INDUSTRIAL RESEARCH

SESAR Solution PJ07-W2-40 SPR-INTEROP/OSED for V3 - Part I

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PJ07-W2 OAUO

OPTIMISED AIRSPACE USER OPERATIONS

This Solution 40 W2 SPR-INTEROP/OSED for V3 is part of a project that has received funding from the SESAR Joint Undertaking under grant agreement No 874465 under European Union's Horizon 2020 research and innovation programme.

Abstract

SESAR Solution PJ-07-W2-40 Initial 4D Mission Trajectory development with DMA type 1 and 2 supported by automation and dynamic civil-military CDM is a joint effort of partners (Airbus Defence and Space, EUROCONTROL , Polish ANSP PANSA, Czech ANSP, and military experts MEPS) involved and committed to the project development and validation activities. Each of the partner contributes to the solution within respective area of expertise supporting the development and validation of operational improvement steps and binding enablers.

The solution belongs to the SESAR solutions clustered around nine essential operational changes EOCs described in the ATM master plan. These interconnected essential operational changes create a backbone and SESAR vision of the future European ATM system.

Solution PJ-07 -W2-40 Initial 4D Mission Trajectory development with DMA type 1and 2 supported by automation and dynamic civil-military CDM contributes to the EOC Fully Dynamic and Optimised Airspace, which is providing an airspace context that is appropriate for fully dynamic airspace and Trajectory Based Operations TBO.

The EOC Fully Dynamic and Optimised Airspace enables all relevant operational stakeholders to participate in collaborative decision-making processes in a transparent framework, to negotiate their preferences and reach agreements that benefit not only one but also all stakeholders involved, thus contributing to the performance of the entire ATM network.

The solution demonstrates the relationship between all conceptual elements related to trajectory management, advanced ASM, ATFCM, including DCB / CDM, which should be better developed and validated to maturity V3.

The solution further develops and validates a concept of DMA as integral part of the military ATM demand. It should be noted that the DMA concept complements and does not substitute the already validated in SESAR 1 concept of static ARES and modular ARES based on the VPA design principle as integral part of the military ATM demand.

The concept of Dynamic Mobile Area (DMA) in the context of mission trajectory contributes to the development of the solution with a new ARES design principle, to be exploited by military operational stakeholders. It brings more dynamicity to the complex operational environment and facilitates allocation of military operational requirements at short notice while providing benefits to all ATM actors concerned.

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1 Executive Summary

The solution PJ-07-W2-40 Initial 4D Mission Trajectory development with DMA type 1and 2 supported by automation and dynamic civil-military CDM contributes to the target ATM concept demonstrating a comprehensive approach to the development of military ATM demand by military operational stakeholders and its further integration into the ATM network operations. It details the MT concept through implementation of a new ARES design principle based on DMA concept and further explains integration of MT with DMA type 1 and 2, representing military ATM demand, into the TBO environment through seamless ASM/ATFCM processes at the local and sub-regional level.

The solution develops new operating methods, which facilitate flexible and dynamic management of shared trajectories in conjunction with dynamic airspace configuration and advanced management of airspace in the ATM planning phase. The anticipated effect is an optimised and coordinated organisation and management of airspace and traffic flows in medium to short-term phases and improved collaboration between pertinent ATM actors supported by automation and dynamic civil-military CDM.

The Solution contributes to the improvement of ASM and ATFCM processes with goal of facilitating operationally and technically the definition of the dynamic airspace configuration at local and sub-regional levels while maintaining mission effectiveness and safeguarding mission objectives.

SESAR Solution PJ-07-W2-40 ensures consistency with SESAR ATM concept and contributes to the improvement of following KPIs:

- En-route capacity and predictability
- Environment and Fuel efficiency
- Civil-military cooperation/coordination and flexibility.

Mission trajectory management with integrated Dynamic Mobile Areas type 1 and 2 brings together detailed description of the military integrated ATM demand that evolves through trajectory lifecycle undertaking modification in collaborative decision-making (CDM) and dynamic sharing of the ATM related data with pertinent ATM and relevant non-ATM actors concerned. The demonstration of new operating methods and activities will be enabled by automation[1] of the human processes in the relevant military ATM domains (WOC, ASM, AIM), automation of the exchange of information in CDM processes and enhanced civil-military ATM/CNS interoperability.

While the MT detailed concept explains all phases of the MT lifecycle, the solution only focuses on the planning phase with pertinent actors and system support. These factors determine the scope of the concept description and the corresponding use cases.

[1]In the context of the Solution 40, human process automation and CDM implies the development of functional system algorithms that facilitate operational processes and the exchange of information in an automatic mode with the participation of a human, since the latter is the last link in the decision-making chain.

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2 Introduction

2.1 Purpose of the document

The purpose of this document is to describe the operational concept according to the high level operational requirements and to develop requirements related to SESAR Solution PJ-07-W2-40 Initial 4D Mission Trajectory development with DMA type 1and 2 supported by automation and dynamic civil-military CDM.

2.2 Scope

This is a V3 OSED/SPR-INTEROP for Solution PJ-07-40W2. The scope includes new operating methods, operational concept requirements, and use cases related to initial Mission Trajectory management with integrated Dynamic Mobile Areas type 1 and 2.

According to the Grant agreement, the solution scope covers the planning phase at local level with local actors only but can also be projected to the sub-regional level. The execution phase is not reflected in the description of the solution and will be considered at a later stage, depending on the needs and requirements of operational stakeholders.

2.3 Intended readership

The intended audience of this document consist of:

- PJ.07 Solutions; all solutions part of Project 07 should have a close collaboration to ensure a consolidated approach to their common validation threads
- PJ.09-W2-44, which is a solution with cross reference to the validation of the performance benefits, regarding the integration of DMA type 1 into Dynamic Airspace Configurations (DAC)
- PJ.19.02, in charge of the SESAR conceptual documents in Wave 2
- PJ.19.04, which will collect outputs of the validation exercises for consolidation and will perform the performance gap analysis
- Key stakeholders who will benefit from the deployment of the Solution:
  - Military and Civil Airspace Users
  - Air Navigation Service Providers, particularly Airspace Managers (AMCs) and Air Traffic Flow and Capacity Managers (FMPs)
  - Network Manager, indirectly from improved sub-regional/local processes

2.4 Background

The Solution PJ-07-W2-40 Initial 4D Mission Trajectory development with DMA type 1and 2 supported by automation and dynamic civil-military CDM is a successor of two solutions developed and validated in Wave 1; PJ.07-03 Mission Trajectory Driven Processes and PJ-08-01 Dynamic Airspace Configuration.

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The solution consolidates validation results regarding the integration of DMA into DAC and development of the initial Mission Trajectory driven processes and develops new operational processes together with technical capabilities facilitating integration of a new concept of DMA type 1 and 2 into MT management.

The validation results, reflected in the validation reports of two solutions, provide a justification of the operational and technical feasibility of the operating methods and the technical capabilities of the system support.

Validation results (V3 ongoing maturity level) achieved in Solution PJ07.03 Mission Trajectory Driven Processes are as following:

- Technical and operational feasibility of Mission Trajectories planning, using the improved Operational Air Traffic Flight Plan (iOAT FPL), compliant with the complete set of ATM Network rules and restrictions, without compromising military mission needs.
- The integrated management of mission trajectories and VPA design type of ARES, in the ATM planning phase, throughout information exchange via iOAT FPL between WOC, NM, and ATC actors.
- Operational and technical feasibility of using an exemption policy mechanism for mission trajectories which could not comply with network restrictions without compromising mission needs.
- A CDM process amongst WOC, NM, and ATC actors for the revision of mission trajectories shared via the iOAT FPL to adjust military ATM demand to network management requirements.
- SWIM compliant B2B services enabling exchange of Mission trajectory related data through iOAT FPL and associated messages between WOC, NM, and ATC systems.

Validation results (V2 maturity level) concerning the DMA type 1 and type 2 achieved in Solution PJ 08.01 Dynamic Airspace Configuration are as following:

- The DAC concept successfully integrates ASM and ATFCM in a single logical and continuous process. Considering and assessment of DMAs and traffic flows and performing CDM in the planning phase bring benefits for civil and military users as well as to the ATM network.
- The use of DMAs minimizes the impact of airspace segregation on the traffic demand while fulfilling DMA user request. A key element enabling such a minimisation is represented by the flexible parameters attached to DMA definition, which could refer to: time over ARES entry (TOT ARES), minimum/maximum flight level, distance (transit time) from/to a specific reference point, distance (transit time) between successive DMA activations, geographical positioning of successive DMAs, time of activation/deactivation. The flexible parameters are considered in the automatic optimization of DMAs allocation.
- Definition of DMA in accordance with MT concept requirements is possible. The DMA parameters defined and allocated by the tool are compatible with the requirements of mission trajectory concept. The application of DMA design principles enables a flexible access to airspace to military AU.

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These findings provide a solid foundation for further developments and evolution of the operational concepts in Wave 2 and will be considered by the solution. On top of that the solution incorporates the conclusions of specific workshops with military experts and partners working on related MT and AFUA topics.

The solution PJ-07-W2-40 Initial 4D Mission Trajectory development with DMA type 1and 2 supported by automation and dynamic civil-military CDM develops operating methods, which correspond to the operational improvement steps related the solution, and respond to the following operational shortcomings:

- Airspace Users:

- Limited capabilities of the ATM network to accommodate military ATM demand at short notice.
- Inefficient use of available airspace resource by all ATM actors concerned
- Heterogeneous procedures for flight information sharing.
- Luck of dynamicity in civil-military CDM and technical system support.

- Airspace Management:

- Inability to exploit the opportunities for improvement when available airspace resource exploited ineffective.
- Inefficiencies in the ATM Network management and increasing complexity calling for increased flexibility in airspace capacity.

- Network Operations Planning:

- Limited integration of ASM and ATFCM processes in the context of DAC and DCB interactions.
- Limited sharing of up-to-date planning data leading to poor predictability of demand.
- Inconsistent planning information preventing Airspace Users from optimizing their operations.

- Demand Capacity Balancing:

- Limited flexibility of current ATFCM to cope with increasing traffic demand essentially based on slot allocation.
- AU's priorities/preferences not taken into account.

The benefits that new concept elements and operating methods will bring to civil and military operational stakeholders, and NM is a key value point of the solution PJ-07-W2-40 Initial 4D Mission Trajectory development with DMA type 1 and 2 supported by automation and dynamic civil-military CDM in the scope of Optimised Airspace Users Operations project. Deployment of new operating methods supported by the system technical functionalities will facilitate the integration of i4D MT into the TBO environment.

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2.5 Structure of the document

The structure of the document is as follows:

- Chapter 1 provides the executive summary
- Chapter 2 provides a general introduction to the solution, including purpose, scope, the intended audience and the background
- Chapter 3 provides a description of the solution, the detailed operational environment and the detailed operating method
- Chapter 4 provides a description of the Safety, Performance and Interoperability requirements
- Chapter 5 indicates references and other applicable documents
- Appendix A:
  - A1 Stakeholders identification and Expectations
  - Benefits mechanism

2.6 Glossary of terms

TERMS	DEFINITION	REFERENCE
ATM actors	A person, organisation or technical system authorised/licensed to act within the ATM System. Several ATM actors can perform a role. One ATM actor can perform several roles.	SESAR
ATM community	Organizations, agencies or entities that may participate, collaborate and cooperate in the planning, development, use, regulation, operation and maintenance of the ATM system.	ICAO Doc.9854
Aeronautical Information Service	A service established within the defined area of coverage responsible for the provision of aeronautical information/data necessary for the safety, regularity and efficiency of air navigation.	ICAO, ANNEX15
Aircraft Identification	A group of letters, figures or a combination thereof which is either identical to, or the coded equivalent of, the aircraft call sign to be used in air-ground communications, and which is used to identify the	ICAO Doc.9924

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	aircraft in ground-ground or air traffic services communications. Note. The aircraft identification is also referred to as flight identification.	
Airspace Management	Means a planning function with the primary objective of maximising the utilisation of available airspace by dynamic time-sharing and, at times, the segregation of airspace among various categories of airspace users on the basis of short-term needs;	Regulation (EC) No 549/2004
Airspace Reservation	Means a defined volume of airspace temporarily reserved for exclusive or specific use by categories of users;	Regulation (EC) No 2150/2005
Airspace Restriction	means a defined volume of airspace within which, variously, activities dangerous to the flight of aircraft may be conducted at specified times (a 'danger area'); or such airspace situated above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions (a 'restricted area'); or airspace situated above the land areas or territorial waters of a State, within which the flight of aircraft is prohibited (a 'prohibited area');	Regulation (EC) No 2150/2005
Airspace Structure	means a specific volume of airspace designed to ensure the safe and optimal operation of aircraft;	Regulation (EC) No 2150/2005
ASM Solution	An ASM solution is a formalized request for conflict-free re-allocation in space and/or time of the elements of airspace structure initiated by ASM actor in order to optimize an airspace configuration that ensures conflict-free operations and meets the performance expectations and objectives of the operational stakeholders. The ASM solution contains proposals for reconfiguring/locating and/or activating dynamic elements of airspace structure within flexible thresholds provided by operational stakeholders and triggers CDM process between ATM actors concerned.	OSED PJ07-40-W2
ATFM solution	Formalised request to consult and apply ATFM regulations by different categories of Airspace Users in order to optimise capacity and mitigate impact on traffic flows in the context of DAC.	W1 Solution PJ08.01

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Air Traffic	All aircraft in flight or operating on the manoeuvring area of an aerodrome (ICAO)	ICAO Doc.4444
Air Traffic Service airspace	Airspaces of defined dimensions, alphabetically designated, within which specific types of flights may operate and for which air traffic services and rules of operation are specified	ICAO Doc.4444
Air Traffic Service Reporting Office	A unit established for the purpose of receiving reports concerning air traffic services and flight plans submitted before departure.	ICAO Doc.4444
Air Traffic Management	means the aggregation of the airborne and ground-based functions (air traffic services, airspace management and air traffic flow management) required to ensure the safe and efficient movement of aircraft during all phases of operations;	Regulation (EC) No 549/2004
Air Traffic Service	A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).	ICAO Doc.4444
Air Traffic Services Unit	means a generic term meaning variously, air traffic control unit, flight information centre, aerodrome flight information service unit or air traffic services reporting office	ICAO Doc.4444
Appropriate ATS authority	The authority designated by State responsible for providing air traffic services in the airspace over the territories of States, over the high seas, or over territories of undetermined sovereignty. ATS authorities belong to the same or different States.	ICAO Doc.4444
ATM system	A system that provides ATM through the collaborative integration of humans, information, technology, facilities and services, supported by air and ground- and/or space-based communications, navigation and surveillance	ICAO Doc.9854
Civil-Military coordination	Means the interaction between civil and military authorities and components of ATM referred to in Article 3(1) necessary to ensure safe, efficient and harmonious use of the airspace	Commission Implementing Regulation (EU) 2019/123
Collaboration	Collaboration entails the long-term (5 to 20 years) envisioning planning and development of future global aviation systems and operations	ICAO Doc.10088
Co-operation	Cooperation is the more practicable effort towards developing mutually agreeable optimized solutions	ICAO Doc.10088

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	to strategic and pre-tactical issues and challenges in the nearer time horizon	
Co-ordination	Coordination refers to the real-time exchanges of information and joint tactical decisions at the operational level.	ICAO Doc.10088
Controlled airspace	An airspace of defined dimensions within which air traffic control service is provided in accordance with airspace classification Note-Controlled airspace is a generic term that covers ATS airspace classes A,B,C,D and E	ICAO Doc.4444
Controlling Military Unit	Any fixed or mobile military unit handling military air traffic and/or pursuing other activities, which owing to their specific nature, may require an airspace reservation or restriction.	Regulation (EC) No 2150/2005
Flight Intent	The future aircraft trajectory expressed as a 4-D profile until destination (taking account of aircraft performance, weather, terrain, and ATM service constraints), calculated and "owned" by the aircraft flight management system, and agreed by the pilot.	ICAO Doc.9854
Formation Flight	A flight consisting of more than one aircraft which, by prior arrangement between the pilots, operates as a single aircraft with regard to navigation and position reporting, as well as clearances issued by ATC.	EUROCONTROL Specifications for harmonised Rules for Operational Air Traffic (OAT) under Instrument Flight Rules (IFR) inside controlled airspace of the ECAC Area (EUROAT)
Flight Plan	contains specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft (ICAO Doc 4444).	ICAO Doc 4444
General Air Traffic (GAT)	All movements of civil aircraft, as well as all movements of State aircraft (including military, customs and police aircraft) when these movements are carried out in conformity with the procedures of the ICAO; (REGULATION (EC) No 549/2004)	Regulation (EC) No 549/2004
Improved OAT Flight Plan (iOAT FPL)	The iOAT FPL is a structured formalised flight plan based on the ICAO model flight plan form that aggregates information on military IFR flights and is	EUROCONTROL Guidelines for a harmonised and

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	shared with all pertinent ATM and relevant non-ATM actors in a harmonised format.	improved OAT FPL (New)
Military activity/exercise	A military tactical event requiring multi-agency (i.e. civil - military coordination) and/or cross border coordination which potentially requires temporary ASM measures that has an impact at network level.	Mission Trajectory Detailed Concept
Military tactical control	Actions of a qualified (military) controller in his / her area of responsibility (e.g. ARES, QRA), who guides the military aircraft towards the point (time or space) where the pilots take responsibility for the mission and / or continue to monitor the position of the military aircraft	EUROCONTROL Guidelines for a harmonised and improved OAT FPL (New)
Network Manager NM	means the body entrusted with the tasks necessary for the execution of the functions referred to in Article 6 of Regulation (EC) No 551/2004;	Commission Implementing Regulation (EU) 2019/123
Non-ATM actor	A person, organisation or technical system authorised to interact with ATM system to obtain information about IFR flight through FPL and use it for further monitoring and control.	EUROCONTROL Guidelines for a harmonised and improved OAT FPL (New)
Non-standard Formation	A formation that is operating outside the limits of a standard military formation. A non-standard formation requires ATC approval	EUROCONTROL Specifications for harmonised Rules for Operational Air Traffic (OAT) under Instrument Flight Rules (IFR) inside controlled airspace of the ECAC Area (EUROAT)
Operational Air Traffic (OAT)	All flights, which do not comply with the provisions stated for GAT and for which rules and procedures have been specified by appropriate national authorities. OAT can include civil flights such as test-flights, which require some deviation from ICAO rules to satisfy their operational requirements.	EUROCONTROL Specifications for harmonised Rules for Operational Air Traffic (OAT) under Instrument Flight

		Rules (IFR) inside controlled airspace of the ECAC Area (EUROAT)
Operational stakeholders	Means the civil and military airspace user's civil and military air navigation service providers and airport operators, which operate in the airspace of ICAO EUR region where Member States are responsible for the pro vision of air traffic services.	Commission Implementing Regulation (EU) 2019/123
Standard Military Formation	A formation of aircraft flying under IFR in which each wingman aircraft will stay within 1 NM horizontally and 100 ft vertically of the lead aircraft.	EUROCONTROL Specifications for harmonised Rules for Operational Air Traffic (OAT) under Instrument Flight Rules (IFR) inside controlled airspace of the ECAC Area (EUROAT)
Wing Operations Centre (WOC)	The Wing Operations Centre is a generic term, which designates the operational processes and services directly related to the military airspace users and linked to Mission Trajectories and other aerial activities. The definition avoids detailing the diverse organisational structures existing in Europe; therefore, it is considered to be a function	Mission Trajectory Detailed Concept

Table 1: Glossary of terms

2.7 List of Acronyms

Acronym	Definition
A/C	Aircraft
ACC	Area Control Centre or Area Control
ADR	Aeronautical Data Repository
AFUA	Advanced Flexible Use of Airspace
AIM	Aeronautical Information Management
AIP	Aeronautical Information Provider

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Acronym	Definition
AIRAC	Aeronautical Information Regulation and Control
AIS	Aeronautical Information System
AIXM	Aeronautical Information Exchange Model
AM	Airspace Manger
AMC	Airspace Management Cell
ANS	Air Navigation Service
ANSP	Air Navigation Service Provider
AO	Aircraft Operator
AOC	Aircraft Operations Centre
AOI	Area of Interest
AOR	Area of Responsibility
APP	Approach
ARES	Airspace Reservation
ARO	Air Traffic Services Reporting Office
ASHTAM	NOTAM relating to volcanic and/or dust activity
ASM	Airspace Management
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATCU	Air Traffic Control Unit
ATFCM	Air Traffic Flow and Capacity Management
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATS	Air Traffic Services
ATSU	Air Traffic Services Unit
AU	Airspace User
AUP	Airspace Use Plan
B2B	Business-to-Business
BT	Business Trajectory
CACD	Central Airspace and Capacity Database
CADF	Centralised Airspace Data Function (ECAC)
CAP	Capacity

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Acronym	Definition
CASA	Computer Assisted Slot Allocation System
CAT	Category
CBA	Cost Benefit Analysis
CBA	Cross-Border Area
CC	Capability Configuration
CDM	Collaborative Decision Making
CFMU	Central Flow Management Unit
CHMI	Collaboration Human Machine Interface
CMC	Civil-Military Coordination
CNS	Communication Navigation and Surveillance
COM	Aeronautical telecommunication service
CONOPS	Concept of Operations
CPDLC	Controller-Pilot Data Link Communications
CPR	Correlated Position Report
CR	Change Request
CRC	Control & Reporting Centre
CTA	Control Area
CTP	Combat Training Program
CWP	Controller Working Position
DAC	Dynamic Airspace Configuration
DCB	Demand Capacity Balancing
dDCB	Dynamic Demand and Capacity Balancing
DDR	Demand Data Repository
DMA	Dynamic Mobile Area
EAD	European AIS Database
eAMI	electronic Aeronautical Management Information
EATMA	European ATM Architecture
EATMS	European Air Traffic Management System
EAUP	European Airspace Use Plan
EC	Executive Controller (also referred to as Radar Controller)
ECAC	European Civil Aviation Conference

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Acronym	Definition
EET	Estimated Elapsed Time
eFPL	Extended Flight Plan
EMP	Electromagnetic Pulse
EOBT	Estimated Off Block time
E-OCVM	European Operational Concept Validation Methodology
EPP	Extended Projected Profile
ER ACC/APP	En-route Area Control Centre/Approach
ERNIP	En-Route Network Improvement Plan
ETFMS	Enhanced Tactical Flow Management System
EUUP	European Updated Use Plan
FAB	Functional Airspace Block
FD	Flight Deck
FDP	Flight Data Processing
FDPS	Flight Data Processing System
FL	Flight Level
FF-ICE	Flight and Flow Information for a Collaborative Environment
FMP	Flow Management Position
FMS	Flight Management System
FOC	Flight Operations Centre
FPL	Flight Plan
GAT	General Air Traffic
HLAPB	High-Level National / Sub-regional Airspace Policy Body
HPAR	Human Performance Assessment Report
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ID	Identification
IER	Information Exchange Requirement
IFPS	Integrated Initial Flight Plan Processing System
iMT	Initial Mission Trajectory
INTEROP	Interoperability Requirements
iOAT FPL	Improved Operational Air Traffic Flight Plan

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Acronym	Definition
IOP	Interoperability Protocol
iRMT	Initial Reference Mission Trajectory
iSMT	Initial Shared Mission Trajectory
ISRM	Information Services Reference Model
KPA	Key Performance Area
KPI	Key Performance Indicator
LTCM	Local Traffic Complexity Management
MDT	Mission Development Trajectory
MEPS	Military Engagement Plan for SESAR
MET, METEO	Meteo, Meteorological
MILO	Military Liaison Officer
MOE	Military Operational Environment
N/A	Not Applicable
NM	Network Manager
NMF	Network Management Function
NMOC	Network Manager Operations Centre
NOP	Network Operations Plan
NOTAM	Notice to Airman
NOV	NAF Operational View
NSOV	NAF Service Oriented View
NSV	NAF System View
OAUO	Optimized Airspace User Operations
OAT	Operational Air Traffic
OATTS	Operational Air Traffic Transit Service
OE	Operational Environment
OI	Operational Improvement
OSED	Operational Service and Environment Definition
PAR	Performance Assessment Report
PENS	Pan-European Network Service
PI	Performance Indicator
PRD	Predictability

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Acronym	Definition
PRR	Performance Review Report
PRU	Performance Review Unit
QRA	Quick Reaction Alert
RAD	Route Availability Document
RBT	Reference Business Trajectory
REQ	Requirement
RTSA	Real Time Status of ARES
SAC	Safety Criteria
SAR	Safety Assessment Report
SAR	Search and Rescue
SBT	Shared Business Trajectory
SDD	Service Description Document
SecAR	Security Assessment Report
SESAR	Single European Sky ATM Research Programme
SID	Standard Instrument Departure
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SPR	Safety and Performance Requirements
STAM	Short-Term ATFCM Measures
STAR	Standard Instrument Arrival
SWIM	System Wide Information Management
TAD	Technical Architecture Description
TAFMO	Tactical Flow Management Operations
TM	Trajectory Management
TMA	Terminal Manoeuvre Area
TOC	Top of climb
TOD	Top of descend
TRA	Training Area
TRL	Technology Readiness Level
TS	Technical Specification
TSA	Temporary Segregated Airspace
TTA	Target Time of Arrival

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Acronym	Definition
TTO	Target Time Over
UC	Use Case
UDPP	User Driven Prioritization Process
UUP	Updated Use Plan
VALP	Validation Plan
VALR	Validation Report
VALS	Validation Strategy
VP	Validation Plan
VPA	Variable Profile Area
VR	Validation Report
VS	Validation Strategy
WOC	Wing Operations Centre
WP	Way Point
WP	Work Package
XML	Extended Markup Language

Table 2: List of acronyms

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3 Operational Service and Environment Definition

3.1 SESAR Solution PJ07-W2-40: a summary

A new generation of military manned and unmanned aircraft/platforms, with innovative technologies and enhanced tactical capabilities, require ATM network to be more flexible and adaptive to integrate military mission-specific requirements and ensure fulfilment of mission objectives. Trajectory management becomes more dynamic and complex with enriched data content to be managed in real time, while providing opportunities for better balancing of the Military ATM demand leading to the optimisation of performance of the entire ATM network operations.

