic Management
- ATS	- Air Traffic Services
- AUP	- Airspace Use Plan
- BAC	- Belgian Air Component
- CADF	- Centralized Airspace Data Function
- CBA	- Cross-border Area
- CDM	- Collaborative Decision Making
- CDR	- Conditional Route
- CFMU	- Central Flow Management Unit; see also DNM, NMC and NMF
- CHMI	- CFMU Human Machine Interface
- CIAM	- CFMU Interface for Airspace Managers
- CIV	- Civil
- CM	- Contingency Measures
- COD	- Contact of the Day
- COM	- Current OPS Manager (CFMU)
- CONOPS	- Concept of Operations
- CURA	- Civil Use of Released Airspace (part of PRISMIL)
- DCMAC	- Directorate Civil and Military ATM Coordination
- DFS	- Deutsche Flugsicherung

- DNM	- Directorate of Network Management, Directorate in Eurocontrol within which CFMU is contained, see also CFMU, NMC, NMF
- DSNA	- Direction des Services de Navigation Aérienne
- EAUP	- European Airspace Use Plan
- ETFMS	- Enhanced Tactical Flow Management System
- FAB	- Functional Airspace Block
- FABEC	- Functional Airspace Block Europe Central
- FABF	- Functional Airspace Block Function
- FMP	- Flow Management Position
- FUA	- Flexible Use of Airspace
- GAT	- General Air Traffic
- HLPB	- High Level Policy Body
- LARA	- Local And sub-Regional ASM support system
- LOCF	- Local Function
- LT	- Live Trial
- LTPT	- Live Trial Project Team
- LVNL	- Luchtverkeersleiding Nederland
- MIL	- Military
- MILO	- Military Liaison Officer
- MUAC	- Maastricht Upper Area Control Centre
- NMC	- Network Management Cell, the group of people doing pre-tactical work for the whole network at CFMU; see also CFMU, DNM, NMF
- NMF	- Network Management Function; the new European role assigned to Eurocontrol by the EC to be responsible for the management of the whole European Air Traffic network; see also CFMU, DNM, NMC
- NOP	- Network Operations Portal
- OAT	- Operational Air Traffic
- OPS	- Operations
- PREDICT	- ATFCM prediction tool at CFMU
- PRISMIL	- Pan-European Repository of Information Supporting Civil Military Key Performance Indicators
- RAD	- Route Availability Document
- SLA	- Service Level Agreement
- SPOC	- Single Point of Contact
- SPVR	- Supervisor
- SWA	- South-West Axis
- TFV	- Traffic Volume
- TRA	- Temporary Reserved Area

- TSA	- Temporary Segregated Area
- TVS	- Traffic Volume Set
- UAC	- Upper Area Control Center
- UTC	- Universal Time Coordinated
- UUP	- Updated Airspace Use Plan