Optimised airspace users' operation project opens an opportunity to express military needs and to reflect specific aspects regarding the integration of military ATM demand into the future TBO environment through realisation of the operational improvement steps and corresponding technical enablers.

These improvements are enabled by the 4D trajectory concept (specifically Mission Trajectory detailed concept) and new ARES design principle for DMA type 1 and 2. Importantly, MT concept does not challenge those military operations, which constitute national defence and security aimed at protecting national airspace – these are out of scope of SESAR R&D.

The solution contributes to the increasing transparency, flexibility, predictability, efficiency, and effectiveness, enabling flexible access to airspace by improving the MT concept. The MT concept facilitates integration of military IFR flights together with military mission-specific requirements into the ATM network operations, but this should not restrict other airspace users exploiting the concept in circumstances where their operational requirements cannot be fulfilled by applying the concept of business trajectory.

For military aircraft operators, the utilisation of the MT concept as a way to integrate flight intent with flight profile containing Airspace Reservation (ARES), allocated via ASM processes, represents a significant operational improvement. It reflects how complex processes managed by different actors and composed of several activities in the planning phase can be integrated into 4D trajectory dataset hence sharing respective MT data with all ATM actors concerned.

Offering new opportunities in the context of the Advanced Airspace Management concept, ARES types based on VPA and DMA design principles are agreed upon in a CDM process, and form part of the holistic trajectory description.

The trajectory data, shared via iOAT FPL in the ATM network systems for DCB and DAC processes, aims at fulfilling the military mission requirements whilst minimising the potential impact on the wider ATM network performance. The complexity of the task involving dynamic management and dynamic updates, together with the interaction between processes, makes automation and new modelling capability for decision-making a necessity while keeping in mind that human role remains key in the decision-making chain. The concept envisages full integration of ASM/ATFM/ATS processes, in combination with dynamic and collaborative decision-making layered process supported by automated tools.

Military AU operations are strongly supported by the WOC function with the system support performed at different levels and based on the architecture of the military national ATM systems. This

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is a key capability for the military operational stakeholders that facilitates planning, development, sharing, execution, and management of MT. WOC function also provides an interface with ATM network facilitating along trajectory lifecycle seamless exchange of the ATM related data and CDM.

The Solution PJ-07-W2-40 aggregates effort of two solutions developed and validated in SESAR 2020 Wave 1 (PJ07.03 and PJ08.01) bringing together concept elements of the entire MT concept. The Solution is focusing on further improvement of operating methods and operational activities related to the definition of DMA type 1 and 2, its integration into iMT description and collaborative layered planning process with focus on CDM supported by automation and management of the ATM constraints.

The scope of the MT concept is wider than the scope of the Solution PJ-07-W2-40 and dependencies between concept elements are reflected in the figure below.

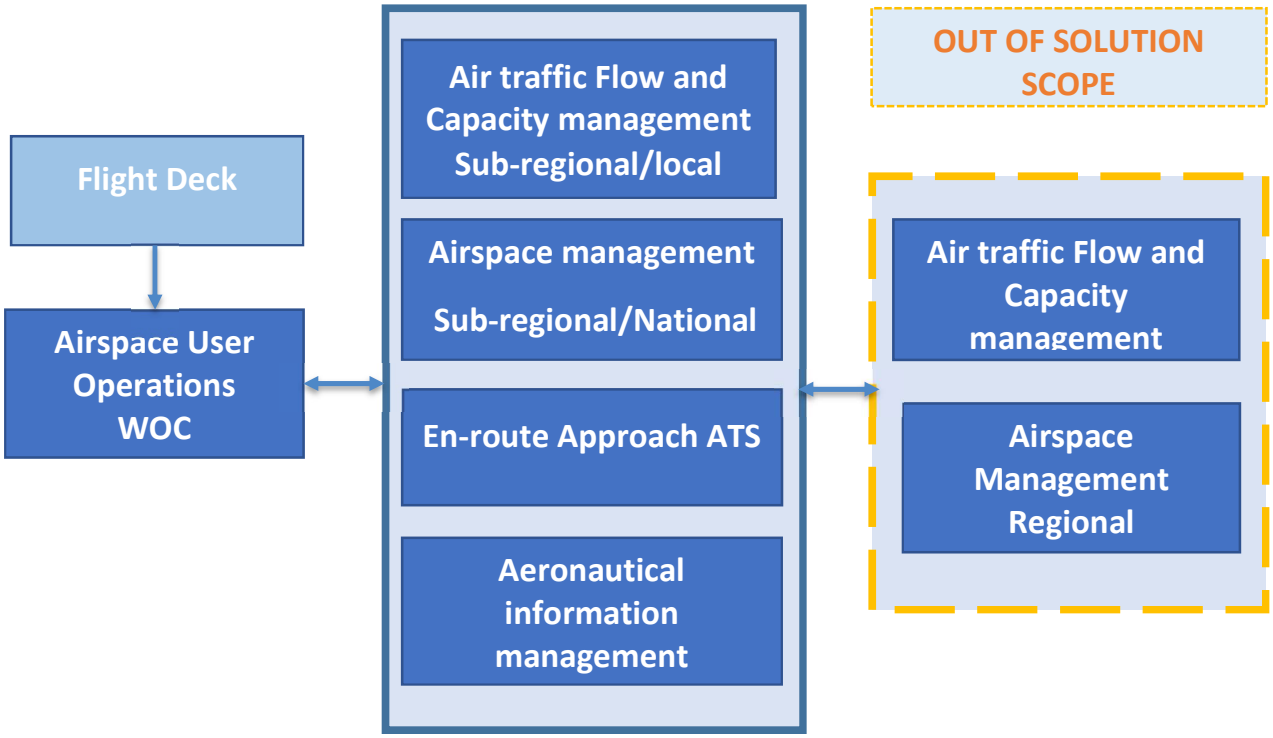

Figure 1: Scope of the MT concept

According to the Grant agreement the solution PJ-07-W2-40 Initial 4D Mission Trajectory development with DMA type 1and 2 supported by automation and dynamic civil-military CDM aims at developing and validating new operating methods and operational processes for iMT in planning phase at local/sub-regional level only.

Dependencies between operational nodes as well as exchanges of information elements in the iMT Nodes connectivity diagram reflect the entire iMT concept integrated into EATMA.

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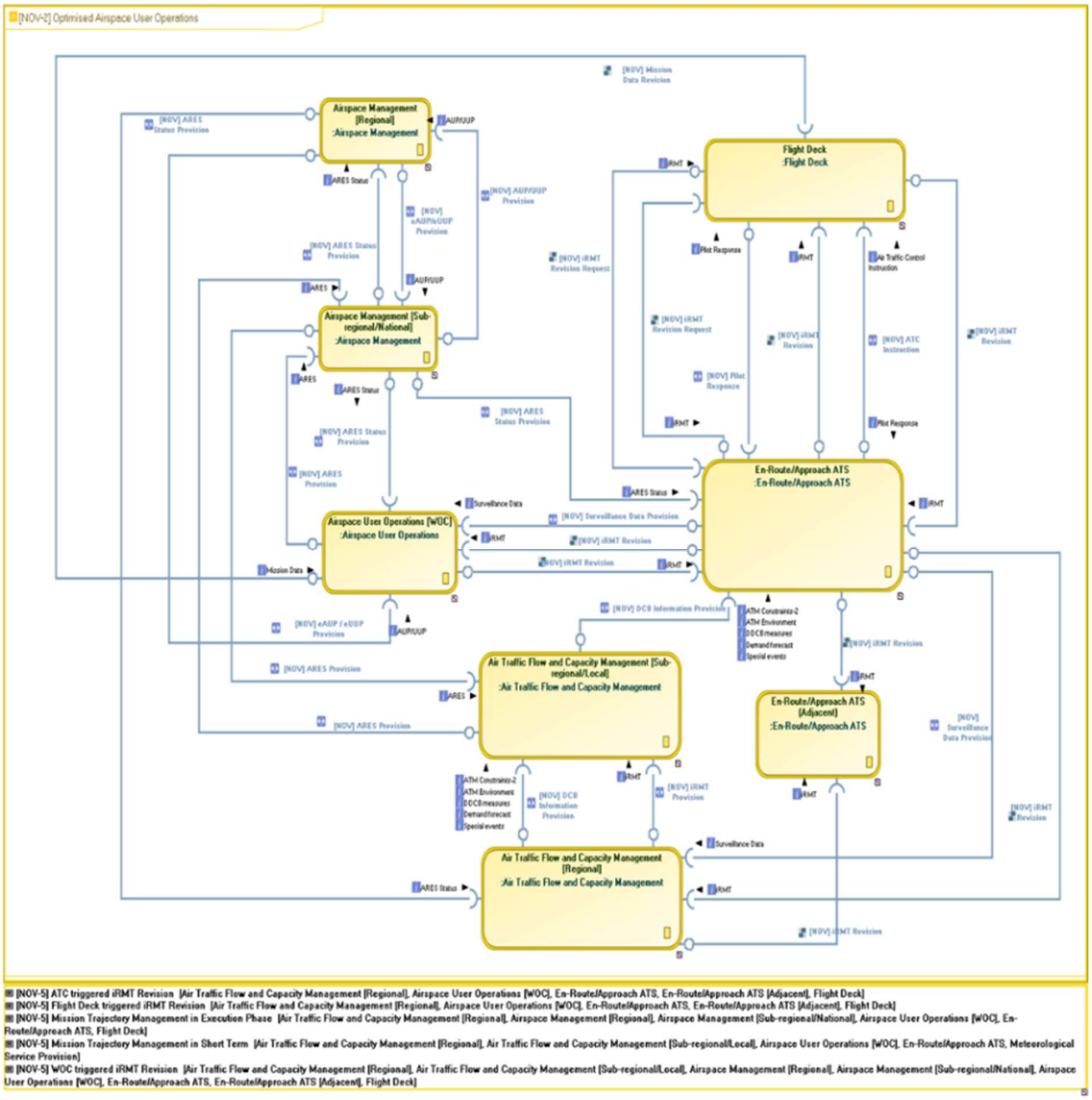

Figure 2: iMT Nodes connectivity diagram

Owing to the circumstances of global nature, the effort and resource initially envisaged for the solution has been limited, hence refining its operational content. Therefore, the solution focuses on the iMT lifecycle describing the development phase and sharing of iMT with ATM actor concerned. The interaction between relevant nodes is adjusted to the operational content of the solution.

The following OIs and enablers belong to the scope of this solution:

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SESAR Solution ID	SESAR Solution Title	OI Steps ID	OI Steps Title	Enabler ID	Enabler Title	OI Step/Enabler Coverage
PJ-07-W2-40	Initial 4D Mission Trajectory development with DMA type 1and 2 supported by automation and dynamic civil-military CDM	**AUO-0210**	Participation in CDM through iSMT and Target Time (TTO) negotiation	AOC-ATM-14	Upgrade of WOC system to handle improved OAT flight plans	**OI step:** • **Fully** **Enablers:** • Use
				AOC-ATM-20	Sharing of trajectory data between AOC/WOC and the ATM world using B2B web services	• Use
				MIL-0105	CDM data integrated into the Wing Operations Centre Mission Support System	• Develop
				MIL-0106	Wing Operations Centre Mission Support System enhanced to support the CDM process	• Develop
				PRO-076	Procedures for the iSMT in the CDM process	• Develop
PJ-07-W2-40	Initial 4D Mission Trajectory development with DMA type 1and 2 supported by automation and dynamic civil-military CDM	AOM-0304-B	Integrated management of Mission Trajectory in trajectory-based operations environment	AAMS-16a	Airspace management functions equipped with tools able to deal with free-routing	**OI step**: • Fully • **Enablers**: • Use
				AAMS-16b	Airspace management system equipped with	• Use

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SESAR Solution ID	SESAR Solution Title	OI Steps ID	OI Steps Title	Enabler ID	Enabler Title	OI Step/Enabler Coverage
					tools able to deal with flexible use of airspace	
				MIL-0108	Exchange of specific MT data (ARES description) in standard format	• Develop
PJ-07-W2-40	Initial 4D Mission Trajectory development with DMA type 1and 2 supported by automation and dynamic civil-military CDM	AOM-0208-B	Dynamic Mobile Areas (DMA) of types 1 and 2	AAMS-16a	Airspace management functions equipped with tools able to deal with free routing	**OI step:** • **Fully** **Enablers:** • Use
				Mil-AOC-ATM-0108a	WOC mission support system enhanced with functionalities facilitating integration of DMA type 1 and 2 data into the development of mission trajectory	• Develop
PJ-07-W2-40	Initial 4D Mission Trajectory development with DMA type 1and 2 supported by automation and dynamic civil-military CDM	AUO-0216	Shared Mission Trajectory Data	MIL-AOC-ATM-0108b	WOC mission support system enhanced to enable converting DMA type 1 and 2 data into the standard format for the exchange of the integrated military	**OI step:** • **Fully** **Enablers:** • Develop

SESAR Solution ID	SESAR Solution Title	OI Steps ID	OI Steps Title	Enabler ID	Enabler Title	OI Step/Enabler Coverage
					ATM demand through iOAT FPL mechanism	

Table 3: SESAR Solution 40 Scope and related OI steps/enablers

Table 4 summarizes the High Level Operational Requirements applicable to the SESAR Solution in the Concept of Operations.

The solution ensures traceability and connectivity with SESAR ATM concept through High level operational requirements.

High Level Concept of Operations Requirement ID	High Level Concept of Operations Requirement	Reference to relevant Concept of Operations Sections e.g. Operational Scenario applicable to the SESAR Solution
S40-HLOR-01	Mission Trajectory management with integrated DMAs type1 and type2 shall allow to improve the following KPIs: • En-route capacity and predictability • Environment and Fuel efficiency • Civil-military cooperation and coordination and • Flexibility While maintaining the overall performance of the ATM network through: • Integrated management of the Military ATM demand • Enhanced collaborative decision-making (CDM) • Dynamic sharing of the ATM related data Enabled by: • Automation of human processes in the relevant military domains (IMT, ASM, FPL) • Automation of CDM processes • Enhanced civil-military ATM/CNS interoperability	High Level Operational Requirements for Wave 2 Solutions
S40-HLOR-02	The integrated management of the Military demand shall enable improvement of planning output to en-route capacity and predictability through: • Efficient allocation of ARES (DMA type1/2) coherent with airspace configuration	High Level Operational Requirements for Wave 2 Solutions

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	• Uninterrupted sharing of the ATM related data set • Seamless civil-military coordination While maintaining mission effectiveness and mitigating adverse impact on the ATM network performance Enabled by: • Automation support to processing of the IMT related data and flight plan filing • Automation support to CDM • Enhanced civil-military coordination	
S40-HLOR-03	New ARES design principle (DMA type 1 and 2) shall enable better use of the airspace resource through: • Integrated ASM-ATFM based CDM processes for ARES allocation and management • Efficient civil-military collaborative processes for Airspace planning based on AU preferences and priorities, while maintaining optimal airspace configuration enabled by: • Digitalisation and automation of DMA data set definition, sharing and integration into IMT and airspace configuration • Preservation of national prerogative on airspace allocation and on prioritisation of IMTs	High Level Operational Requirements for Wave 2 Solutions

Table 4: PJ07-W2-40High Level Operational requirements

3.1.1 Deviations with respect to the SESAR Solution(s) definition

The following deviations to solution PJ.07-40W2 definition in EATMA have to be taken into account. Corresponding Change Requests have been created by the solution. The solutions assumes that the initiated CRs are granted and this SPR-INTEROP/OSED is based on these implemented CRs. The following table is a summary of the content of the CRs.

Enablers	OI step	Deviation
	AUO-0210 Participation in CDM through iSMT and Target Time (TTO) negotiation	Updated description of the OI step CR in rolling approval process
NIMS-35 Flight Planning management sub-system enhanced to process improved OAT flight plans		Out of scope not applicable

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Enablers	OI step	Deviation
NIMS-45 Initial Flight Planning management enhanced to support initial Mission Trajectory		Out of scope not applicable
	AUO-0216 Shared Mission Trajectory Data	Updated description of the OI step CR in rolling approval process
ER APP ATC 10	Mission Trajectory including airspace reservations integrated in ATC systems	Out of scope not applicable
ER APP ATC 101	4D Trajectory Management to support the RBT (Reference Business Trajectory) revision process	Out of scope not applicable
	AOM-0304-B Integrated management of Mission Trajectory in trajectory based operations environment	Updated description of the OI step CR in rolling approval process
A/C-61 Handling of additional military datalink messages in military aircraft for ATM purpose		Out of scope not applicable
A/C-61b Handling of additional military datalink messages in military aircraft for ATM purpose		Out of scope not applicable
A/C-61cOn-board management of ARES		Out of scope not applicable
AAMS-17 Adaptation of all AAMS sub-systems to the common ATM information model airspace		Out of scope not applicable
AAMS-18 Airspace management system		Out of scope not applicable

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Enablers	OI step	Deviation
enhanced to support the European-wide use of Military Training Area as part of the integrated European airspace planning process		
CTE-C06d Gateway for CIV/MIL interoperability		Out of scope not applicable
CTE-N01 GPS L1/L5		Out of scope not applicable
CTE-N06 Space Based Augmentation System (SBAS)		Out of scope not applicable
CTE-N06a EGNOS V2.4.X		Out of scope not applicable
ER APP ATC10 Mission Trajectory including airspace reservations integrated in ATC systems		Out of scope not applicable
CTE-N02GALILEO E1/E5		Out of scope not applicable
CTE-N03 GLONASS-K		Out of scope not applicable
CTE-N04BEIDOU B1/B5		Out of scope not applicable
CTE-N06b EGNOS V3		Out of scope not applicable
	AOM-0208-B Dynamic Mobile Areas (DMA) of types 1 and 2	Updated description of the OI step CR in rolling approval process
ER APP ATC 80 — Enable ATC System to Use Dynamically-Defined Airspace Reservations		Out of scope not applicable
AIMS-15 Aeronautical Information sub-system enhanced to be able to handle Dynamic Mobile Areas		Out of scope not applicable
NIMS-14b — Demand Data Repository Phase II		Out of scope not applicable

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Enablers	OI step	Deviation
NIMS-14c — Demand Data Repository Phase III		Out of scope not applicable
NIMS-19 — Flight Planning management sub-system enhanced for AFUA		Out of scope not applicable
PRO-146 ASM Procedures for agreeing and promulgating information on Mobile Exclusion Areas		Out of scope not applicable

Table 5: Deviations to the SESAR solution PJ07-W2-40

3.2 Detailed Operational Environment

Operational environment refers to the operational nodes operational processes and systems, which facilitate ATM operations of civil and military operational stakeholders and the Network Manager. All the constituents of the operational environment play vital role to ensure successful flight operations and maintain performance of the ATM network. The operational environment description is limited to the nodes performing operational activities in the medium-to-short-term planning phase at local/sub-regional level only.

The ECAC airspace is constantly undertaking modernisation in order to optimise ATM network operations and satisfy performance targets set for different reference periods. This modernisation of the ECAC airspace brings new design features and operational processes/procedures to be validated in the scope of SESAR projects. Each operational node of the European ATM Architecture implements functions and services to realise the ATM capabilities.

3.2.1 Operational Characteristics

This section provides the detailed description of the operational characteristics of the operational environment about operating and sub-operating environments considered in the solution from perspective of Wing Operations Centre, Air Traffic Flow and Capacity Management, and Airspace Management.

The notion of operating environment provides a logical link between the operational needs expressed by Airspace Users and the need to deploy new ATM procedures and technologies. Operating Environment (OE) means an environment with a consistent type of flight operations. In fact, operating environment can equally be applicable to civil and military flight operations with slight difference in the description of categories of such an environment.

For the purposes of strategic deployment planning set out in the Master Plan, European service provision units have been categorised into four operating environments: airport, terminal manoeuvring area (TMA), en-route and network. Further subdivisions to the sub-operating

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environments for detailed planning purposes recognise the different needs of units with differing complexity and traffic Levels.

Each operational node, and capability configuration, are related either to one or more Sub-operating environments (Airport, En-Route (High Complexity, Medium Complexity, Low Complexity), Network, TMA (High Complexity, Medium Complexity, Low Complexity).

In the context of the solution the Airspace User Operations (WOC) is associate with operational environment en-route and sub-operational environments En Route-Very High complexity, En Route-High complexity, and En Route-Medium complexity.

Military operating environment (MOE) has been created to analyse the contribution of civil-military coordination and interoperability solutions for mission effectiveness and overall network performance. Military's approach is to implement civil capabilities when possible and when those capabilities do not introduce constraints and limitations to higher military functions. While a large portion of civil operations at airports, in TMA and en-route are comparable, military flight operations are substantially different.

Military operational stakeholders will be concerned with operating environments when deploying new operating methods, tools and procedures and consider both ground and airborne components.

The ground based operating environment will comprise organisation of air operations and service provision whilst the airborne based operating environment will mainly focus on provision of services rendered to military and civil traffic in respective areas of responsibility. Such Operating environments will cover:

· Military airbases and airbases collocated with co-use by civil aviation

· TMA with military and mixed operations handling and transit service for military and civil flights

· CTA control area with military areas of responsibility

· ARO handling and transit service for military and civil flights

· ARES with tactical control and transit service for all non-participating flights

The ECAC airspace is constantly undertaking modernisation to optimise ATM network operations and satisfy performance targets set for different reference periods. This modernisation brings new design features and operational processes/procedures.

Each operational node of the European ATM Architecture implements functions and services to realise the ATM capabilities. In solution PJ07-W2-40 the following operational nodes, including their instances, are addressed:

3.2.1.1 Airspace organisation

This node is not in the scope of the conceptual developments and validation activities of the Solution, however it is described in this document in order to provide a complete view over the ATM architecture support to the management of military ATM demand.

The Airspace Organisation node is responsible for airspace design and consolidation of airspace needs under consideration of traffic demand forecast.

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Airspace Organisation is enriched by elements of airspace structure based on new airspace design principles (VPA, DMA) introduced by the AFUA concept as well as on advanced solutions for the flexible ATC sectorisation and Free Route Airspace operations.

The AFUA concept provides more flexibility to all Airspace Users by allowing dynamic airspace management in all phases of the operations - from initial planning, throughout the execution phase and post-operational analysis phase.

AFUA concept brings new airspace design features to optimally fulfil military AU needs and better share the airspace resources with all Airspace Users concerned.

Implementation of AFUA concept implies for

- Military: The dynamic management of airspace that allows the planning and management of military operations much closer to the time of operation when required. The automation of some identified human processes in ASM support tools which improve the civil-military decision making process and provide additional features, like forecast, which improves visibility and transparency in planning and execution phases. It ensures, in some situations, the optimum satisfaction of military Airspace requirements.
- Civil: The dynamic management of airspace allows the planning and management of a better demand and capacity balancing (DCB) at the three levels of airspace management at national sub-regional and regional scale.
- All: In order to ensure optimum use of available airspace by all Airspace Users, the need for direct co-ordination and a collaborative dialogue between civil and military Local Network Management actors (AMC, ACC, …) and the Network Manager will require system support and communications to allow for real-time update of the environmental database (in planning and execution phase). This will provide improved coordination between military and civilian operational stakeholders and an enhanced mutual awareness of the airspace activities of both civil and military airspace users. Additionally, this more effective and advanced flexible use of airspace will increase capacity while reducing of the workload in the Execution Phase.

Network Operations Plan (NOP) serves as a unique living source of information for all ATM actors and operational stakeholders providing network view on ATM operations from strategic through planning to the execution and post operations phases. It contains:

- Re-enforcement of capacity planning;
- Airspace design and utilisation actions;
- Use of network planning tools and data;
- Preparation of system changes/special events;
- Deployment of flight efficiency improvement actions;
- Proposals and support for operational improvements;
- Network procedures (ATFCM/ASM/ATS);
- Deployment of network systems and programmes.

Free route airspace (FRA) is a specified airspace volume within which users may freely plan a route between a defined entry point and a defined exit point. Subject to airspace availability, the route can be planned directly from one to the other or via intermediate (published or unpublished) way points,

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without reference to the ATS route network. Within this airspace, flights remain subject to air traffic control.

Within FRA airspace there will not be a published ATS route network, however, where required, transition routes facilitating arrival and departure traffic could be extended from Terminal Airspace into FRA airspace. These will be used to segregate traffic and mitigate against excessive demand over capacity through the introduction of target times over points. On exiting the Terminal Area or last point on the transition route, the Airspace User will be free to plan and fly their chosen trajectory to the defined entry point at their destination airport.

ATC sectors will be designed in a modular manner and implemented to accommodate the predicted flows whilst minimising multiple re-entry of flights within a sector. This use of Dynamic Airspace Configurations (supported by the DAC tool) within the fully integrated ASM/ATFCM/ATS CDM layered process will take account of a new ARES design principle Dynamic Mobile Areas for flight requiring segregation complementary to already validated ARES based on VPA design principle.

The Dynamic Mobile Area (DMA type 1 and 2) 3D configuration will be designed and located, both in terms of vertical and geographical dimensions and time duration, where suits to military operational requirements and with the least possible impact on ATM performance targets. The DMA design provides greater flexibility and facilitates the optimisation of possible ARES impact on the geographical shape and size of the ATC sector while ensuring that such airspace is reserved for a period of time appropriate to the planned activity and geographically located to cause minimal Network disruption.

3.2.1.2 Airspace Management Sub-Regional/National (AMC)

The Airspace Management node is responsible for the airspace organisation and management and the airspace allocation activities.

Local and Sub-regional actors (ACCs, AMCs, FAB) in close coordination with Regional ATFCM assess the impact of airspace demand and develop solutions in order to optimise network, regional, sub-regional and local performance. This process is a continuously iterative and interactive validation, development and refinement of the forecast that is built into a final operation plan promulgated the day before the operations.

Modular temporary airspace structures and reserved areas are introduced to enable sub-divisions, new areas or revised airspace requirements. The VPA design principle for ARES is becoming a common principle used in the European airspace design providing sufficient level of flexibility and adaptability to military operational requirements.

The greater flexibility is offered to integrate military requirements by defining different airspace scenarios providing different airspace configurations with acceptable network impact through extension or sub-division of military training areas (TSA/TRA/CBA) adjusted to match military training and operational requirements for each type of mission.

While offering greater flexibility to integrate military operational requirements, the operational stakeholders and the NM, will benefit from higher availability of the airspace resource agreed upon in CDM process for flight planning and tactical ATS operations,

3.2.1.3 Sub-Regional/Local Air Traffic Flow and Capacity Management

The ATFCM node is responsible for the demand and capacity balancing activities.

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Air Traffic Flow and Capacity Management is an iterative process that runs along the ATM lifecycle starting at the Long-Term Planning Phase, being refined and detailed during the Medium Term Planning and Short Term Planning Phase, with corrective actions even during the Execution phase.

The Air Traffic Flow and Capacity Management process integrates Local-/Sub-Regional and Regional information into a common shared Demand and Capacity picture. It is a key characteristic that none of the levels/actors work in isolation, but together in an integrated way.

The Demand planning is based on forecasts about traffic demand and Airspace Use. The forecasts are progressively detailed and refined with new / updated / more detailed information about flight intentions, as getting closer to operations.

Coordination between Flow management and Airspace Management is effected before the day of operation with reviews and updates in the tactical Phase (Day of operations).

The reference traffic demand is based on historical data, intentions and predictions for civil traffic.

Detailed flight specific historical military IFR traffic data is not included, since military flights or portion thereof is not processed today by the NM systems and in consequence did not feed historical traffic demand data sets.

If historical military IFR traffic data would be useful to be included in the future, needs to be validated. It is assumed that due to the high variability of military IFR operations compared to regular scheduled flights, predictability might even be decreased.

Capacity planning is reflected by a capacity plan, which takes into account refined information, where available, on the potential impact of Long-term military planning of major exercises.

The Capacity plan is based on the definition of ATM resources and the selection of configurations adapted to the demand.

3.2.1.3.1 Demand Capacity Balancing

Dynamic Airspace Configuration is part of the wider Demand and Capacity Balancing (DCB) process, one of many processes, which serve to adjust capacity to meet demand.

Demand and Capacity Balancing (DCB) activities will be carried out by various functions (Regional, Sub-regional, and Local levels) in a seamless process which will maximise the use of available capacity and will minimise deviations by AUs from their optimal flight profiles.

Dynamic Airspace Configuration processes may identify a requirement to change demand (via the inability to balance capacity with demand); however, any subsequent change in demand will be done via DCB.

Following configuration parameters should be defined as DAC/DCB parameters:

- Sector Load Thresholds
- Airspace Blocks attributes, such as:
  - Airspace blocks Family arrangement (rules to group airspace blocks);
  - Delegations - Between same organisational level (ex: 2 Centres);

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- Delegations - Between upper and lower organisational level (ex: FAB and ANSP);
- Notified time to change sector configuration (Time to build Situation Awareness for ATCOs) e.g. 15 min;
- Min Sector Duration = stability of a sector configuration e.g. 30 min;
- Max Load Duration = Maximum duration of maximum load peak before triggering reorganisation e.g. 15 min.

• ARES/DMA design principles and rules.

The DAC/DCB strategy does not rely only on a consecutive implementation of a DAC measure and then of an ATFCM measure to resolve remaining imbalances; the integrated DAC-DCB processes, assisted by decision-support tools, enable to refine optimised combined solutions of the different DCB-DAC measures, depending on time horizon, optimisation criteria and performance targets

3.2.1.3.2 Dynamic airspace configuration DAC

"Dynamic Airspace Configurations" concept, provides different options to manage capacity, through varying the degree of Sector Design and Configuration dynamicity, the level of automation and the innovation in human performance and related training to better support a higher flexibility in the airspace configuration.

The **objective** of Dynamic Airspace Configuration is to manage airspace in an efficient manner to contribute to the achievement of various defined AUs' performance targets and operational requirements. In pursuing this objective DAC processes will take fully into account military ATM objectives and requirements.

The DAC concept delivers processes distributed through different phase of the ATM lifecycle focusing on organising planning and managing elements of the airspace structure in order to:

- meet User Preferred Routing, in a Free Route operating environment;
- respond to any change in traffic demand; unexpected events, and update in airspace reservations in the optimum way;
- allow better distribution of ATCO workload.

The objective of the DAC processes is to identify optimised airspace configurations (including configuration plans for transitions) for a defined airspace through the implementation of airspace design and configuration sub-processes based on the forecasted air traffic complexity, ATCo workload and ATCo availability as well as the traditional count methodologies provided by the Imbalance Prediction and Monitoring Service (Hourly Entry Counts and Occupancy). The identified optimised airspace configuration should meet forecasted traffic demand and reach the defined performance targets both at Local and Network levels and with minimal impact on the Business/Mission Trajectories.

With Dynamic Airspace Configuration in place, it will be possible to manage dynamically all capacity elements and constraints in one single, seamless process.

• Sector configurations are arranged according to an initial set of decision criteria (among which confidence indices, capacity load and stability, accuracy versus uncertainties, or local parameters – staffing, capacity level calculation or stability parameters).

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- The assessment of the criteria results on an airspace configuration that is negotiated through the DCB Collaborative Decision Making Process (CDM) with the ATM Actors, including Military (negotiating the automated allocation Dynamic Mobile Areas, DMA).

- The final configuration plan is made available to the ATSU Supervisor, LTM and EAP. These final actors, should be able to optimise the configuration plan to adapt capacity to demand and meet the needs of the ATM community while minimising demand adjustments. To achieve these objectives, the What-If service becomes a fundamental asset.

3.2.1.4 Airspace User Operations (WOC)

The AU operations node wing operations centre (WOC) performs all the necessary activities to support AU operations, including pre-tactical and tactical phases, participating in CDM processes and user driven prioritisation processes UDPP (when fully operating as GAT), update of airport operations plan AOP with available, provided by AU information, and ground handling.

From SESAR definition phase on, along the evolution of the operational concept development, WOC has never been mirroring neither the organisational structure nor operational activities of FOC. The MT concept explicitly describes WOC as a function that can be distributed amongst different entities with different roles and actors according to national military organisation and infrastructure. In the context of the solution, roles actor's responsibilities and support systems associated with WOC function and WOC technical capabilities are used to explain operational activities and information exchanges between all relevant nodes along all phase of iMT lifecycle.

The Operational Concept describes phases of the mission trajectory life cycle, which are congruent with the ATM planning phases:

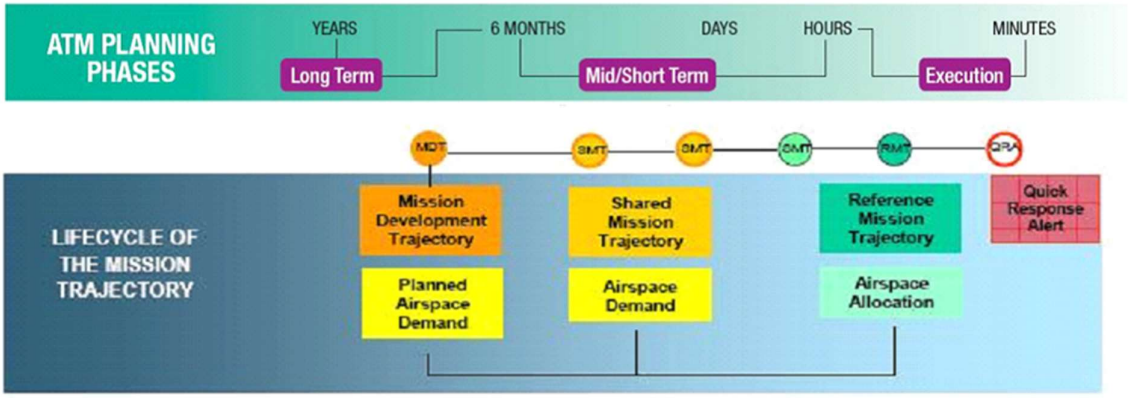

Figure 3: iMT lifecycle vs ATM planning phases

The duration, details, events and organizational matters of these three phases of the MT life cycle will vary among military operational stakeholders of the European states. This section will provide a generic view regardless of national and/or military specifics, by focusing on ATM relevant aspects only.

An up to date and complete set of planning data forms an essential basis for efficient and safe mission planning. The required data in appropriate quality and correctness will be made available via initial SWIM services. It will be downloaded into proved and certified support systems and data bases. Initial SWIM will facilitate exchange of aeronautical data (EAD, CACD), environmental data i.e. Aeronautical Information Management data (i.e. the regional AIM Technical System), weather data (4D Weather

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Cube) and flight plan data amongst other. Initial SWIM services will enable transfer/import of planning data into the WOC system(s) (i.e. the State AU WOC Technical System(s)) and further exchange with ATM actors concerned.

WOC will plan missions/flights with respect to aeronautical, meteorological information and tactical aspects. In mid-term planning phase, an Early Flight Intent (EFI) will be published prior to flight plan submission. The EFI expresses a mission intention to use a segregated/restricted volume of airspace over a defined geographical location within pre-defined timeline. The EFI content does not include a trajectory description but provide the following information:

- Aerodrome (Departure/Arrival)
- ARES description/designator (for the intended Airspace to be used)
- Time/Duration of the activity (including Date)
- Aircraft Type
- Priority Information
- Number of Aircraft in the mission

Once the EFI is accepted and ARES is allocated the iOAT FPL must be filed after the mission planning process has been consolidated. The Mission Support System (MSS) will support the filing of the flight plan in a common format. This format is based upon the ICAO FPL 2012 model and applies to military IFR flights in controlled airspace. The required functionality has been implemented in form of an intuitive user interface in the Mission Planning Software The MSS enables WOC to easily share flight plan data in form of an iOAT FPL format with the regional ATFCM (i.e. Network Manager) via SWIM compliant B2B service.

3.2.1.4.1 Harmonised and improved OAT FPL

The iOAT FPL is a structured formalised FPL based on the ICAO 2012 model FPL form that aggregates information regarding military flight and is shared with all pertinent ATM and non-ATM actors through NM Integrated Initial Flight Plan Processing System (IFPS).

Concept wise, the iOAT FPL is regarded as a mechanism that facilitates transition from the local to the Network view and is used by military operational stakeholders who intend to share their demand through the centralised processing verification and distribution in IFPS. This mechanism facilitates the accommodation of the military flights in controlled airspace of various classes A, B, C, D, and E.

The military operational stakeholders and the Network manager have recognised the iOAT FPL as an effective mechanism through which they can express their flight intent and deliver integrated military ATM demand. The iOAT FPL format ensures consistency of data and semantic interoperability while describing the military demand. It provides information elements specific to the military mission objectives, which can be processed, verified, distributed, and integrated into the ATM network operations.

Content wise the iOAT FPL aggregates iMT dataset that describes intended flight route with reference allocated ARES and other specific information elements relevant to military operations. It allows integrating information about special en-route activities.

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The integrated special en-route activity information indicates to all ATM and non-ATM actors concerned the intention to use the airspace outside the flight route or along it for a military tactical event. When the tactical event is dangerous to other flights it must be segregated by using ARES. The required ARES is allocated via ASM process. The flight level blocks and patterns defined around or between two waypoints where holding, orbiting and loitering take place, are coordinated with respective ATC authority prior to submission of the iOAT FPL.

The special en-route activities can vary by type and may include flights inside reserved/restricted airspace ARES, flights at the aerodromes for multiple approaches and "touch and go" exercises as well as flights inside airspace defined either around one or between two navigation points for orbiting, holding, and loitering. The modification allows the inclusion in the route description information regarding entry and exit parameters for the designated portion of airspace or ARES designator together with time duration of the activity.

In order to reflect the timing of a special en-route activity the STAY indicator applies. The flight route description contains STAY to indicate the beginning and the end of the activity along the flight route. In the description of the flight route the STAY indicator is used to describe the airspace/pattern between the entry and exit points defined for the special en-route activity. It also indicates to NM and ATSU the time delay associated with the activity

Time values reflected in the iOAT FPL include estimated elapsed time (EET) of the entire flight, EET to the STAY entry point e.g. ARES or predefined patterns and EET for the special en-route activities conducted inside ARES or along predefined patterns. It should be noted that the value of EET inside ARES or along the predefined patterns could not exceed the value of EET of the entire flight. These time values indicated in the iOAT FPL are essential parameters for the Flight Crew ATCO and NM in flight profile calculation, validation, and management

3.2.2 Civil-Military ATM coordination

In the reference operational environment, civil/military ATM coordination is the cornerstone for the military operational stakeholders and the Network manager. With due regard to future military airspace requirements based on cutting edge technologies and performance of new generation of manned and unmanned aircraft/platforms the civil/military ATM coordination becomes a necessary precondition for safe and efficient flight operations in consideration of the need of states to guarantee their defence capability over land and their territorial waters.

Civil-military ATM coordination is a crucial enabler for the management of airspace in an equitable and dynamic manner that ensures the efficient use of airspace, better responses to changing operational conditions (e.g. weather conditions, natural disasters), faster deployment of resources for contingency responses and enhanced safety for civil and military operations. This allows for efficient flight paths, resulting in lower fuel costs, reduced emissions and the availability of alternative routings to circumnavigate adverse weather conditions, resulting in obvious financial, environmental and safety benefits. Flexible access to airspace translates into quicker responses to developing situations, improving effectiveness and optimizing mission time of military aircraft.

Civil-military ATM coordination is based on a seamless CDM process, starting from the capture of all civil and military airspace requirements for the definition and management of airspace configuration. This must be supported by continuous information sharing amongst all ATM actors concerned; however, there will be situations where information is limited and cannot be shared amongst all ATM partners due to national security restrictions and confidentiality policies.

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The following Civil/military ATM coordination principles shall apply:

- The organisation and management of airspace must ensure that military defence capability will continue to provide and further improve effective security and defence in Europe.

- Freedom to operate both manned and unmanned aircraft, in all weather conditions in all areas of the European airspace where national regulations allow to do so to execute all variety of assigned national and/or international missions.

- Provision of ATM system capabilities, including civil ones, to facilitate military deployment, for priority flights and for time-critical missions, but also for military aircraft not fully equipped to the civil standard.

- The establishment of temporary airspace reservations situated as close as practicable to the appropriate operating areas, including airspace restrictions for non-flight-related activities.

- The implementation of a transparent process supported by commonly agreed modalities and monitoring scheme is considered a key enabler.

In the context of DAC concept, civil-military ATM coordination implies seamless collaboration between military operational stakeholders and pertinent DAC actors to ensure that military ATM demand is not jeopardised by integrated ASM ATFCM ATS processes while optimising airspace configuration tailored to the performance objectives.

Demand allocation will follow the CDM process between civil and military ATM actors where conflicting requests for airspace resources must be dealt with in a balanced manner, considering each other's priorities.

3.2.3 CDM

Collaborative decision-making (CDM) is defined as a process focused on how to decide on a course of action articulated between two or more community members. Through this process, ATM community members share information related to that decision, agree on, and apply the decision-making approach and principles. The overall objective of the process is to improve the performance of the ATM system as a whole while balancing the needs of individual ATM community members.

CDM benefits all participating parties through the negotiation of proposed options. The negotiation is concluded either when all participating parties reach the agreement, or when they are unable to accept further compromises due to defined priorities.

CDM supports decision-makers with timely and accurate information essential for the planning of their respective operations. CDM increases predictability in case of unforeseen events or disruption. Properly carried out, CDM also leads to efficient airspace utilization through optimised airspace configuration agreed between all operational stakeholders and the NM.

The dynamic operational environment requires dynamic information sharing that rolls through all phases of the ATM lifecycle. This flow of information with added SWIM capabilities allows rolling CDM in planning and execution phases.

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To enable CDM, the Military will share relevant ATM information with accredited CDM partners based on the "need to know" principle. Consequently, the iMT and ARES data set shared for CDM would not provide the full set of military information but only related unclassified ATM information.

CDM should be applied to all layers of decision making from strategic planning through to real-time operations and post operational analysis. Civil and military authorities and stakeholders should establish pre-defined and agreed upon procedures and rules to ensure that collaborative decisions will be made expeditiously and equitably.

The State should ensure that a framework is established for the effective coordination between ATS, ASM and ATFM at all phases of the ATM lifecycle in a collaborative manner, and ensure the establishment of cooperation and coordination agreements defining clear and unambiguous operational procedures at planning and execution phases

3.2.4 Roles and Responsibilities

In the scope of the solution following terms are used in combination with following corresponding meaning:

- A **role** is an aspect of a person or organisation that enables them to fulfil a particular **function**
- A role is a collection of responsibilities that an ATM actor can take.
- **Responsibility** is the obligation to conduct assigned **tasks** to a successful conclusion

Note: several ATM actors can perform a role. One ATM actor can perform several roles.
This sections groups the roles and responsibilities of each operational node relevant to the scope of the operational concept described in the document

3.2.4.1 Airspace Organisation and Management

3.2.4.1.1 Approved Agency

Approved Agencies are units, which are authorised by States to deal with Airspace Managers for airspace allocation and utilisation matters.

Their responsibilities include the submission of their needs for airspace to the airspace manager and of any update on their request.

They are permitted to negotiate for airspace to be allocated by airspace manager within the European AFUA (Advanced Flexible Use of Airspace) framework constraints.

They are also required to ensure that the airspace usage is in accordance with the agreed airspace use plan.

3.2.4.1.2 High Level National / Sub-regional Airspace Policy Body (HLAPB)

High Level Airspace Policy Bodies are established by States for strategic ASM policy, planning and coordination. Appropriate civil and military representation is granted in HLAPB.

Has a leading role within the Strategic Level 1 Cycle activities at national level and at the sub-regional (FAB) level. It is responsible for assuring prerequisites for the most optimum operational Airspace Configuration for the volume(s) of airspace within its responsibility;

Closely coordinates with the adjacent HL APBs (both in horizontal and vertical plane) in order to ensure that national /sub-regional airspace design projects are compatible and consistent with cross-border airspace policy;

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Closely coordinates with the Network Manager to obtain required information, data and expertise, and to ensure that national/sub-regional airspace design projects are compatible and consistent with all the plans, in particular with the overall Network Strategy Plan and its implementation through the Network Operations Plan;

Enable seamless and synchronized operational transition between the neighbouring Airspace Configurations;

Relies on the expertise of all the stakeholders within the CDM process, mainly on the national or sub-regional expertise as Flow Managers, Airspace Managers, Local Capacity / Traffic Managers, working in the area of its responsibility;

Consults any of the stakeholders and users of the airspace (e.g. different service providers, civil or military airspace users);

Supports National Supervisory Agencies (NSAs) (or its sub-regional equivalent) in performance monitoring activities.

3.2.4.2 Sub-Regional/National Airspace Management

3.2.4.2.1 Airspace Designer

Airspace Designer shall be understood as a function performed by different stakeholders at local, sub-regional and regional levels.

This function allows the establishment of airspace structures in order to accommodate the different types of activities, volume of traffic and differing levels of service in accordance with the airspace policy defined by the HLAPB.

In the Long-term Planning phase, the main task is based on the design and optimisation of the ATS route network and the areas such as conventional TSAs and TRAs, but also Cross Border Areas (CBAs) and Variable Profile Areas (VPAs). Design options for both the efficient usage by the military of such areas and the optimum route network for civil airspace users are also prepared within the context of the advanced FUA.

In the long, medium-short planning, ad-hoc airspaces might be designed to accommodate major events (e.g. large scale military exercises, Chief of States Summit, Olympic Games, Football World Cup) leading to AIP Supplement publications

3.2.4.2.2 Sub-regional/local Airspace Manager

Airspace Management functions are fully integrated in DCB process and they are performed at regional, sub-regional (FAB) and local (national or ACC) levels.

By convention, the “Airspace Manager” refers only to the local function integrated in all Sub-regional ATM Network Management Function.

The Airspace Manager (AM) is responsible for the medium to short term planning of national and potentially FAB level ASM right up to its operational implementation within European FUA (Flexible Use of Airspace) framework constraints. The AM role may in reality be filled by two actors: The Civil Airspace Manager (CAM) & The Military Airspace Manager (MAM), these actors would then have clear locally defined roles and areas of authority;

The AM task is to manage the competing airspace demands from Civil and Military operations in a pragmatic way, taking account of relevant factors.

The output will involve the management of things like: CDR's, Euro (RAD) restrictions, exercise restriction, airspace allocation. This is resolved into an agreed plan which is then communicated to FM, LTM and NM

3.2.4.3 Sub-Regional/local Air Traffic Flow and Capacity Management

3.2.4.3.1 Flow manager

The Flow Manager is a role performed at sub-regional level, which contributes to the Network Management Function. In circumstances warranted by traffic demand and complexity, the Sub-regional capability enables achievement of AU and AO operational ambition within the envelope of local and regional performance targets whilst simplifying the tactical interaction between stakeholders.

Remaining consistent with the processes described in this document, Sub-regional activity takes management responsibility for the airspace for a number of geographically adjacent ACCs whilst presenting a single operational interface to the regional actor; representing the local actors, including Airports, within this airspace. Whilst involvement throughout the planning phase promotes predictability in operation, one of the key benefits of the Sub-regional capability is the additional flexibility provided in execution, as desired by customers.

Such flexibility results from a detailed understanding of the airspace, the implications of the evolving demand and the ultimate impact on workload at local level. Another benefit is the ability to know, with a greater clarity than would be available at the Regional level, the actual configurations and running of the operations room(s) on a day-to-day basis. This local expertise allows the sub-regional to operate with a high level of clarity of the issues and options to resolve those issues, largely without recourse to constraints. The requirement for such detailed understanding also limits the size of a sub-region.

Within ACCs, during execution Sub-regional actors (Flow Manager), interacts significantly with relevant actors involved in the INAP process, optimising intervention for the benefit of the collective group or actors.

3.2.4.3.2 Local Capacity Manager

The Local Capacity Manager is a role acting mainly in long-term planning phase.

- The Local Capacity Manager is focusing on either an ACC, a FAB geographic area or Airfields operation. The Local Capacity Manager is a planning role, which contributes to the long-term capacity planning (for Airspace Organisation and Management and DCB activities).

- The main tasks of the Local Capacity Manager are to analyse and establish traffic flows and local capacity values for various airspace configurations and airport capabilities and to contribute to the establishment of DCB procedures and practices.

The local information and knowledge base they have provides an important platform on which to build optimised capacity plans. The type of local factors that a Local Capacity Manager will take account of are: Geo-political (i.e. quiet hours), related procedures, staff availability, sector flexibility, non-nominal weather condition, special events, optimised landing / departure rates, infrastructure and un-serviceability.

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3.2.4.3.3 Local Traffic Manager

The Local Traffic Manager is a role exercised at local level that contributes to the Network Management Function.

Main Responsibilities:

- The Local Traffic Manager functionally lies in between the Flow Manager and ATC planning actors, taking a view over a sector family or group of sectors (potentially a complete ACC) and any Airfield Towers that fall within the Local Traffic Manager's area of responsibility. He acts as the coordinating link between the ANSP, sub-regional and regional flow and airspace management.

- Within the medium to short term planning phases, the Local Traffic Manager contributes to the planning activities handled by the Flow Manager, as an expert in the process.

- He develops and coordinates locally and adequately within the FAB area and appropriate partners, catalogues of DCB measures to solve hotspots at local/FAB level during execution phase.

- The Local Traffic Manager has the leading role in the DCB processes in execution phase (and appropriately in the short term planning phase close to execution).

- He monitors the situation at local level and anticipates hotspots and workload issues. In case of an imbalance, he is responsible for:

- Declaring the hotspot

- Identifying the adequate solutions (Airspace Configuration and flow / Trajectory Management if necessary),

- Assessing their impact, looking for optimisation, coordinating and refining them with concerned partners (other Local Traffic Managers, AUs, Airports, Flow Manager, Network Manager, ATC actors)

- Using CDM process, except if time doesn't permit, implementing them (or delegating the implementation to the adequate actors), requiring a sub-regional or regional action where necessary.

- The Local Traffic Manager provides a bridge in understanding between operational perceptions of complexity, workload & demand and how that translates into DCB requirements as deliverable occupancy & workload values.

- In execution and as appropriate within the short term planning phases, the Local Traffic Manager works closely with Supervisors and ATC actors (through INAP function, see following section). The Local Traffic Manager is also likely to either be a Supervisor, or report to one, and as such will retain local safety accountability. As such, any proposed DCB initiatives will have to be approved by him.

3.2.4.3.4 Local DAC

Local DAC fulfils a joint civil-military function at national level which integrates ASM, ATFCM and ATS functionalities so that their processes can be performed in a combined manner allowing for a cooperative management of Airspace Configurations. This function is expected to manage civil/military airspace allocation, flow and capacity management, including sector configuration management role at local/sub-regional level with following responsibilities:

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- Develop and deploy Dynamic airspace configurations for the execution phase;
- Monitor Airspace configuration deployed taking into account Network and local performance;
- Retrieve from iSMT data related to ARES (VPA, DMA, and Static) and process it in the context of airspace configuration;
- Identify civil-military performance indicators to be processed for a specific airspace configuration so that to fulfil at optimal extent local/network performance targets and to fully respond to military mission requirements;
- Assess impact of DAC modification on military mission requirements and advice WOC on possible ARES (VPA, DMA, Static) adaptation or modifications where suitable;
- Coordinate with civil and military airspace users the implementation of priority rules for a specific airspace situation when and if the problem detected – using "What if" tool to find new sectorisation, matching the demand with acceptable level of performance;
- Negotiate with operational stakeholders solutions for ARES (VPA, DMA, Static) modification If airspace sectorisation does not meet the demand with acceptable level of performance.
- As a result of ARES (VPA, DMA, Static) modification and adaptation to DAC performance expectations identifies: SBTs/RBTs that are not compliant anymore with new DAC and pass them to DCB for further coordination with Civil AUs; and SIMTs that must be revised by WOC in accordance with new/modified ARES (VPA, DMA, Static) activation parameters;
- Coordinate airspace configuration via CDM process with other DACs/FAB and NM;
- Take final decision on the DAC;
- Make final decision on the DAC planning at local/sub-regional level, concerning sector configuration, hotspots and DMAs;
- Promulgate new/latest DAC configuration (EDAC) on the NOP.

3.2.4.4 State Airspace Users Operations (WOC)

The WOC with respective technical support systems facilitate the military AU operations in planning and execution phase. The WOC function has different implementation dimensions, based on the architecture of the national military organisations. Effectively, for military AU this is a key capability that interfaces with the ATM network and facilitates the trajectory development, sharing, execution, and management.

State Airspace Users are a subgroup of Airspace Users in general, who are involved in airspace planning, reservation and management and usage of airspace on behalf of a state. State Airspace Users (e.g. Air Force, Army, Navy and the paramilitary users like police forces, border security, customs services, SAR organizations, etc.) are a wider group than military Airspace Users. The variety of mission types for these (non-military) Airspace Users is reduced. Most missions will be executed under civil rules and regulations.

The level, position and structure, which can accommodate those roles, depend entirely on the State Airspace User. One role can represent several processes in different phases of AU's activities.

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Due to the shift from ASM to Trajectory management environment in ATM the actors and the roles can change and the number of processes is reduced. This is logical outcome as many of the processes performed by human actors will be delegated to system actors and thus human workload will be reduced (automation is a main SESAR Concept feature).

3.2.4.4.1 Long Term Planner

The Long Term Planner is a WOC function, which is complementary to the Regional ATFCM perspective of the long term planning process. It expresses the State Airspace Users' needs such as draft plans for exercises, training and special events.

Responsibility

· Long term planning of the State Airspace Users needs and expectations based on the guidelines (draft plans) of the long term planning process.

· Demands for education and CTP (Combat Training Program).

· Defining the training policy within military organization and the training needs throughout the year.

3.2.4.4.2 Mission Scheduler

The Mission Scheduler arranges the missions according to the detailed plans of the State AU for training and operations. The level, position and structure required to accommodate this role depend entirely on the State AU.

Responsibility:

· Scheduling the missions of the State Airspace User and preparation plus update of the State Airspace Users missions plan.

· Schedules the training missions based on the training needs.

· Alerting WOC in time in case of QRA.

· Assignment of operational activities

3.2.4.4.3 AIS Static Data Operator

The AIS Static Data Operator supports the WOC activities by provision of aeronautical information and data used to develop and perform the mission, usually supported from AIS and/or ATS office.

His task is to import and prepare all necessary navigation data such as maps, aeronautical data, and obstacle data and further.

Responsibility:

· Support the WOC with provision of topical information and prognoses.

· Provide aeronautical advisory service to the mission planner and the Flight Crew during planning, execution and post flight phases of a mission

3.2.4.4.4 AIS Dynamic Data Operator

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The AIS Dynamic Data Operator supports the WOC activities as expert of the NOTAM theme. In general these NOTAMs contain aeronautical, meteorological, tactical information etc., usually supported from the NOTAM office.

Responsibility:

· Support the WOC with provision of topical NOTAM.

3.2.4.4.5 Flight Data Operator

The Flight Data Operator assists the Flight Crew with the management of flight plans. He drafts the FPLs according to the prepared missions, shares FPLs for further processing by NM and potentially executes necessary corrective actions or FPL modifications.

Responsibility:

· Support the State WOC with provision of topical information related to FPL

· Create, file, update and cancel flight plans.

3.2.4.4.6 MET Data Operator

The MET Data Operator provides the required forecast and the latest observed MET information to the State Airspace User to ensure adequate mission support. He observes and reports airport weather as well as territorial weather progress like GAFOR. Finally the MET Data Operator advises the Flight Crew on weather situations and forecasts.

Responsibility:

· Meteorological advisory service to the mission planner and the Flight Crew during planning, execution and post flight phase of a Mission

3.2.4.4.7 Mission Planner

The Mission Planner prepares the missions of the State Airspace User with consideration to possible influences on the mission's trajectory. Personnel acting under the role of the "Mission Planner" can be seen as, military persons who will assist the Flight Crew in all aspects of mission planning.

Responsibility:

- To receive and analyse the mission request
- To assess MET information, NOTAMs plus other AIPs and calculate impacts to the planned mission.
- To provide ASM support to missions requiring ARES
- To assess tactical situations.
- To prepare the flight routes.
- To decide about operational changes.

3.2.4.4.8 Mission Observer

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The Mission Observer executes the overall monitoring of the mission to support the Flight Crew in managing operational changes in order to achieve mission objectives.

Responsibility:

· Monitoring the mission/flights during execution.

· Provide support to the Flight Crew in order to achieve the mission objectives.

3.2.5 CNS/ATS description:

Not applicable.

3.2.6 Applicable standards and regulations

The following standards and regulations are applicable to the solution PJ-07-W2-40 Initial 4D Mission Trajectory development with DMA type 1and 2 supported by automation and dynamic civil-military CDM:

- CFMU Interface Manual for ICAO 2012 (New Flight Plan Content Introduced by Amendment 1 to DOC 4444 (PANS-ATM))
- (EC) Regulation 2150/2005 of 23 December 2005
- EUROCONTROL Guidelines for a harmonised and improved OAT FPL implementation Edition 1.0, 09/07/2021
- EUROCONTROL Guidelines Minimum CNS Infrastructure and Avionics Equipage for the Support of OAT Harmonisation
- EUROCONTROL Specification for harmonized Rule for Operational Air Traffic (OAT) under Instrument Flight Rules (IFR) inside controlled Airspace of the ECAC Area (EUROAT)
- EUROCONTROL Guidance for Military Aeronautical Information Publications Consistency with ICAO Annex 15
- Mission Trajectory Detailed Concept EUROCONTROL document

3.3 Detailed Operating Method

3.3.1 Previous Operating Method

The baseline for previous operating method sits in the results achieved in SESAR 2020 Wave 1 relevant to two Solutions; Mission Trajectory Driven Processes with maturity level initial V3 and Dynamic Airspace Configuration with maturity level V2 These conceptual elements of the SESAR Target ATM CONOPS create a framework within which the further development of the consolidated concept of Mission trajectory with new dynamic elements (DAC, DMA) takes place.

The previous operating methods provide perspectives on the management of the integrated military ATM demand with focus on short term planning phase. In the short-term planning phase, all actors collaborate to develop a consolidated iMT dataset to be shared with ATM actors concerned. The actors collaborate with each other through a CDM process with system support to balance and accommodate

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their demand. Military ATM demand contains information regarding special en-route activities normally conducted in reserved/restricted airspace ARES. The ARES can be designed either as a static solution or modular solution, and often constitutes a constraint from the ATM network perspectives.

The variable profile area design principle (VPA) applies to the ARES with static geographical location and modular design offers better level of flexibility to accommodate mission requirements while allowing to balance civil and military ATM demand in the planning phase. Effectively, previous operating methods are mostly based on static solutions for airspace reservation imposed on and limiting civil aircraft operations by defining envelope surrounding planned military mission. This is a 3D area plus safety buffer activated well in advance thus hereby impairing any civil aircraft operation. Avoiding the ARES can in some situations cause additional ATCO workload, Environmental impact and Air Carrier economical losses.

The iOAT FPL mechanism applies in order to enable sharing the integrated military ATM demand with static or VPA designed ARES into trajectory description. This allows sharing of military flight intent with all ATM actors concerned. The iOAT FPL contains information regarding multiple ARES providing more precise information to ATSU and FMP at local level hence contributing to the optimisation of capacity and predictability of the ATM network with true military ATM demand.

3.3.2 New SESAR Operating Method

The solution develops and describes a new operating method that links the MT concept with the new ARES design principle implemented in the DMA concept developed in SESAR 2020 Wave 1. The focus is on integrating DMA type 1 and 2 into the MT description with ancillary data through advanced management of airspace and trajectory.

Given the evolution of the operating methods developed in Wave1, the descriptions of new operating methods are shifting towards greater dynamism and management of integrated military ATM demand.

The DMA design principle is a game-changer and provides opportunities for short-term use of ATM solutions in high-density operating environments through greater flexibility and agility in managing available airspace resources. This entails more efficient use of iMT data, which contains flexible DMA of type 1 and 2 parameters, facilitating airspace configuration optimisation and enhancing the efficiency of ATM operations.

The objective of dynamic airspace configuration (DAC) is to manage airspace in an efficient manner and to contribute to the achievement of various defined AUs' performance targets and operational requirements. In pursuing this objective DAC processes will take fully into account military mission objectives and requirements expressed as military ATM demand.

The new operating method facilitates military operational stakeholder's adaptation to ATM network dynamics, if mission objectives permit so, and to respond appropriately to a rapidly changing operational environment while maintaining operational objectives. It describes the development and management of integrated military ATM demand composed of the iMT profile with integrated ARES DMA type 1 and 2.

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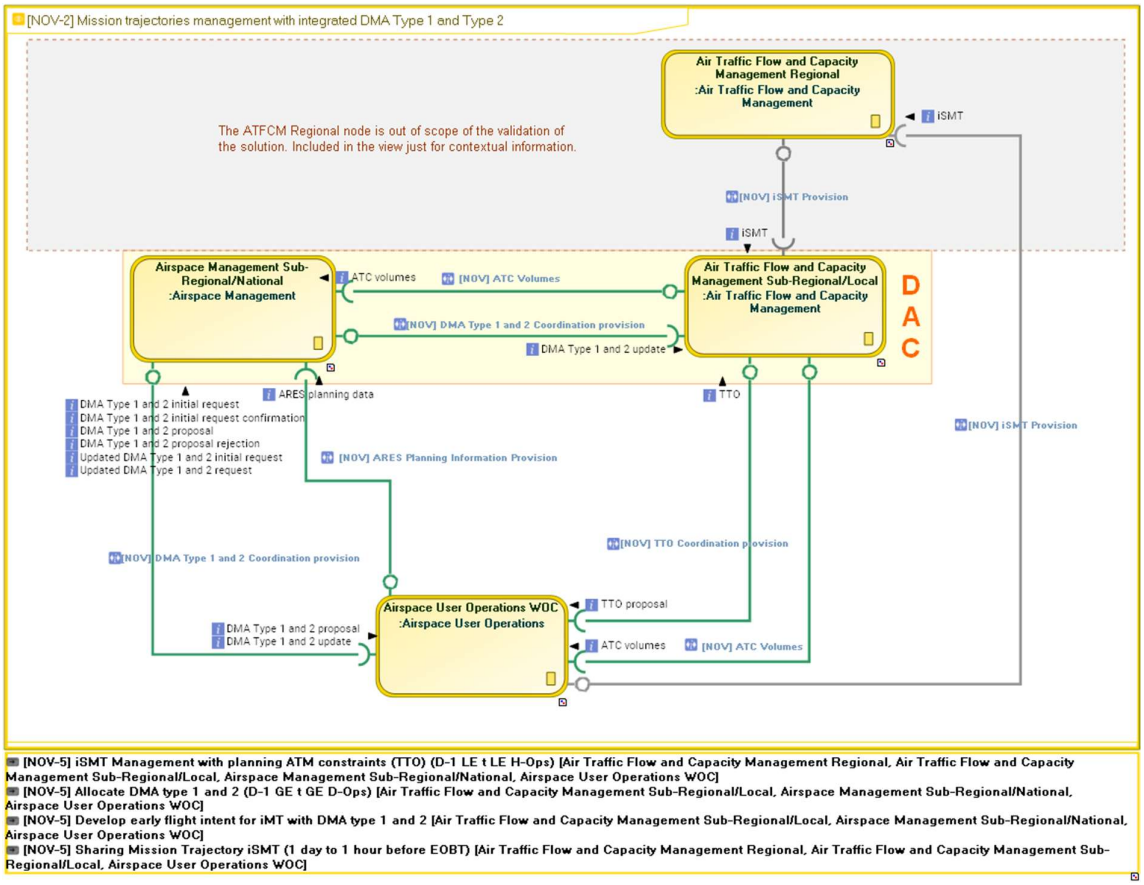

Figure 4: MT management with integrated DMA type 1 and 2

The new ARES design principle (DMA) caters for greater flexibility and for increased dynamicity in respective operational processes facilitating optimisation of DAC and management of AU demand. It demonstrates the evolution of the detailed iMT concept and Advanced Airspace Management underpinned by validation results achieved in SESAR 2020 Wave 1.

Effectively, the solution refers to the integrated civil-military ATM model that ensures integrated civil-military ATM service provision upon unified procedures, harmonised aeronautical and surveillance data sharing within one airspace continuum for civil and military airspace users.

In the context of PJ07-W2-40, iMT stands for Initial, and such status is inherited from Wave 1 due to a maturity level of the project that gradually evolves from a time-based operations to a trajectory-based operations. Therefore, the notion of iMT will remain in the scope of new operating methods description.

3.3.2.1 Initial Mission Trajectory iMT

The initial Mission trajectory is the trajectory that expresses the intention of the military AU, includes both ground and airborne segments, which are built and updated with the most accurate and timely data for integration into ATM network operations. When deemed necessary, the trajectory dataset may contain airspace reservation/restriction ARES of various types (Static, VPA, DMA).

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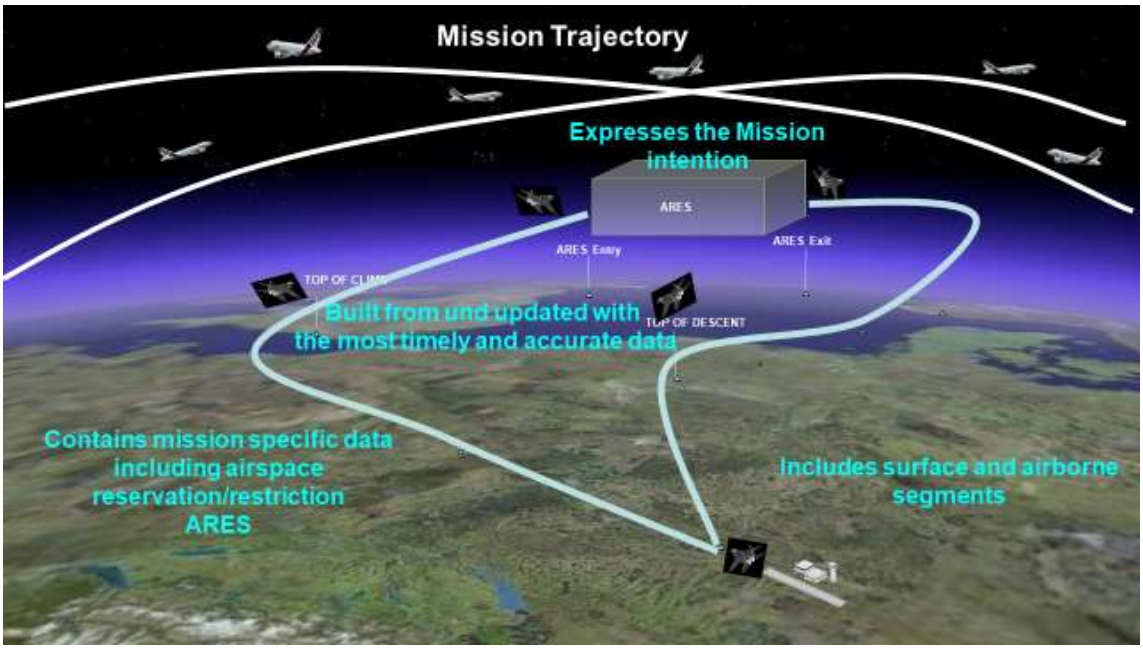

Figure 5: iMT definition

The iMT describes the trajectory with specifics adherent to the mission objectives. The trajectory data set contains a 2D route, multiple values of elapsed time EETs, flight level/altitude, speed, targets, and constraints. It may also contain data describing ARES type (Static, VPA, DMA) with flexible parameters as well as information related to the aircraft type, its equipment, and exemptions when applicable.

The iMT description does not include an accurate 4D values, therefore, the NM, after reception of the iOAT FPL must interpolate a 4D trajectory into IFPS and ETFMS and make assumptions wherever required to close the gaps resulting from limited data provided by the iOAT FPL. Usage of the correct flight performance information facilitates the mitigation of these gaps through more precise insight on the trajectory profile per flight phase.

Given the limitations of iMT and in order to fully comply with 4D requirements the iMT data model will be refined in the next R&D cycle with respect to confidentiality of mission specific data. The further harmonisation of iMT data regards eFPL and FF-ICE flight related data models as future reference models to substitute the iOAT FPL allowing military AUs to perform coherent and efficient sharing and management of 4D trajectory.

In the context of the solution PJ07-W2-40, iMT concerns the development and integration of ARES based on DMA design principle into description of the integrated military ATM demand. Developed in Wave 1 the concept of DMA type 1 and 2 will evolve to the level of details necessary to describe new operating methods with focus on the development the iMT data set with DMA flexible parameters and associated thresholds.

3.3.2.2 Dynamic mobile area DMA type 1 and 2

The Dynamic Mobile Area is a new ARES design principle that provides greater dynamism and flexibility for specific military missions of manned and unmanned aircraft. By design, DMA could be geographically centric DMA type 1 and 2 and aircraft centric DMA type 3.

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The solution is focusing on the geographically centric DMA type 1 and 2, while aircraft centric DMA type 3 is shifted to the next cycle of R&D activities within the scope of SESAR 3.

However, it should be noted that the DMA concept does not replace existing concepts using static ARES design principles and should be considered as a complementary solution that provides more flexibility and agility for airspace users who require temporary airspace reservation/restriction for their activities.

Geographically centric DMA type 1 can be allocated within predetermined geographic boundaries according to parameters set by the AU (time or distance flown from airbase or reference point). DMA type 2 can be allocated along the flight profile at any geographic location as dictated by the operational objectives of the military mission.

DMA may contain flexible parameters, which are integrated into the iMT dataset and are shared with all pertinent ATM and relevant non-ATM actors concerned. Flexible DMA parameters are necessary constituents to manage and optimize DMA configuration/geographical location in the scope of dynamic ATC sectors configuration and traffic volumes to meet local performance targets. The CDM process between ASM ATFCM and WOC actors facilitates the agreement on an optimal conflict-free airspace configuration within predefined geographic boundaries, while maintaining the requirements of military activities.

DMAs are integral part of the trajectory description, expressed in a 4D dataset via DMA specification, for which the three dimensional values (e.g. spatial coordinate's x-y-z), time, and velocity, either constants or variables and depend on the DMA type. The DMA flexible parameters enable dynamicity and flexibility of the military ATM demand.

DMAs are described in a 4D dataset:

- Either as a part of the MT dataset, or
- Separately in the cases where the entire MT is inside the DMA volume, or when MT is entering the DMA volume from unmanaged airspace

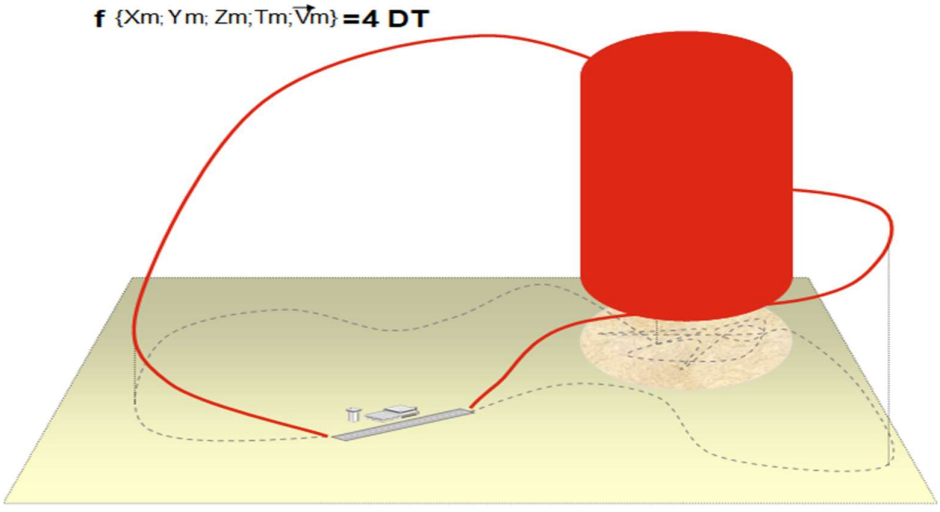

Figure 6: Description of 4D trajectory with DMA

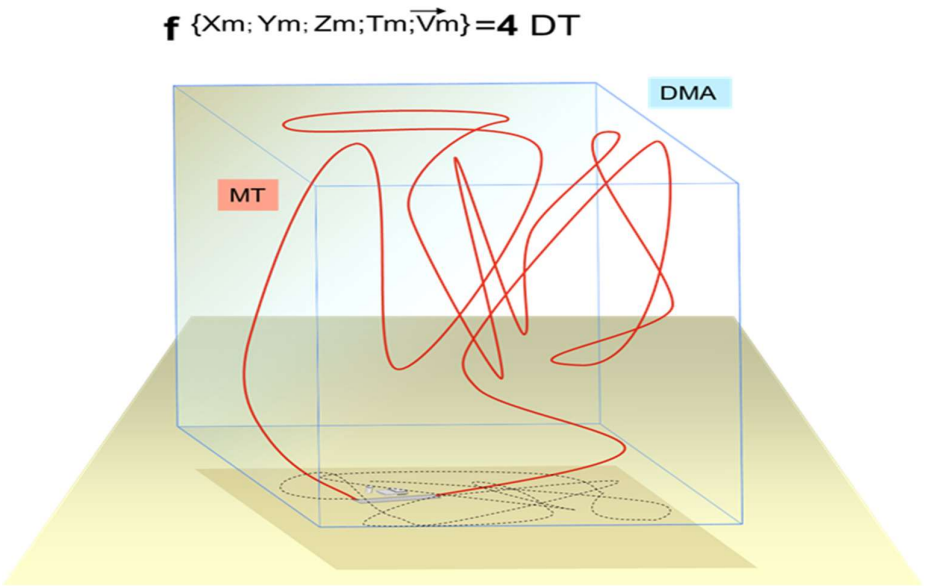

Figure 7: 4D-trajectory description (MT entirely inside DMA)

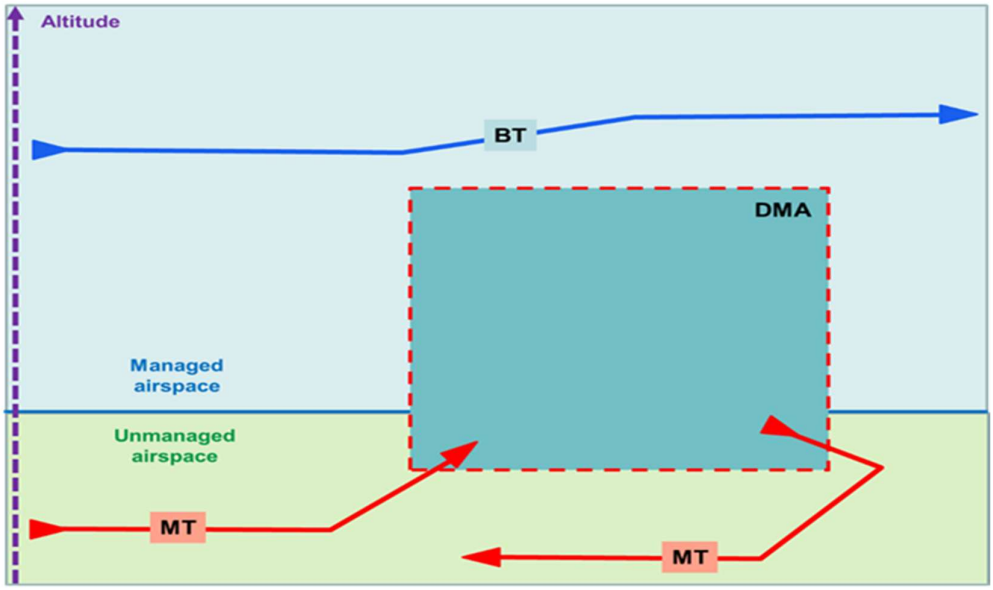

Figure 8: MT in unmanaged airspace and the DMA (in vertical plain)

3.3.2.2.1 DMA type 1

DMA Type 1 is a volume of airspace of defined dimensions, described either as an integral part of a MT, or independently at flexible geographic locations agreed upon in the CDM process, to meet airspace user's requirements in terms of a time and/or distance constraint parameters from the reference point specified by the AU (e.g. aerodrome of departure).

The position of this volume over specific geographic location is variable and negotiated through the CDM process. The outcome may require modification of the relevant MT data set.

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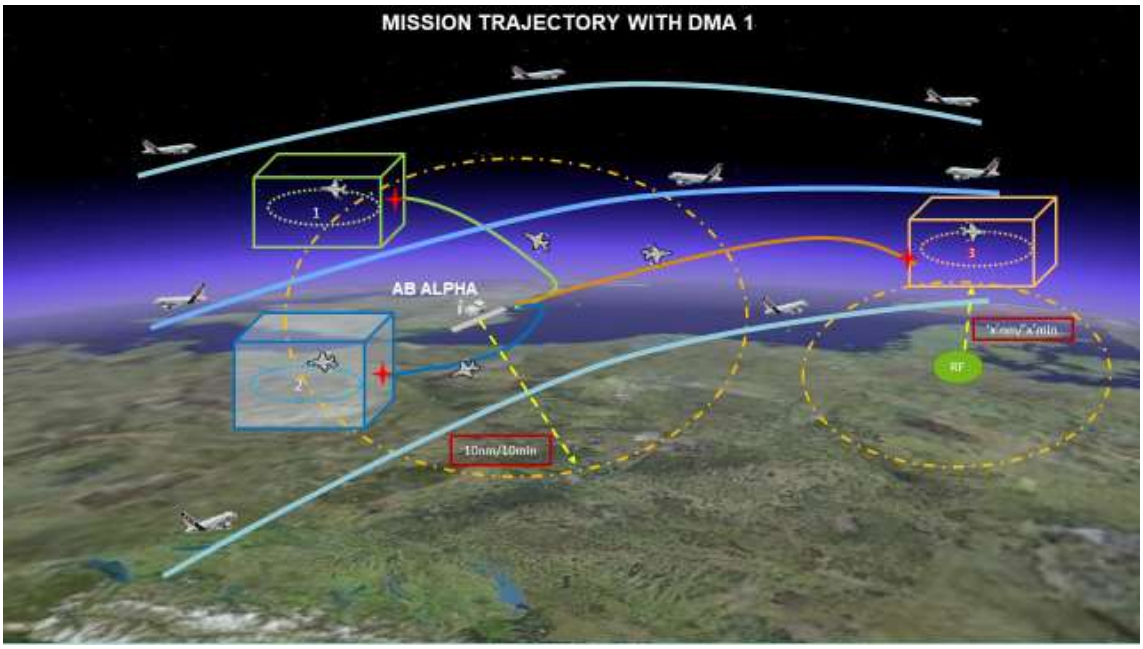

Figure 9: DMA type 1

The timeline set for the DMA type 1 allows previously synchronised trajectories to operate in this volume of airspace during the limited period. The design of such ARES should satisfy operational requirements of the mission and must contain flexible parameters, which facilitate alignment of the geographic location of such volume of airspace. The implementation of the new design principle does not substitute the fixed or VPA designed ARES and applies only when DMA can facilitate accomplishment of the mission objectives.

3.3.2.2.2 DMA type 2

DMA type 2 is a volume of airspace of defined dimensions, described as an integral part of the MT and agreed upon in the CDM process, and designed to meet the requirements of airspace users in terms of volume, location, and duration. This volume of airspace can be allocated to any geographic location that meets the operational requirements of military AU. Integration of DMA in MT description indicates to all ATM and non-ATM actors concerned, the intention to use temporarily the ARES along the intended flight route.

The main feature of ARES DMA type 2 is iMT profile dependency. The DMA type 2 description integrated into the iMT dataset contains flexible parameters as a necessary attribute to facilitate the allocation and management of ARES in combination with trajectory management. While flexible parameters are essential for the CDM and impact analysis performed by relevant ATM actors, the trajectory management process becomes more complex.

As a result of the CDM process, either DMA type 2 configuration/geographical location or the activation time may need to be changed, or the trajectory profile and DMA parameters may need to be fully adapted to military mission objectives.

The usage of the allocated DMA by multiple missions requires synchronisation and preliminary coordination between the military operational stakeholders before sharing their trajectories with ATM actors concerned.

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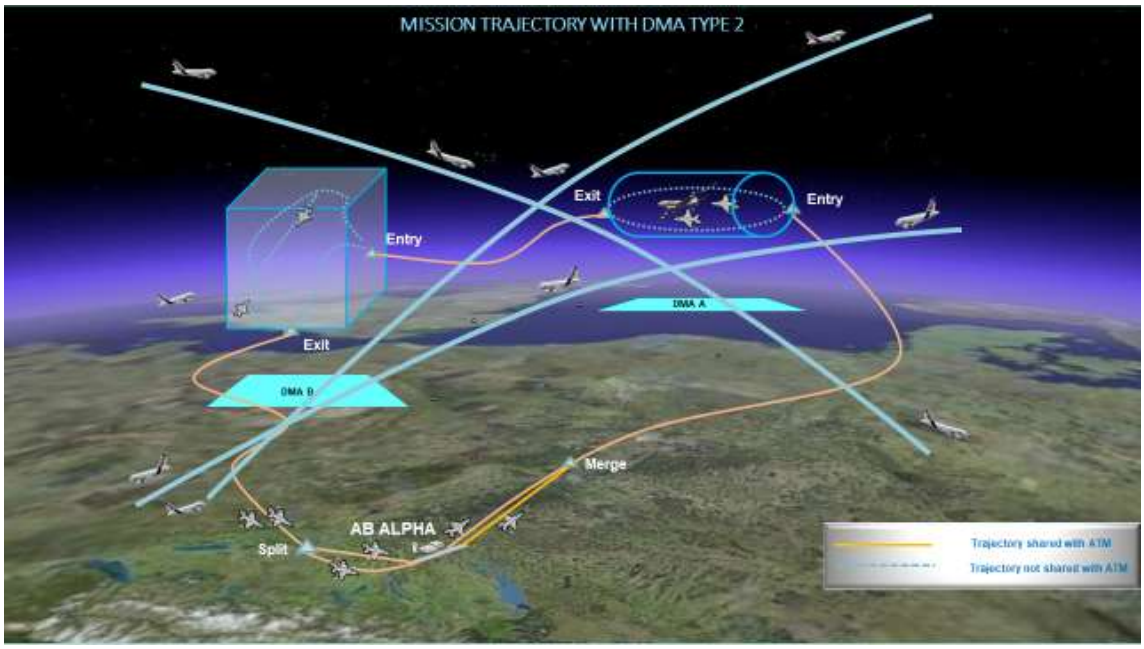

Figure 10: DMA type 2

3.3.2.3 DMA design and allocation

DMA design is a process supported by system functionalities based on the predefined algorithms and criteria's developed by operational stakeholders in order to define a three-dimensional volume of airspace that satisfies, based on CDM, the operational needs of the military AU and pertinent ATM stakeholders.

DMA design principle applies when military operational stakeholders decide to use DMA type 1 and 2 for their specific mission needs mainly based on ad-hoc approach. For DMA design they apply multiple criteria's, which include aircraft type (manned/unmanned, fighter jet, transport type etc.), type of mission (ground support, air-to-air refuelling, cargo drop etc.) and operational objectives, which fulfilment depend on DMA configuration and geographical position.

The DMA volumes can be of various shapes and must reflect delineation of lateral and vertical boundaries, including the safety buffers. Given the type of mission and the flight performance of the aircraft, the volume of airspace must be optimally sized to meet the objectives of the mission.

There are two possible approaches, but not limited, the operational stakeholders may apply for the DMA design:

1. First option is when military operational stakeholders develop a list of the predefined DMA 3D volumes configured according to the operational requirements and scenarios available per mission type for daily training. The allocation process and time duration still remain ad-hoc and have temporary nature.
2. Second option is when DMA design and allocation are strictly linked to the mission profile (could be more than one mission or more than one DMA) and objectives to be fulfilled inside ARES temporarily allocated at the predefined geographical location within fixed period of time. The allocation process still remain ad-hoc and activation having temporary nature.

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First approach allows developing DMA configurations far in advance and to catalogue it for daily use at geographical locations that suit best a mission type. However each request may or may not contain flexible parameters linked to the DMA type which can be modified within predefined thresholds unless these parameters have already been fixed and associated with the DMA type 1 volume designed for the specific mission needs.
Flexible parameters are important information elements that facilitate adjustment and modification of the airspace volumes in the context of dynamic airspace configuration within thresholds defined by airspace users. Such thresholds provide clear indication of the perimeter within which the flexible parameters could be used in order to optimise the DMA dimensions and time.

Second approach is more complex as it requires individual approach to each mission type that requires DMA to be designed and allocated along the trajectory profile. In this case, the allocation process requires more information regarding historical data of the traffic flows, ATC volumes, and ATM constraints, which may influence the entire mission trajectory. Additionally, DMA parameters should be converted into 4D trajectory description as it becomes integral part of the mission trajectory profile. In the case of using the same DMA by several different aircraft, e.g. AAR mission, the process of synchronisation of trajectories becomes a necessary precondition for the successful accomplishment of the mission.

Military operational stakeholders are responsible for determining the type of missions that can use DMA design principle in order to fulfil operational objectives and ensure mission effectiveness.

It should be noted that in operating environment with high complexity, the size of the DMA should be tolerated with other elements of the airspace structure, and the allocation process should be subject to the CDM process, taking into account the priorities of different categories of airspace users.

The allocation of the DMA type 1 and 2 shall take place in a medium-to-short term planning phase considering ad-hoc nature of the ARES and need to integrate it into ATM network configuration.

In the context of the MT concept, the allocation process for ARES DMA Types 1 and 2 occurs during the medium and short term planning phase and is initiated by the filing of early flight intention (EFI). EFI is an ARES request submitted by the WOC 7 days prior to the day of operations facilitating the incremental integration of DMA types 1 and 2 into the airspace configuration.

The timeline referred to the submission of EFI should be respected by the WOC, to ensure a proper assessment and balance measures identification between military and civil requests for airspace volumes.

Each ad-hoc allocated DMA type should carry its unique identifier that will be used as a reference for the airspace and trajectory management in planning and execution phases.

Prior coordination with other operational stakeholders is a necessary prerequisite to ensure efficient allocation and further use of DMA type1 and 2. This implies that when the ASM process is completed, the trajectory management process takes over the control and fine-tunes MT data.

3.3.2.4 DMA specifications

The DMA specifications provide the information needed to complete the development and allocation of the DMA type along the iMT lifecycle in planning, sharing, and execution and performance assessment by the relevant actors.

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DMA Specifications contain conceptual ID taxonomy (Figure 12) and the labels which express the DMA 4D dataset. The DMA labels contain the type and the metrics for the DMA definition which expresses the logical links between the processes, dependencies and priorities for iMDT, iSMT, iRMT and Post Ops analysis. The initial dataset describing the DMAs would consist of:

- Airspace definition (3D description - coordinates, dimensions, volume, FLs, size, Shape, etc.);
- Specific priority levels, defining the use of DMA;
- Initial location;
- Time values;
- Synchronisation parameters;
- Other Users' requirements and data, etc.;
- Constraints.

DAC extracts from the shared 4D trajectory dataset the relevant DMA Specifications' data labels that contain the information needed for DAC processes. After an assessment and simulations, the proposals for modifications of DMAs are indicated in the relevant labels and sent to the originator for negotiation. A conceptual example for the ARES ID taxonomy is presented in Figure 11. It demonstrates a non-exhaustive list of the data labels needed to define a DMA.

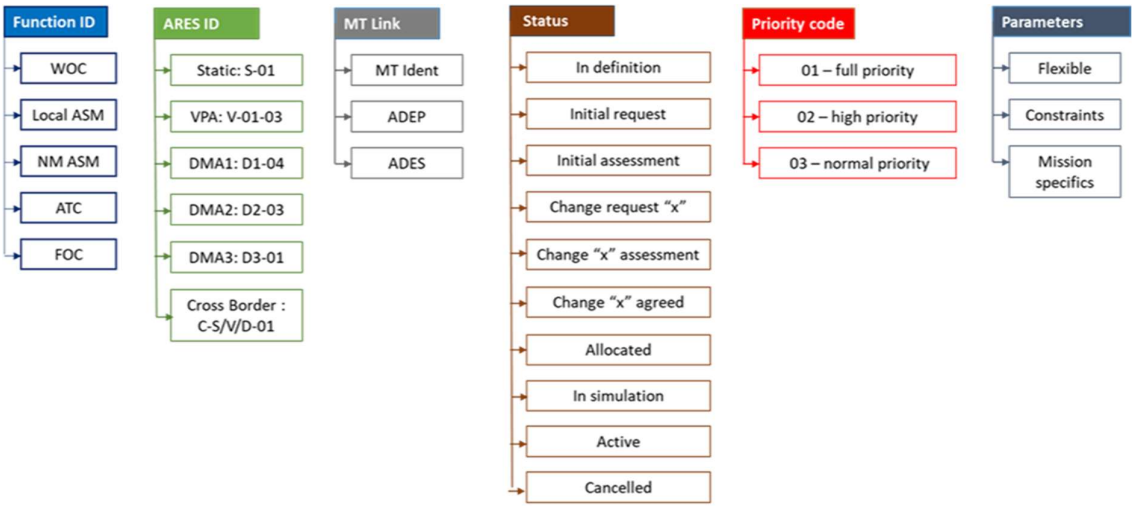

Figure 11: DMA ID taxonomy and data labels

Figure 12 illustrates an imaginary example of the DMA definition process (at the primary level – the complete set of data) by WOC "Fox" operator "23", who on 12/01/2021 defines a DMA 2 with a specific volume and location, needed for mission. The dataset contains also specific parameters to be considered, which define the flexibility and the limitations for modifications during the negotiation process between DAC and the WOC.

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The DMA labels shall enable the information exchange for all interactions between WOCs, and/or between DAC and WOCs

DMA Specifications does not present technical solutions but rather a conceptual proposal for an enabler to the DMA (MT) related processes. The DMA specifications should be developed in detail in coordination among the involved actors and with the support of the state AU (at least the military AU).

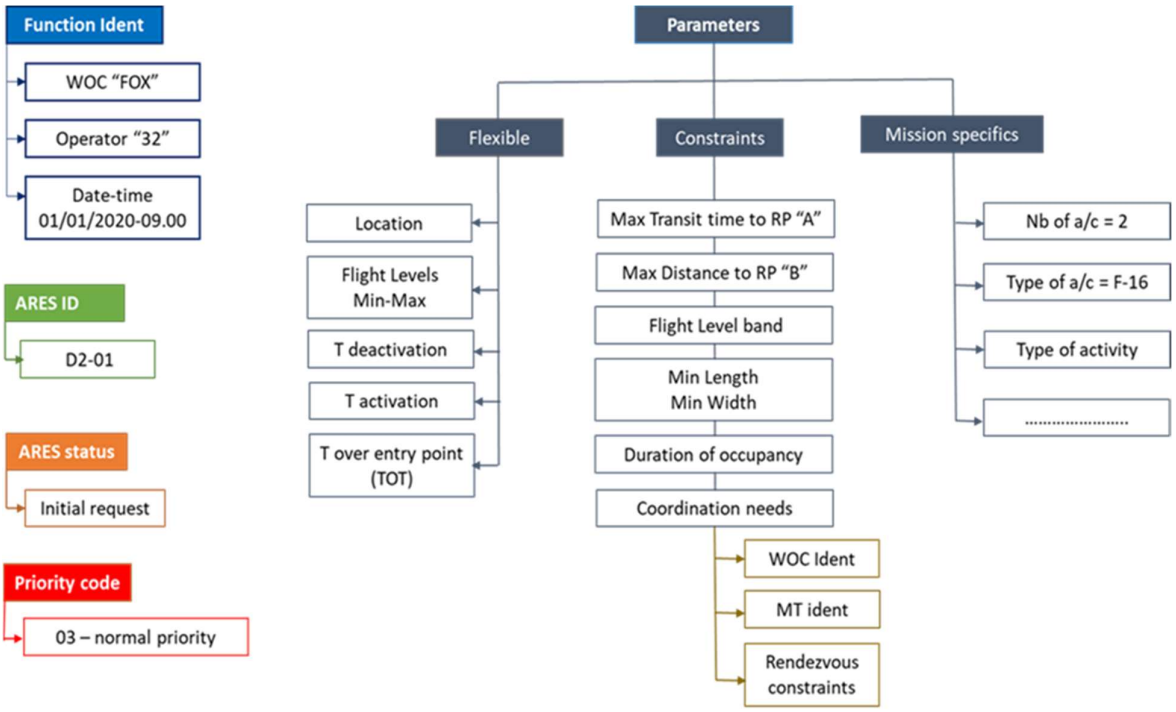

Figure 12: DMA labels application

3.3.2.5 Military ATM priorities

To avoid a complex and lengthy negotiation process to balance the capacity of the ATM system with the demand through optimization of airspace structure configuration and adjustments to traffic demand, the definition and implementation of civil-military priority criteria and negotiation rules for integrated ASM-ATFCM based CDM processes is required.

Civil-military ATM priorities should be understood as indicators defined at national level and integrated into AU demand. This facilitates the recognition of ATM needs of the operational stakeholders and used in CDM process to define the perimeter of acceptable flexibility to accommodate the stakeholder operational requirements.

Having regard to its limited scope, Solution 40 applies a generic approach to military ATM priorities, aiming mainly to check the ability of actors and tool prototypes to define, exchange, and integrate them rather as an information than an input into the operational processes subject to validation exercise. That should provide a basis for further analysis and adaptation by concerned stakeholders to their specifics during deployment and implementation activities.

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Furthermore, (strategic level) airspace policy activities are not in the scope of the validations performed by the solution thus, the principles provided have a generic nature and are the result of expert judgements based on available references and best practices. One of the main evolutions proposed by the solution, with the new operating methods, is a shift of responsibilities and competencies from the airspace policy level to the pre-tactical level concerning the design and negotiation of airspace reservations, which considers the ad-hoc nature of DMAs.

The following requisites need to be considered by the Solution to address military ATM priorities.

The 'European Route Network Improvement Plan – Part 3 Airspace Management Handbook Procedures for Airspace Management' document provides the ground for further R&D activities concerning the development and implementation of military ATM priorities:

- The HLAPB is responsible for setting priority rules in the agreement between the respective national administrations to resolve the problem of the allocation of this airspace between potential users, and for tasking the competent AMCs with such allocation.
- AMCs operate in accordance with the airspace allocation priorities, negotiation rules and protocols established by the HLAPB.
- AMCs shall resolve conflicts between incompatible or conflicting airspace requests by the application of approved priorities, re-negotiation, rescheduling or segregation.
- Requirement: authorised users/units should be able to enter/modify/delete additional static and dynamic data for planning request into the local system: ADEP; ADES; Aircraft type; Number of aircraft; Priority; Call sign(s); Mission ID; Link to other missions; Controlling Units; Remarks.

Furthermore, the Military ATM Board (MAB) document 'Civil-Military Collaborative Decision-Making in the future European Air Traffic Management Harmonized military views' requests SESAR activities to consider the following principles in defining the civil-military CDM processes in the context of SESAR 2020 concept:

- A national or international (bi- or multilateral) strategic framework document for Airspace Management (ASM) and Air Traffic Flow Management (ATFM) should be elaborated by each State; it defines actors, roles, responsibilities, airspace configuration and trajectory management principles and priority rules as well as the decision process.
- In accordance with the CDM strategic framework, each civil or military ATM demand may be associated with a priority level and flexible/negotiation parameters.
- To overcome the complexity related to civil-military negotiation and conflict resolution, the civil-military CDM processes should be supported by a system of ATM priority rules.
- In the future ATM environment, the management of military AU demand will consist of two distinctive but integrated processes, ASM and Trajectory Management.
- A national consolidated military airspace demand will be used by both ASM and Trajectory Management processes at all levels (local, FAB, network) following an assessment and de-confliction of military airspace users' requirements performed by designated national entities.
- In accordance with mission requirements, the shared MT will provide two major attributes for supporting CDM, flexibility of ATM parameters for negotiation (e.g. activation time, flight level band, location for ARES or time over specific reference point for trajectory) and/or a priority level.
- Considering the variety of CDM actors as well as their cross-border interactions, an escalation process towards upper-level authorities to solve conflicting situation may be not possible; an alternative way stays in pre-defined priority criteria/rules; a 'system of priorities' that

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encompasses both civil and military priority criteria will be defined and periodically updated by civil and military authorities at State level in coordination with NM as part of a CDM strategic framework document.

- Sharing and negotiation of MT data will be possible only after a first step in ASM process is concluded; WOC in coordination with the joint civil-military local/sub-regional ASM-ATFCM actor will judge for each type of ARES the flexible parameters subject to CDM. Decision on ARES allocation will determine the flexibility of MT for supporting NM' optimization and prioritization processes.
- In TBO, the MT management related processes: mission preparation, ASM, ATFCM, weather information management, and flight planning will be integrated at the extent necessary to address all attributes of military mission within CDM.

By fully considering the above requisites, the solution addresses military priorities for ATM purposes only (no military mission prioritization) exclusively related to regular training activities and provides non-exhaustive criteria and rules for R&D purposes.

The aim is to trigger and support the way forward to easing the complexity of civil-military CDM by early provision of MT availability to changes and negotiation.

The approach pursued is that a priority level is defined solely by the military AU and is used for the management of iMT with integrated ARES (of all types).

In the scope of the solution the following additional principles are proposed for addressing military ATM priority:

- iMT management (definition, development, review) is connected to ASM/DAC whenever the military ATM demand contains a request for ARES.
- ASM provides inputs to MT management that are integrated solely based on military AU agreement; this implies the capability of WOC to assess the impact of DAC proposals for ARES change over the entire iMT impacted.
- The main role of priority to iMT for operational purposes is to provide the integrated ASM-ATFCM functions of DAC (regional, sub-regional, and local) an information on the availability of military ATM demand to be subject to ATFCM-DCB processes.
- A level of priority associated to MT could be extended to its integrated ARES depending on the type of mission and based on the judgement of military AU; this should ease the civil-military CDM for the optimization and integration of ARES into DAC.
- The association of a priority level to ARES shall be strictly linked to the flexible parameters of that ARES.
- A level of priority is defined from the outset of MT definition by the military AU based on non-shareable criteria and is further shared with concerned ATM partners (ASM, ATFCM, etc) throughout trajectory and ASM processes.
- A direct link between the level of priority associated to iMT shared with ATM and the defined ATFCM exemptions in the iOAT FPL is identified.

Definition and application of priorities to military ATM demand, limited to the scope of Solution, should have two successive steps:

Step1: priority of demand shared in the EFI supporting airspace structures configuration and allocation. For most of the activities/missions, when defining the ATM demand, the Mission Planner in WOC already knows the required level of priority to be shared with the ATM system. Therefore, a priority

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level could be assigned from the very initial phase of MT with DMA development and shared through the early flight intent submitted to ASM/DAC. Naturally, a priority level is associated to DMA request update for D-Ops.

Step2: priority for SMT to be used in the analysis of traffic demand against available capacity and application of planning ATM constraints (TTO in the case of SMT) to balance demand with capacity.

Integration of priority rules in the operating methods follows the trajectory lifecycle and consists of several steps:

- De-confliction by ASM of DMA requests submitted by airspace users (WOCs) for both EFI and D-Ops requests.
- De-confliction by ASM and ATFCM of DMA and ATC volumes after adaptation/change to DMAs through negotiation between WOC and DAC.
- Special treatment of mission trajectories with priority (exemption from ATM constraints TTO and ATFM regulations STAM during the analysis of traffic demand and capacity performed by ATFCM)
- Implementation of priority levels in the iMT description through iOAT FPL.

The following generic set of priorities for military requests could be attached to ATM demand:

- P1:, full priority: not any of the ATM parameters of the military demand is subject of negotiation; the military demand will be accommodated by ATM as requested by WOC;
- P2, high priority: negotiation on the ATM demand will be limited to one specified flexible parameter as defined by WOC.
- P3, normal priority: negotiation is possible on all flexible parameters of the demand.

As a guiding principle for implementation, the above priorities should be applicable under conditions defined in a CDM framework document, e.g.:

- P1 could only be used for government flights or very important events.
- P2 may be applicable to a limited number of annual occurrences agreed at airspace policy level or restricted activities during some predefined time slots.
- P3 should have no limitation to CDM.

The diagram below provides an overview and proposes a solution for the implementation of military ATM priority levels within the scope of solution 40 conceptual developments and validation activities. This explains the relationships between the activities performed by military AU and their priorities in relation to two ATM processes. The colour code explains the perimeter of flexibility for the defined priority in the negotiation process.

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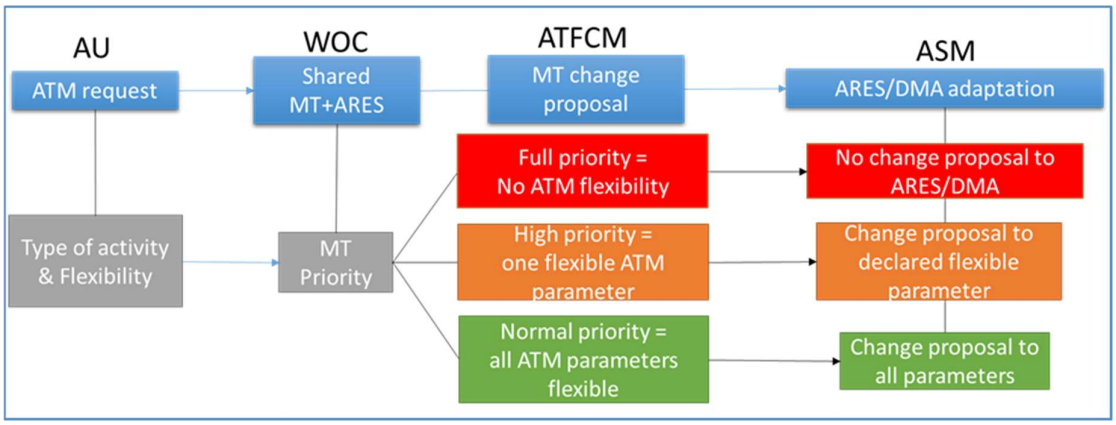

Figure 13 Basic diagram supporting the integration of military priority levels and rules in the operating methods and steps

3.3.2.6 Military ATM demand

In the context of the solution, an integrated military ATM demand is a formalised request that combines the flight intent expressed as a trajectory profile description, ARES of different types connected to the trajectory, and military mission-specific requirements.

The integrated military ATM demand is a result of the iMT lifecycle (figure 14) and is integrated into the ATM lifecycle through pertinent ATM processes in the planning phase. Military operational stakeholders use the iOAT FPL mechanism to share the integrated military ATM demand with pertinent ATM and relevant non-ATM actors.

The iMT lifecycle is somewhat different form the BT lifecycle regarding timelines and operational processes, which apply in the planning and the execution phases. The iMT development phase starts normally one week in advance before the day of operations when plans for the flight operations are stabilised and available for the WOC to commence the development of iMT. Some missions perform their tactical events inside segregated/restricted airspace of different types, therefore request for ARES becomes an integral part of the iMT development process.

The request for ARES first passes through the EFI providing the necessary information about the volume of airspace needed for the mission. The WOC function engages in collaboration with airspace managers and respective CDM for the definition and allocation of ARES taking into account operational requirements and geographic scope of the mission. Once the ARES allocation process is finalised, the WOC function converts the results of the ASM process into trajectory description by connecting requested trajectory to the allocated ARES. The aggregated trajectory data together with allocated ARES represent the integrated military demand which is converted into the iOAT FPL for further submission and iterative and collaborative management.

The development of the integrated military ATM demand follows the standard phases of the iMT lifecycle. The iMT life cycle begins with the iMTD development phase and proceeds through the milestones related to the trajectory sharing iSMT. Once an agreement is reached with the relevant ATM actors on the allocation of the requested iMT it becomes a reference iRMT for all ATM actors concerned and finally proceeds to the execution phase, thereby completing the planning phase.

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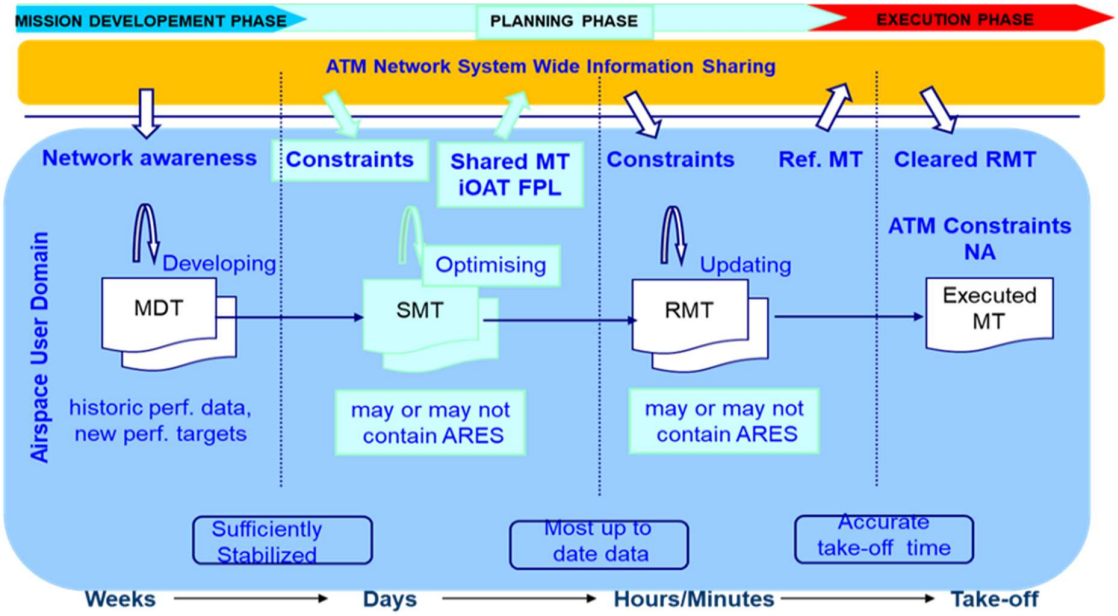

Figure 14: iMT lifecycle

In the iMT lifecycle, the definition of the flight profile and DMA type follow the two parallel threads; trajectory management and airspace management, which complement each other. The figure 15 demonstrates dependencies between these two parallel threads that gradually describe the integrated military ATM demand and provide a high-level overview of the operational processes along the ATM lifecycle. Actors and support systems will not significantly differ from previous descriptions but will be updated accordingly following the improvement of the operational activities.

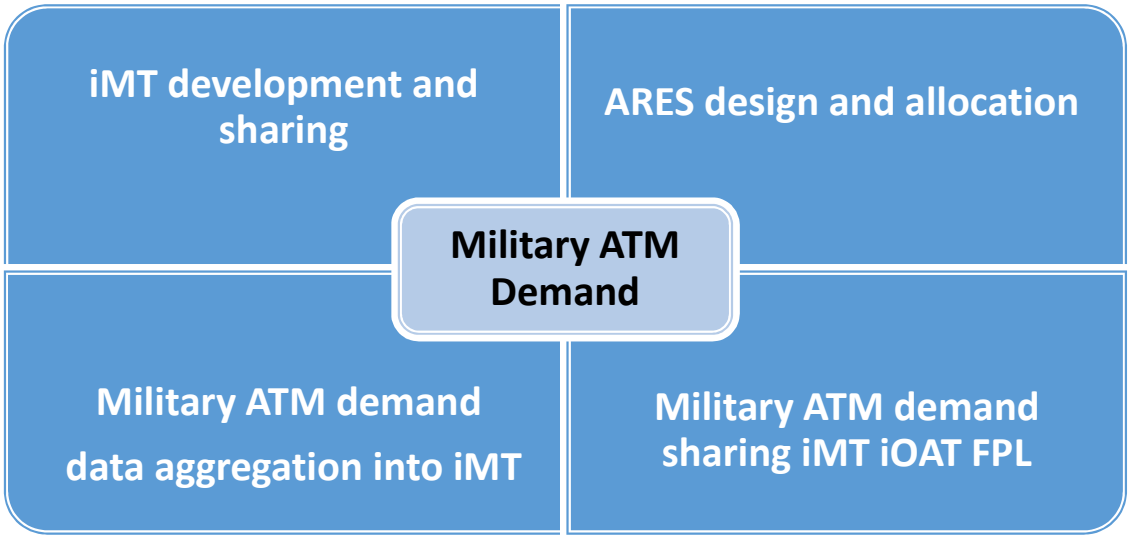

Figure 15: Military ATM demand

The integrated military ATM demand combines results of two interdependent processes relevant to the allocation of ARES via advanced ASM process and development of the trajectory profile description facilitated by the WOC mission support system.

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3.3.2.6.1 Management of Military ATM demand

Management of Military ATM demand concerns the operational activities carried out by relevant ATM actors to integrate the iMT with DMA Type 1 or Type 2 into the ATM network operations. It follows up the ATM lifecycle until the iMT is stabilised through CDM process and becomes a reference for all ATM stakeholders. That means that a pilot agrees to execute the trajectory and ATM actors agree to provide ATM services supporting execution of the reference trajectory. Operating methods in combination with operational activities will be described per iMT planning phase with a focus on DMA definition and trajectory profile description.

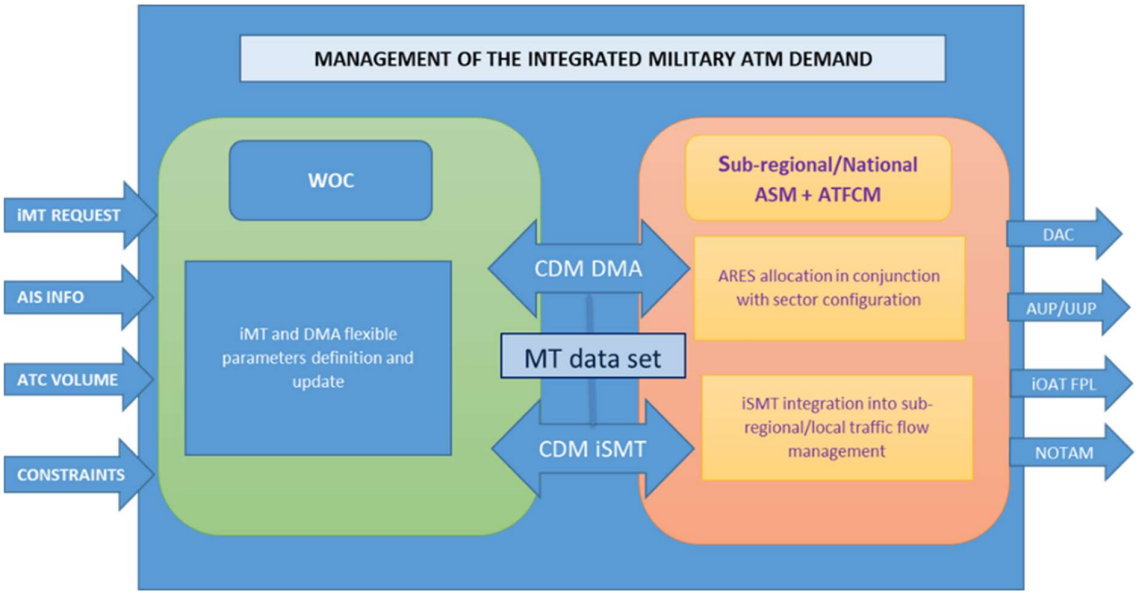

Figure 16: Management of the integrated military ATM demand

To better understand new operating methods, a detailed description is provided for each planning phase of the iMT lifecycle

3.3.2.6.2 iMT Development

Development of iMT is a prerogative of the military operational stakeholders and performed by the WOC function representing military AU operations node. The development process depends on different factors and information elements relevant to mission objectives, mission type, and aircraft type known ground constraints, ATM constraints and operational constraints to develop the most efficient trajectory profile.

In the nominal case the iMT development takes place a week before the day of the operation, but given the specifics of the military flight operations, the iMT schedule may be shifted to the day of operation.

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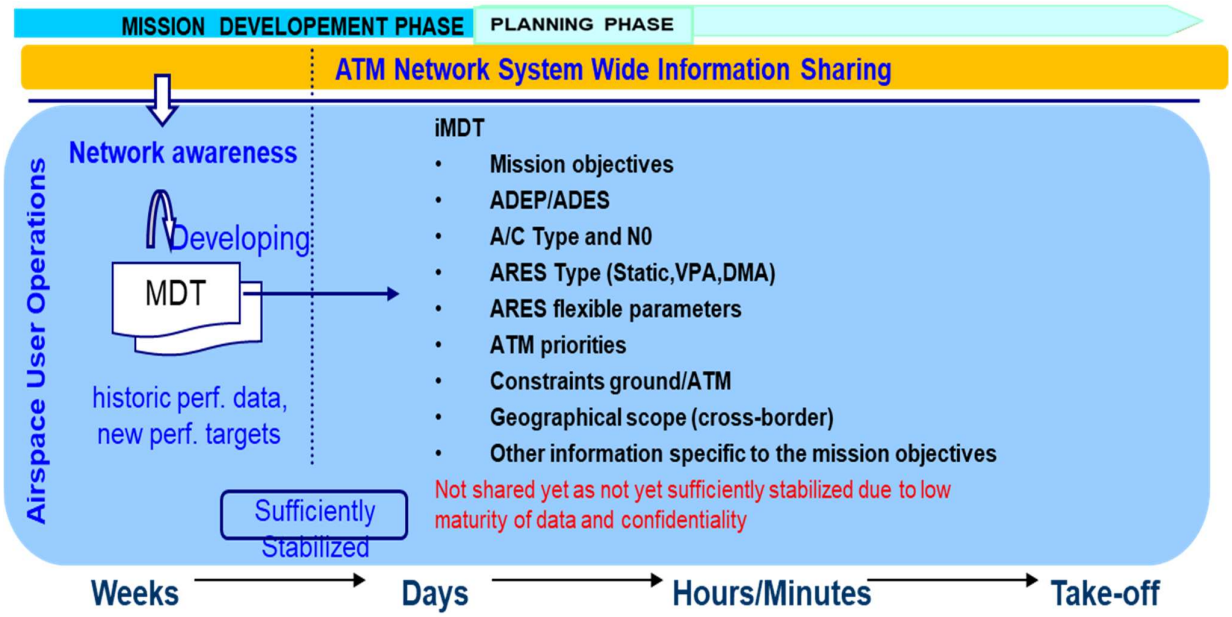

Figure 17: MDT development phase

There are four key elements that contribute to the development phase of the iMT, upon which the WOC operational activities are based. The figure 18 below breaks down these four key elements to a level of non-exhaustive details, which demonstrate the variety of mission and aircraft types.

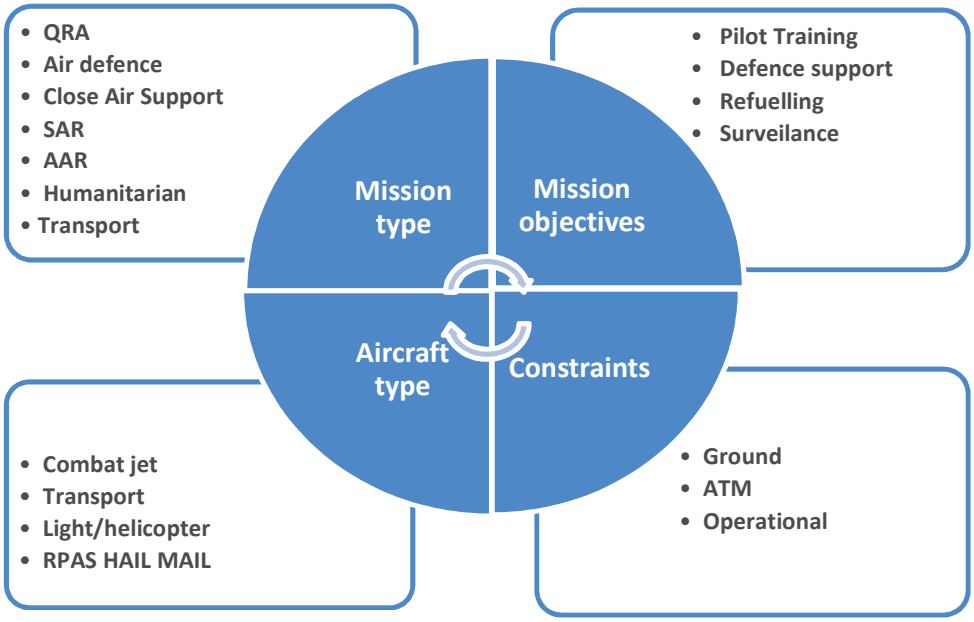

Figure 18: 4 key elements to iMT development

The mission type provides the basis for further extrapolation of the mission operational requirements on the development of an iMT profile.

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The mission objectives usually determine the aircraft type, the geographic scope of a mission and need for ARES of different types that varies in design principles from Static to VPA and DMA design principle.

The mission objectives based on operational requirements are the main drivers to determine relations between an ARES type to segregate a tactical event that will be conducted along intended flight route from non-participating traffic for safety reasons and a mission type.

The aircraft type and flight performance information are crucial enablers used by MSS to design the most accurate trajectory profile which will be integrated into the mission management system MMS and shared with ATM actors concerned. The aircraft flight performance determines the configuration of the flight profile. For military missions with multiple objectives the synchronisation with other trajectories combined for the same mission becomes a necessary precondition for the successful accomplishment of the mission objectives.

Ground and ATM Constraints determine the perimeter of restriction the WOC function can face during iMT development phase. The restriction can influence the development process but will not change the mission objectives.

Operational constraints determine priorities which apply to a mission and are related to the defence and security situation in which military mission may require special handling and consideration. Special air operations may demand the utmost priority with unrestricted access to airspace. In such occurrences, military aircraft may not be able to accept ATC clearances, which correlate their flight-planned route or altitude/flight level.

3.3.2.6.3 DMA development

The WOC analyses mission requests that indicate the need to define an ARES of DMA type along the intended flight paths or independent from the flight paths and initiates a 3D DMA design. The definition process is supported by the ASM functionalities of the mission support system MSS with predefined algorithms. Figure 19 depicts the key elements of DMA definition algorithms. This allows the WOC to simulate the most efficient definition of a three-dimensional airspace volume.

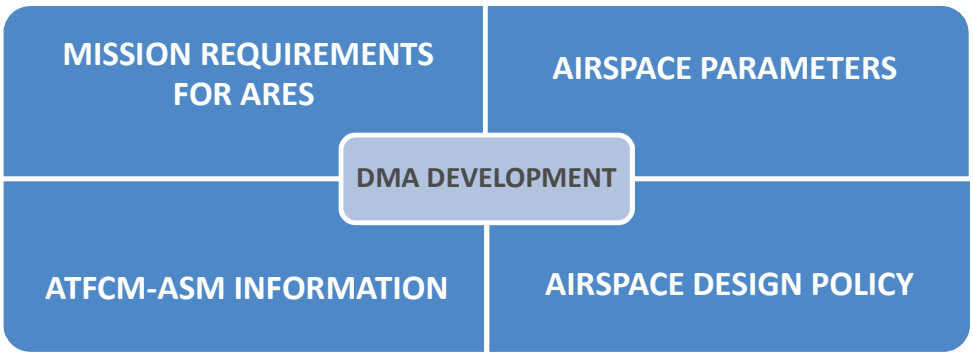

Figure 19: DMA development key elements

WOC determines the parameters of DMA in horizontal, vertical and time dimensions that satisfy the mission objectives using metrics for DMA definition and exploiting the functionalities of the mission support system. Information related to the mission constraints, flexible parameters and associated thresholds is shared with pertinent ATM actors to be further used in the CDM process when it is triggered by a local/sub-regional DAC function in order to integrate DMA into airspace configurations.

Conceptually, DAC is a joint civil-military function that combines the participants in the operational activities and the functional characteristics of the operational nodes of ASM, ATFCM and ATS. This

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function is expected to manage ARES allocation in conjunction with flow and capacity management, including sector configuration management at local/sub-regional level through appropriate civil/military CDM processes.

To alleviate the complexity associated with civil-military processes for DMA integration into airspace configurations, one of the R&D solutions for DAC is the concept of ATC volumes, facilitating DMA allocation and strategic de-confliction in the mid to short term planning stages based on a system-friendly single communication reference to airspace volumes between WOC and DAC functions. The concept of ATC volumes facilitates the allocation of DMA with the less possible impact on airspace configuration performance needs by their positioning in a conflict-free 3D dimension. Used by DAC, ATC volumes enable optimisation of DMA integration into airspace configurations and their allocation with the less possible complexity of CDM processes. Two are the key elements to an effective application of ATC volumes concept: DMA flexible parameters and the ability of technical systems to exchange and update dynamically information on airspace volumes.

Figure 20, shows an example of an ATC volume creation by the local DAC tool, used to declare a volume with a significant load of complex traffic.

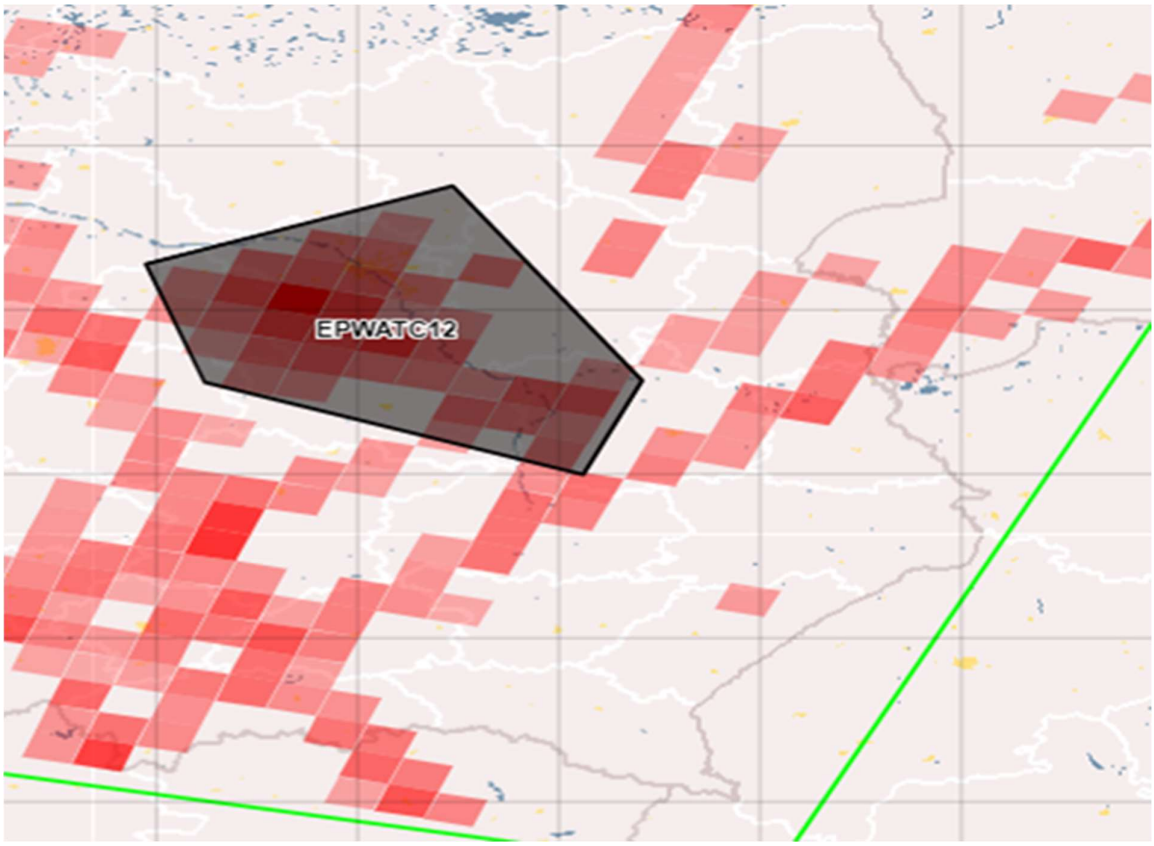

Figure 20: Definition of an ATC volumes

The figure 21 below illustrates a simulation in local DAC tool of the integration of DMA and ATC volume.

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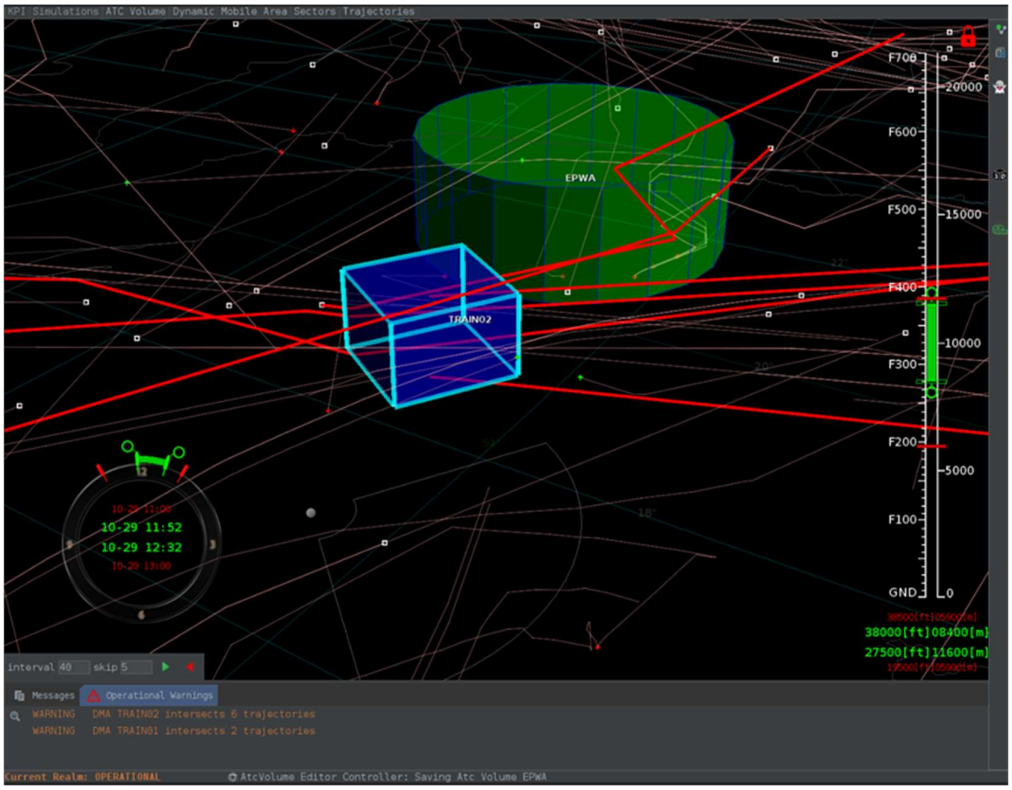

Figure 21: Simulation of DMA and ATC volume in a local DAC tool

Once, the DMA type with flexible parameters and thresholds within which these parameters can be controlled have been determined, the WOC initiates the DMA integration into MT process according to the reference parameters defined by the mission type and mission objectives. The geographic location of DMA is highly dependent on the configuration of the trajectory profile.

For DMA definition purposes, the WOC uses historical data based on ATC volumes shared by the local / sub-regional DAC function with the WOC and historical weather information. Based on historical data, the WOC determines the reference point for the geographic location of the predefined DMA. The reference point enables a connection between trajectory profiles and dedicated DMA.

The predefined metrics and flexible parameters support the alignment of the DMA allocation over the geographic reference point. Such reference point could either be a navigation aid, a way point or a pseudo point expressed by latitude /longitude coordinates.

The geographical location determined by WOC is fixed and can be shared via WOC/DAC interface. WOC generates a request that accumulates all relevant data regarding DMA and submits the request to local/sub-regional ASM. The request contains information relevant to DMA 3D configuration, flexible parameters, thresholds, and the indication of the anticipated elapsed time of the tactical event that will take place inside ARES.

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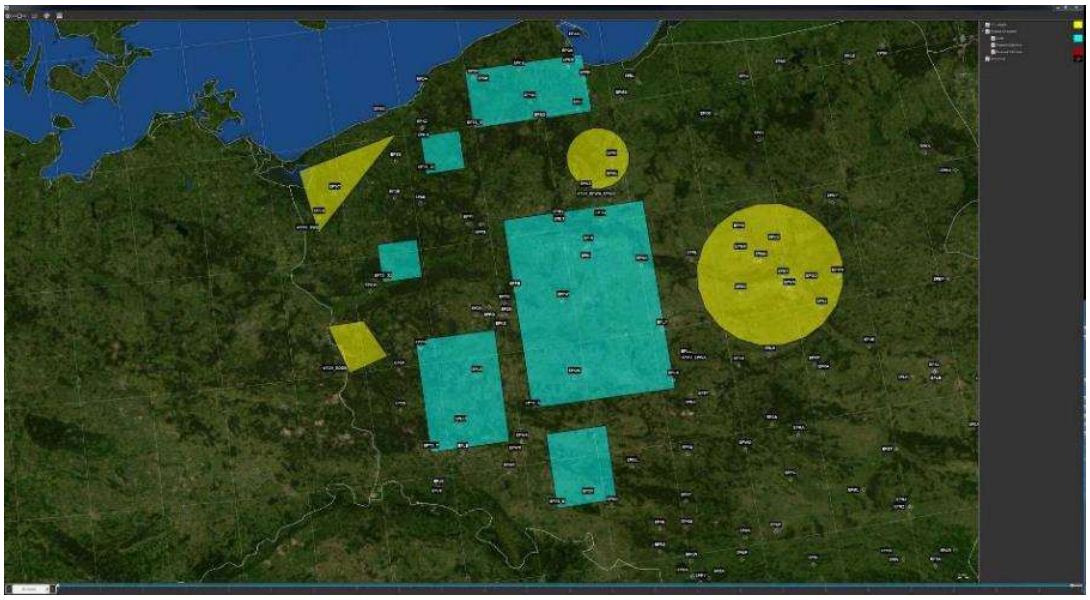

Figure 22: DMA type 1 and 2 request to DAC tool

It should be noted that in this phase the DMA parameters are not fully accurate and preliminary time parameters regarding the duration of a tactical event within ARES are communicated via a request. A more accurate time will appear in the iSMT as soon as the allocated DMA is integrated into the trajectory description.

Upon receipt of a request, the local / sub-regional DAC (ASM and ATFCM) performs an impact analysis on other available airspace requests. Based on historical data, airspace availability, weather forecast and expected traffic demand, the local / sub-regional DAC function performs impact assessment by simulating different ATC sector configurations versus geographic location and configuration of DMA with an emphasis on local KPIs.

Conflict-free modelling results in the request being accepted by DAC function and made available for further publication in AUP/DAC and NOP which are a continuous rolling process.

Conflicts between airspace configuration and DMA allocation and configuration detected during simulation results in CDM are being triggered by local / sub-regional DAC. The CDM triggers the collaboration between WOC and DAC actors on the proposed alternative solution regarding the DMA flexible parameters, to optimise airspace configuration in the area of responsibility of the local/sub-regional DAC.

The DAC function compares different scenarios regarding potential modifications of the DMA using flexible parameters within predefined thresholds and detects the optimal airspace configuration. The associated ATC volumes are made available for the WOC to analyse the impact of the new ATC volume on DMA and mission effectiveness.

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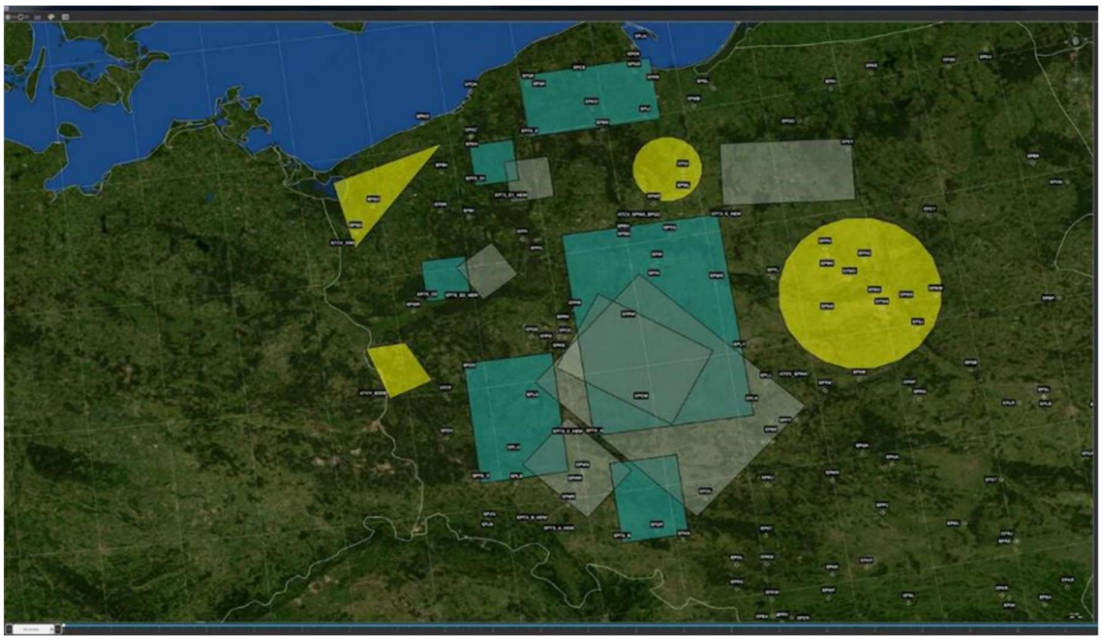

Figure 23: Counter proposal versus requested DMA type 1 and 2

In iMT lifecycle, this is the first iteration of the CDM process related to ARES allocation. The proposed solution may contain change of the requested DMA in horizontal and vertical plain or change of the reference point used for the DMA geographic location and time.

The WOC analyses the proposed solution against the mission request focusing on mission type, aircraft type and mission constraints while evaluating possible adverse effect on the mission effectiveness. If the proposed options for the modifications does not exceed the threshold of the flexible parameters, the proposal is accepted by WOC, which finalises the DMA definition process. Consequently, the initial request is updated, and the local/sub-regional DAC publishes the AUP/DAC to be integrated in the NOP.

The DMA published in NOP receives an ARES temporary designator/ID, which will be used by the NM environmental data base in corresponding processes. This designator is unique and cannot be changed by any of the operational stakeholders concerned until the iMT execution is terminated.

The WOC assigns the given ID to the allocated DMA and saves it in the system. The WOC uses DMA ID while filing the iOAT FPL.

The published DMA becomes a reference allocated ARES and the WOC initiates the development of the iMT profile using the agreed DMA parameters. Further update of the reference allocated DMA can be triggered in circumstances when the performance of the ATM network or mission effectiveness are jeopardised.

3.3.2.6.4 Initial Shared Mission Trajectory iSMT

The iSMT provides flight related data across multiple stakeholders regarding a single flight, ensuring that all systems have a common, consistent, up to date view of the flight, and that the data is widely and easily available, subject to appropriate access controls and confidentiality check.

The iSMT contains a set of trajectory-related data corresponding to the Requested / Filed Trajectory and the Ground Agreed Trajectory updated from the CDM.

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Requested/Filed Trajectory contains trajectory data as submitted by the AU through filed iOAT FPL. Effectively, it expresses the flight intent of a military mission with specific operational requirements. The trajectory data are used to create an integrated view on AU demand or initiate a CDM process when required on iSMT integration into the collaborative planning processes with relevant ATM actors. The SESAR concept considers the collaborative decision making and refinement of iSMT in due consideration of known constraints, of anticipated congestions at specific points, and AU preferences/priorities.

Ground -agreed trajectory is developed by WOC and reflects the Airspace User's intention. All ground partners revise this trajectory through a CDM process, that captures the agreements between ATM actors concerned. There is a continuity of data in the Ground-agreed trajectory from the iSMT to the iRMT. Some data elements are specific for the planning phase and not used in the flight execution phase as well as data elements specific for the fight execution phase will not be used in the flight planning phase.

The iSMT ATM related dataset is reflected in figure 24 and contains not exhaustive list of data elements to be shared with ATM actors concerned.

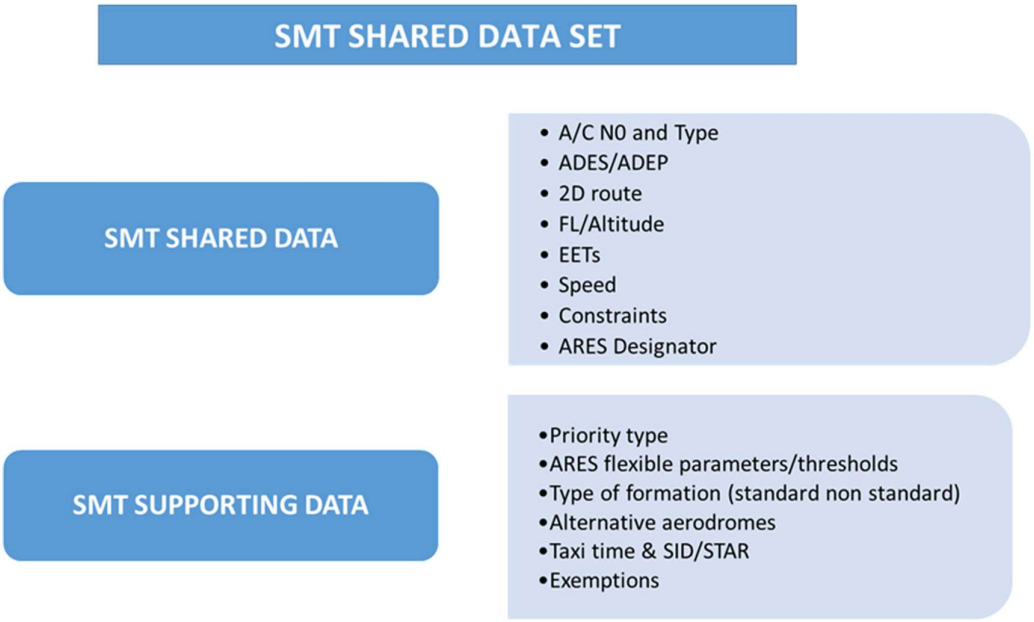

Figure 24: iSMT dataset

Submitted iSMT becomes a subject to trajectory management and implies a joint and iterative exchange of information between ATM actors concerned. The NM system processes and verifies the iOAT FPL generating a 4D trajectory to be further used in relevant ATM processes. Once verified and acknowledged the iOAT FPL is distributed to all pertinent ATM and relevant non-ATM actors along the trajectory profile.

The 4D trajectory developed by the NM system is based on averaged flight performance parameters retrieved from BADA database and the iOAT FPL data regarding intended flight route, ARES and supporting data. The generated 4D trajectory is less accurate than the trajectory developed by MSS and can be used by local / sub-regional ATM actors for collaborative planning and CDM.

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The local / sub-regional DAC receives the iSMT and analyses ARES related dataset whether the previously agreed DMA geographic location, configuration and time duration are compliant with airspace configuration recently updated with new traffic demand information. The DAC function also analyses the trajectory profile and auxiliary parameters that can be integrated and used in local DCB processes.

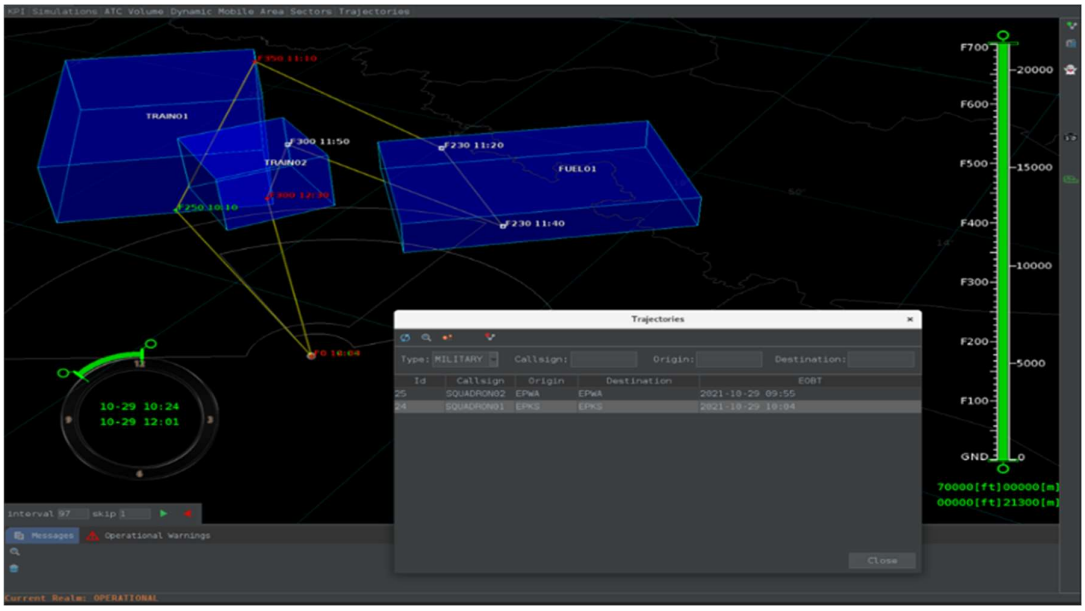

Figure 25: Mission trajectory with corresponding DMA type 1 and 2

The local/sub-regional DAC function must comply with the DMA configuration and location reached in CDM unless the previous version of airspace configuration is not valid anymore.

Given the evolving traffic demand, ever-changing weather and dynamic ATM processes, the DMA allocation agreement versus airspace configuration may no longer meet local performance expectations. To match local KPIs, the local DAC function can initiate CDM.

In CDM, the local DAC function can propose a modification of ARES within the threshold of the flexible parameters or modification of the trajectory by applying a planning ATM constrain, notably Target Time over (TTO). In the context of the MT concept the planning ATM constraint TTO is associated with target time over an entry/exit point of ARES or over navigation fix along MT profile.

The TTO concept contributes to the Flow and capacity management function in providing better predictability and smoothing the effect of hard constraints over bottle necks or hot spots detected in corresponding operating environments. It could also support synchronising multiple mission trajectories which have to arrive over a specific point at the same time (e.g. rendezvous point, formation join up/split, ARES entry/exit point).

TTO adjusts and/or fixates the estimated time over target/specific point (ETOT) point to respond to, either military mission requirements or airspace capacity optimization needs. A time window of adherence to a Target Time shall be applied. If a proposed change to a Target Time falls within the time window of adherence, then no action will be taken.

TTO consists of a nominal value and tolerance windows. TTO tolerance window supports tactical adjustments to MT through CDM between flight crew and ATC in the execution phase.

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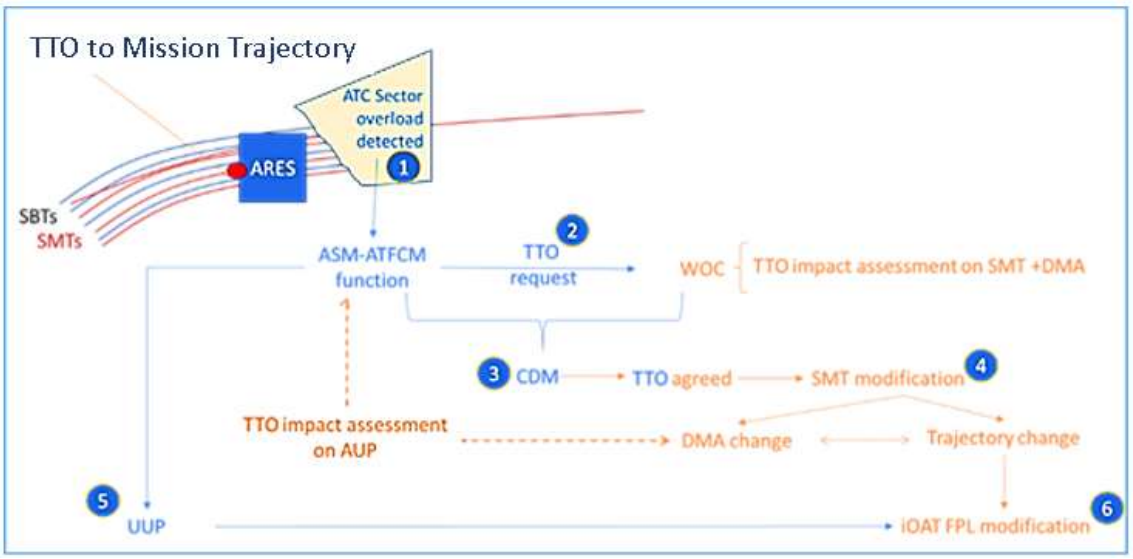

Figure 26: TTO for iSMT

When a TTO is assigned to an ARES entry/exit point, the tolerance window value enables a time buffer (could be defined based on national rules and procedures) to be used tactically for ARES pre-activation/de-activation allowing ATC to ensure de-confliction with any of the non-participating traffic.

DAC local function in CDM process may propose optimisation of the DMA configuration or shifting of the geographical location which will result in iSMT modification. WOC could refuse such proposal at any time, however if this modification falls within the threshold of the flexible parameters it can be accepted unless it has adverse effect on mission objectives.

The local DAC function acknowledges the perimeter of the flexible parameters and when the proposal for iSMT modification exceeds it, the DAC function applies the DCB measures to the traffic flow that may lead to the degradation of the local/sub-regional KPIs.

Another solution for trajectory modification could rely on the time parameters, which may solve imbalance between the configuration of ATS sectors and iSMT profile integrated into the traffic flows. Shift in ARES activation time or application of a time constraint over the significant point may solve capacity shortfalls or smooth the adverse effect of the detected hot spot.

The TTO over ARES (DMA type 1 and 2) entry/exit point is calculated by local DAC function based on the iSMT data extracted from the iOAT FPL. The calculation concerns the time lapse between EOBT and EET to the ARES entry point. The calculation of the target time should be done within the flexible parameters relevant to time frame proposed by WOC and reflected in the request for ARES/DMA allocation.

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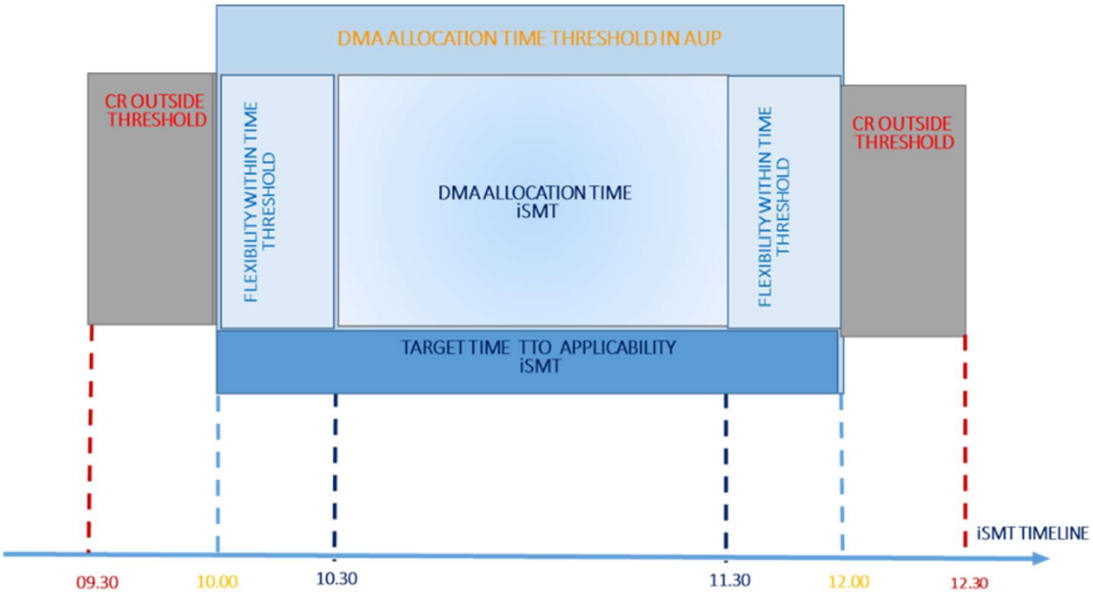

Figure 27 TTO management

During CDM, the DAC function initiates a change request and based on the simulation results proposes to the WOC a new time value either over DMA reference/entry point or significant point along the trajectory profile. WOC runs standard impact assessment simulating trajectory modification while taking into considering the latest available information regarding iSMT. The impact assessment may be either positive or negative depending on many factors in the WOC domain.

When the proposed TTO is accepted it leads to the modification of the trajectory profile description and WOC submits the associated to the iOAT FPL message with the new time parameters. For military missions it means a strong adherence to the time being set over the point within the tolerance window provided by the corresponding trajectory dataset.

If WOC refuses to acknowledge the proposed TTO then DAC will consider an application of the DCB measures to the non-participating traffic and cherry-pick another trajectory most suitable to the DCB measures.

In circumstances when a conflict is detected between iSMT and traffic flows within an airspace configuration, the DAC may request either a change in DMA configuration/location or trajectory modification based on Target Time concept.

3.3.2.7 The operating methods

3.3.2.7.1 Develop Early Flight Intent (EFI) for MT with DMA type 1 and 2

This section describes the operating methodology of the iMT development and operational activities provided by the pertinent nodes in medium-short term planning phase.

The iMT development includes the definition of the 4D trajectory and definition of the ARES when dictated by the mission objectives. The focus is on the definition of ARES based on DMA type 1 and 2 design principle for a specific mission type requiring airspace reservation along the trajectory profile at the predefined geographic location in accordance with mission specific objectives.

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The need for airspace reservation is usually defined by the military AU seven days prior the day of operations. DMA type 1 and 2 definition starts simultaneously with Trajectory definition in accordance with actual mission requirements for the day of operations and is supported by the following operational activities conducted by the nodes:

- **AU operations (WOC)**

- Collect and analyse flight schedules
- Select missions requiring DMA type 1 and 2
- Analyse historical data
- Define DMA type 1 and 2 configuration/location
- Share Early Flight intent with DMA type 1 and 2
- Asses ASM solution
- Reject ASM solution
- Update Early Flight Intent with ASM solution
- Finalise Early Flight Intent

- **ASM (Sub-regional/National)**

- Collect and aggregate requests for DMA type 1 and 2
- Analyse DAC historical data
- Conduct impact assessment on DMA type 1 and 2
- Propose ASM solution for de-confliction
- Simulate conflict-free configuration of airspace
- Share simulation results

- **ATFCM (Sub-regional/local)**

- Provide DAC historical data
- Provide updated ATC volumes based on traffic demand evolution and ATC sectors planning

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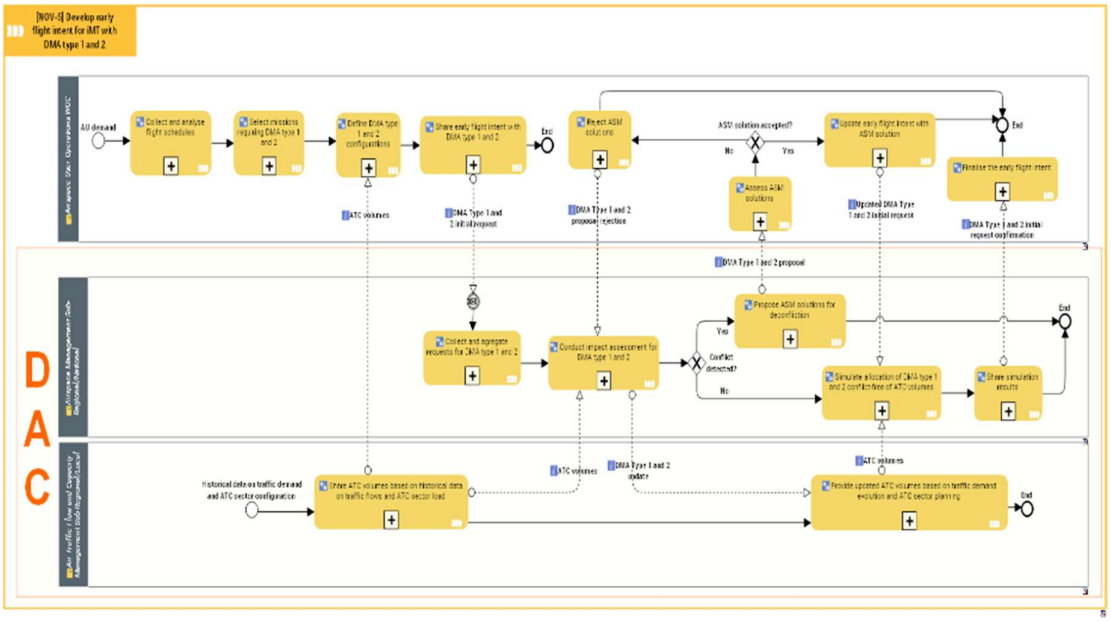

Figure 28: Develop Early Flight Intent (EFI) for MT with DMA type 1 and 2

3.3.2.7.2 Allocate ARES DMA type 1 and 2

This section describes the operating method relevant to CDM on ARES (DMA type 1 and 2) allocation and involves pertinent nodes performing operational activities.

The ARES (DMA type 1 and 2) allocation is based on historical data and collaborative planning results as well as collaboration between respective nodes to ensure optimal balance between civil and military demand and efficient airspace user operations with minimum impact on the ATM network performance.

CDM on ARES (DMA type 1 and 2) allocation starts after analysis demand of other airspace users and latest updates regarding traffic flows and ATC sector configuration supported by the following operational activities conducted by the nodes:

- **AU operations (WOC)**

- Create/Update iSMT
- Refine/update DMA type 1 and 2 request for D-1
- Assess ASM solution
- Update DMA type 1 and 2
- Reject DMA type 1 and 2 updates
- Make counter-proposal to DMA type 1 and 2 updates

- **ASM (Sub-regional/National)**

- Conduct impact assessment on DMA type 1 and 2 updates
- Propose ASM solution for DMA type 1 and 2 updates

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- Assess DMA type 1 and 2 counter-proposal
- Integrate in the DAC and publish DMA type 1 and 2 in the NOP
  - **ATFCM (Sub-regional/local)**
- Provide ATC volumes updates

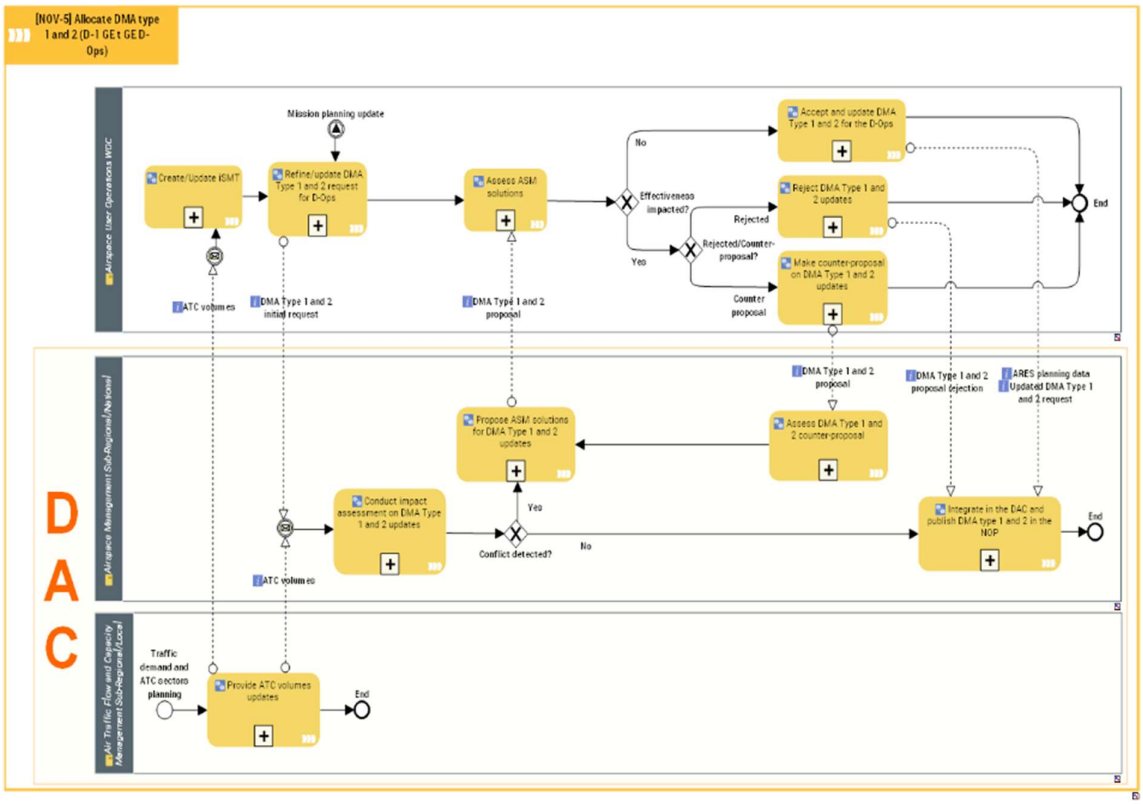

Figure 29: Allocate DMA type 1 and 2

3.3.2.7.3 Sharing Mission Trajectory iSMT

This operating method has been described in the scope of initial trajectory management in **Nov-5 iSMT Management in Short Term** in Wave 1 and therefore, indicates already validated process but it is necessary to demonstrated smooth transition from EFI development to the moment when WOC starts sharing mission related information in the form of iOAT FPL with all ATM actors concerned.

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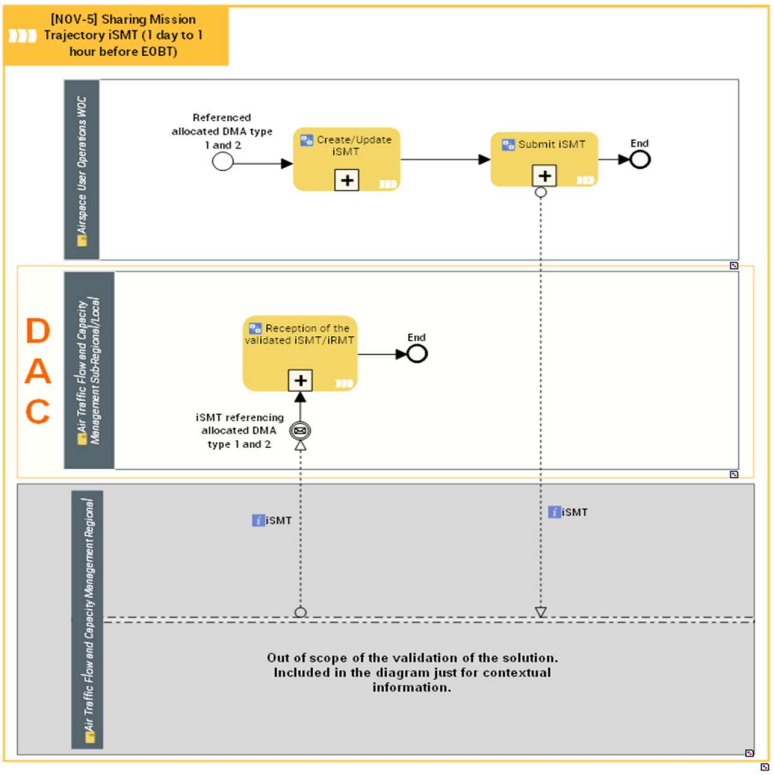

Figure 30: Sharing Mission Trajectory iSMT

3.3.2.7.4 iSMT management in medium-short term[2]

This section describes the management of iSMT using the operating method and operational activities provided by the pertinent Nodes in the medium to short-term planning phase.

The iSMT management includes the finalization of the development of the iMT, the creation and update, submission, validation and distribution of an iSMT through the iOAT FPL mechanism. It also includes transition of iSMT to iRMT[3] when all necessary conditions are met and all involved stakeholders have agreed to the transition of iSMT to iRMT upon decision of WOC and in agreement with all pertinent ATM actors.

The management of iSMT in the medium to short-term planning phase is supported by the following operational activities:

- AU Operations (WOC) :

[2] This section addresses the operating method as it was described in solution PJ.07-03 Mission Trajectory Driven Processes in Wave 1 to demonstrate the validated seamless process.

[3] The transition form iSMT to iRMT is not described by this operating method considering the scope of the solution

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- Create/Update iSMT
- Submit iSMT
- Promulgate iRMT

- ATFCM (Regional):

- ATM Environment and Constraints Service Provision, Traffic Demand Computation, DCB
- Validate iSMT
- Distribute iSMT
- Enrich and publish demand forecast with incoming iSBT/iSMT data
- Publish iRMT in the NOP

- ATFCM (Sub-regional/Local) :

- Provide Local Impact Assessment

- En-Route/Approach ATS :

- Reception of the validated iSMT/iRMT

- Meteorological Service Provider Operational Activities:

- Provide weather information

The following figure shows the activity view and related information exchanges between the involved operational nodes of the Mission Trajectory management in the short term planning Phase.

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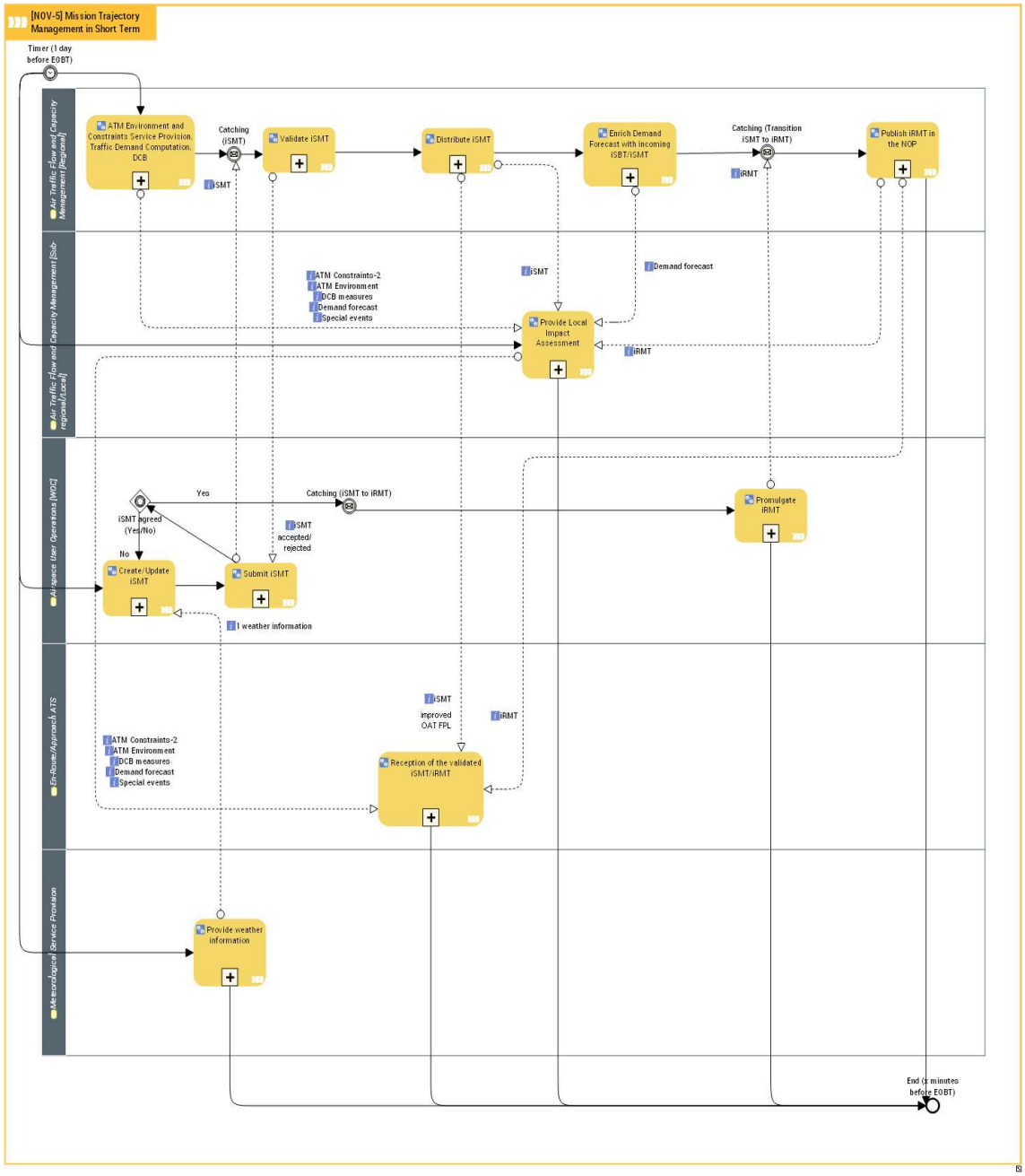

Figure 31: iSMT management in medium to short term

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3.3.2.7.5 iSMT management with planning ATM constraint (TTO)

This section describes the operating method relevant to the application and management of the planning ATM constraint to iSMT with allocated ARES (DMA type 1 and 2) and involves pertinent nodes performing operational activities.

The target time may apply to either allocated ARES (DMA type 1 and 2) or to the iSMT flight route when such trajectory is eligible to constraint management in the planning phase. Target time over entry/exit point of the selected DMA type ore over significant point along flight route may solve conflict and support optimisation of the local performance targets. The TTO may have minimum impact on the mission objectives while facilitating the accommodation of additional traffic within predefined ATC volume if proposed time value does not exceed the threshold of flexible parameters associated with allocated ARES (DMA type 1 and 2).

The application of the planning ATM constraint (TTO) starts after local impact analysis on iSMT as well as the traffic situation and ATC sector design. This process is supported by the following operational activities conducted by the nodes:

- **ATFCM (Sub-regional/local)**

- Provide local impact assessment
- Cherry-pick iSMT/SBT eligible to TTO
- Propose TTO for iSMT
- Acknowledge TTO rejection

- **AU operations (WOC)**

- Analyse TTO proposal for iSMT
- Reject TTO proposal
- Analyse DMA type 1 and 2 impact
- Submit DMA type 1 and 2 updates
- Refine/update iSMT

- **ASM (Sub-regional/National)**

- Update DMA type 1 and 2 in DAC and publish in NOP

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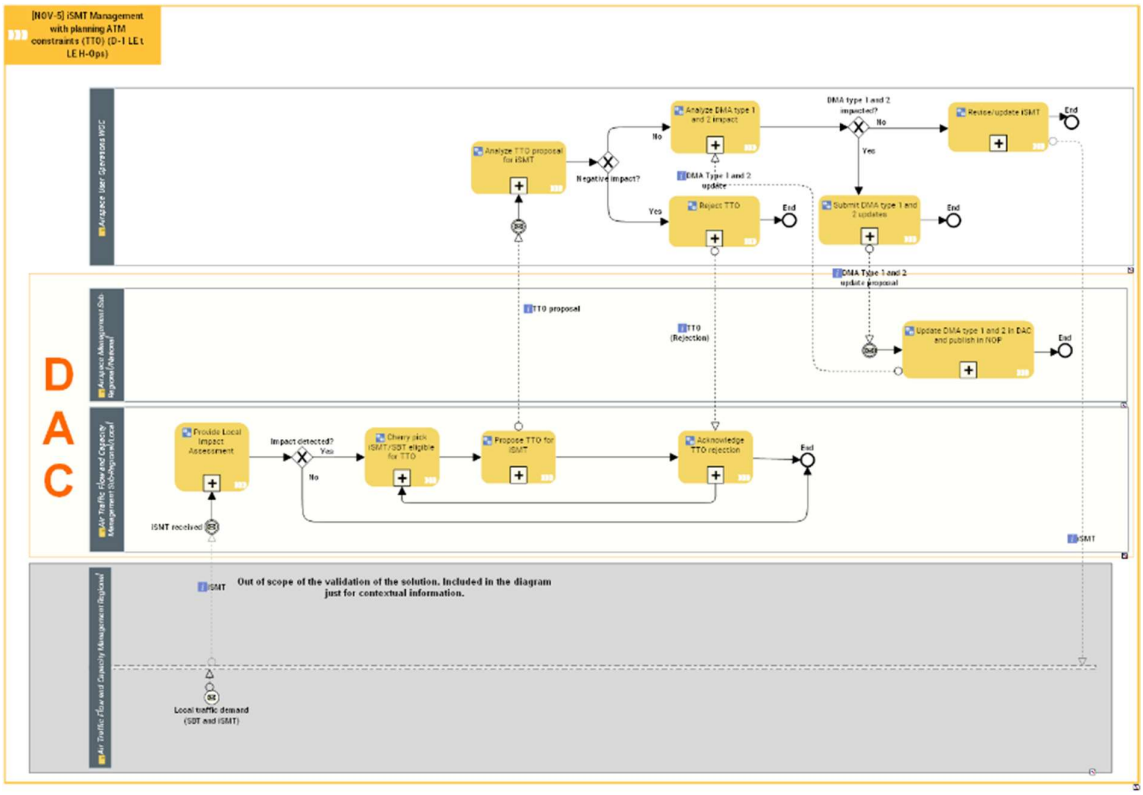

Figure 31: iSMT management with planning ATM constraint (TTO)

3.3.2.8 Use Cases

This section describes the use cases derived from the activity views and are broken down to the level of details necessary to extract operational requirements.

The use cases are grouped around the new operating methods and reflect operational steps associated with operational Nodes. The operational steps reflect logical sequence in the development and sharing of Mission Trajectory with DMA type 1 and 2 and management of the planning ATM constraints. All UC's will be subject to the validation and are expected to reach the V3 maturity level.

The naming of the use cases follows the following convention.

· UC-<Operational Node>-<Number>: <Activity View> [Optional (<Level of Operational Node>)]

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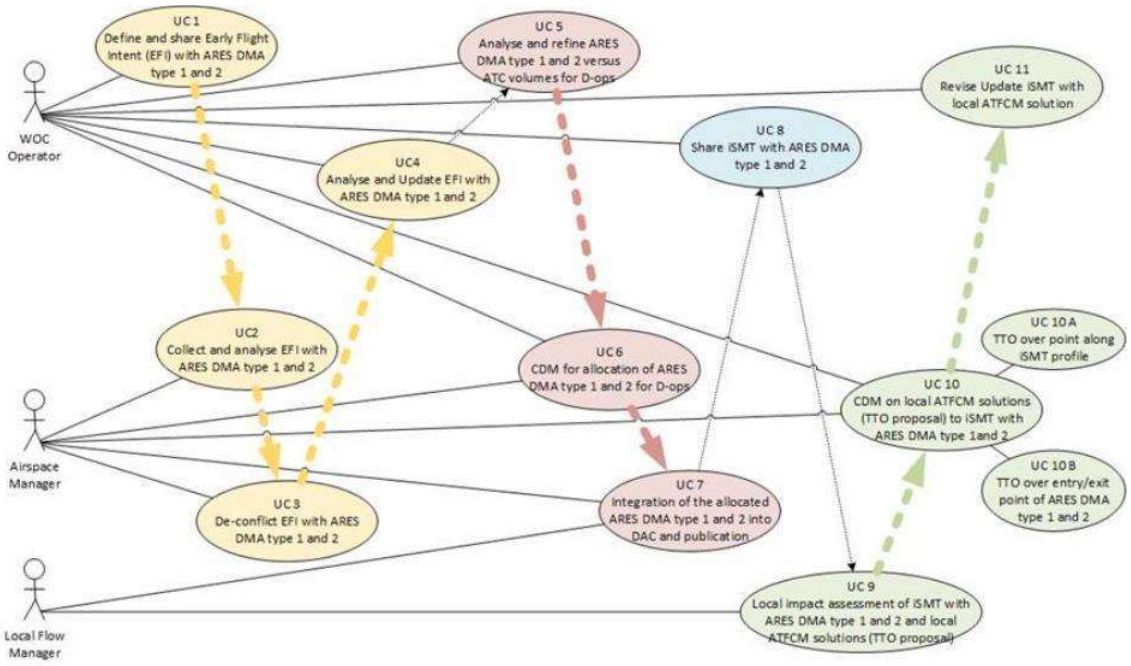

Figure 32: Use Cases

The use cases related to operating method "Develop early flight intent for MT with DMA Type 1 and 2 (D-7-D-1)".

- UC WOC-01: Define and share Early Flight Intent (EFI) with DMA type 1 and 2;
- UC ASM-02: Collect and analyse EFI with DMA type 1 and 2;
- UC ASM-03: De-conflict EFI with DMA type 1 and 2;
- UC WOC-04: Analyse and Update EFI with DMA type 1 and 2.

The use cases related to operating method "Allocate ARES DMA Type 1 and 2 (D-1 – D-Ops)"

- UC WOC-05: Analyse and refine DMA type 1 and 2 versus ATC volumes.
- UC ASM-06: CDM for allocation of DMA type 1 and 2;
- UC ASM-07: Integration of the allocated DMA type 1 and 2 into DAC and publication.

The use cases related to operating method "Sharing Mission Trajectory iSMT"

- UC-WOC-08: Share iSMT with DMA type 1 and 2.

The use cases related to operating method "iSMT Management with planning ATM constraint (TTO) (D-1-H-ops)".

- UC-ATFCM-09: Local impact assessment of iSMT with DMA type 1 and 2 and local ATFCM solutions (TTO proposal);
- UC ASM-10: CDM on local ATFCM solutions (TTO proposal) to iSMT with DMA type 1 and 2;
- UC-ASM-10a: TTO over point along iSMT profile ;
- UC-ASM-10b: TTO over entry/exit point of ARES DMA type 1 and 2;
- UC-WOC-11: Revise Update iSMT with local ATFCM solution.

3.3.2.8.1 UC WOC-01: Define and share Early Flight Intent (EFI) with DMA type 1 and 2

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3.3.2.8.1.1 Scope

This use case covers the development phase of the mission trajectory by preparing Early Flight Intent EFI with DMA type 1 and 2

3.3.2.8.1.2 Level

User Goal

3.3.2.8.1.3 Summary

Based on weekly schedule of the flight operations WOC initiates development of MT by selecting missions requiring ARES DMA type 1 and 2. In order to insure sharing of military ATM demand in medium term planning phase WOC develops EFI that contains initial MT data including ARES parameters and shares EFI with ATM actors concerned.

3.3.2.8.1.4 Actors

- Airspace User Operations WOC
  - Mission scheduler
  - Mission Planner
- AMC
  - Airspace manager
  - Airspace designer
- FMP
  - Flow manager
- Operational Nodes
  - Airspace User Operations
  - ASM (Sub-regional/National)
  - ATFCM (Sub-regional/local)

3.3.2.8.1.5 Preconditions

Weekly planning provides information regarding missions and their objectives. WOC selects missions requiring ARES DMA type 1 and 2 and initiates the development phase with due regard to historical data of the ATC volumes and airspace configuration. EFI is the first milestone in the MT lifecycle enabling sharing of the MT related information at early stage with ATM actors concerned.

3.3.2.8.1.6 Post conditions

EFI is submitted by WOC to AMC to inform about intention of the mission to use the ARES DMA type 1 and 2 at selected geographical location.

3.3.2.8.1.7 Success end state

EFI with DMA type 1 and 2 is developed and submitted accordingly.

3.3.2.8.1.8 Failed end state

EFI is not submitted to AMC

3.3.2.8.1.9 Notes

EFI submitted one week prior the day of operations facilitates recognition of military ATM demand by AMC actors and contributes to predictability and optimisation of the airspace configuration.

3.3.2.8.1.10 Trigger

EFI is shared by WOC in a harmonised format

3.3.2.8.1.11 Main Flow

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WOC actors design ARES DMA type 1 and 2 according to mission requirements and locate it over geographical point along the flight path. This information is submitted by WOC to AMC in the predefined format or shared via established system interface.

3.3.2.8.1.12 Alternative flows

N/A

3.3.2.8.1.13 Failure Flows

N/A

3.3.2.8.2 UC ASM-02: Collect and analyse EFI with DMA type 1 and 2;

3.3.2.8.2.1 Scope

Airspace manager collects processes and analyses the EFI with DMA type 1 and 2

3.3.2.8.2.2 Level

User Goal

3.3.2.8.2.3 Summary

AMC collects requests for ARES of different types in different formats and analyses them against available airspace resource

3.3.2.8.2.4 Actors

- Airspace User Operations WOC
  - Mission scheduler
  - Mission Planner
- AMC
  - Airspace manager
  - Airspace designer
- FMP
  - Flow manager
- Operational Nodes
  - Airspace User Operations
  - ASM (Sub-regional/National)
  - ATFCM (Sub-regional/local)

3.3.2.8.2.5 Preconditions

Early planning of the airspace resource contributes to predictability and awareness of the AU intents, facilitates early de-confliction and optimisation of the airspace configuration

3.3.2.8.2.6 Post conditions

AU requests for airspace are collected and analysed to further facilitate optimisation of the airspace resource.

3.3.2.8.2.7 Success end state

EFI is processed and analysed by AMC

3.3.2.8.2.8 Failed end state

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EFI is not processed

3.3.2.8.2.9 Notes

EFI is analysed and processed one week before the day of operations

3.3.2.8.2.10 Trigger

EFI is received in a standard harmonised format

3.3.2.8.2.11 Main Flow

AMC actors receive and analyse request for DMA type 1 and 2 against requests of other airspace users and historical airspace configuration

3.3.2.8.2.12 Alternative flows

N/A

3.3.2.8.2.13 Failure Flows

N/A

3.3.2.8.3 UC ASM-03: De-conflict EFI with DMA type 1 and 2;

3.3.2.8.3.1 Scope

Airspace manager analyses DMA type 1 and 2 configuration and geographical location within AOR and de-conflicts it with other requests of AU using historical data of the ATC volumes provided by ATFCM sub-regional/local

3.3.2.8.3.2 Level

User Goal

3.3.2.8.3.3 Summary

AMC analyses and de-conflicts DMA type 1 and 2 against other AU demand in order to achieve conflict-free airspace configuration using historical data of the ATC volumes

3.3.2.8.3.4 Actors

- Airspace User Operations WOC
  - Mission scheduler
  - Mission Planner
- AMC
  - Airspace manager
  - Airspace designer
- FMP
  - Flow manager
- Operational Nodes
  - Airspace User Operations
  - ASM (Sub-regional/National)
  - ATFCM (Sub-regional/local)

3.3.2.8.3.5 Preconditions

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DMA type 1 and 2 configuration/location is analysed and ASM solution for the update is generated in order to optimise the airspace configuration based on historical data and other AU demand.

3.3.2.8.3.6 Post conditions

ASM solution is shared with WOC in order to achieve a conflict-free configuration of airspace.

3.3.2.8.3.7 Success end state

ASM solution for the DMA type 1 and 2 update is generated and shared with WOC actors

3.3.2.8.3.8 Failed end state

DMA type 1 and 2 configuration/location is not analysed and stored in the database.

3.3.2.8.3.9 Notes

ASM solution for DMA type 1 and 2 is shared to respond to EFI one week prior the day of operations

3.3.2.8.3.10 Trigger

DMA type 1 and 2 configuration/location is analysed and conflict is detected

3.3.2.8.3.11 Main Flow

AMC actors develop ASM solution to de-conflict DMA type 1 and 2 configuration/location and shared with WOC actors.

3.3.2.8.3.12 Alternative flows

N/A

3.3.2.8.3.13 Failure Flows

N/A

3.3.2.8.4 UC WOC-04: Analyse and Update EFI with DMA type 1 and 2.

3.3.2.8.4.1 Scope

Mission planner analyses ASM solution for DMA type 1 and 2 and updates EFI

3.3.2.8.4.2 Level

User Goal

3.3.2.8.4.3 Summary

WOC analyses how ASM solution for DMA type 1 and 2 updates fits into mission objectives and updates EFI accordingly to ensure conflict-free allocation of DMA type 1 and 2

3.3.2.8.4.4 Actors

- Airspace User Operations WOC
  - Mission scheduler
  - Mission Planner
- AMC
  - Airspace manager
  - Airspace designer
- Operational Nodes

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- Airspace User Operations
- ASM (Sub-regional/National)

3.3.2.8.4.5 Preconditions

ASM solution is received by WOC to assess how proposals for the update of DMA type 1 and 2 fit into mission objectives.

3.3.2.8.4.6 Post conditions

ASM solution is analysed and accepted

3.3.2.8.4.7 Success end state

EFI is updated accordingly

3.3.2.8.4.8 Failed end state

EFI is not updated

3.3.2.8.4.9 Notes

EFI is updated based on accepted ASM solution

3.3.2.8.4.10 Trigger

ASM solution is received and processed by WOC

3.3.2.8.4.11 Main Flow

Mission planner receives and analyses ASM solution for DMA type 1 and 2 updates to ensure conflict-free airspace configuration.

3.3.2.8.4.12 Alternative flows

N/A

3.3.2.8.4.13 Failure Flows

N/A

3.3.2.8.5 UC WOC-05: Analyse and refine DMA type 1 and 2 versus ATC volumes;

3.3.2.8.5.1 Scope

Mission planner analyses DMA type 1 and 2 configuration/location against the latest ATC volume data provided by ATFCM Sub-regional/local

3.3.2.8.5.2 Level

User Goal

3.3.2.8.5.3 Summary

WOC analyses the latest updates related to ATC volumes and the impact of such updates on DMA type 1 and 2 configuration/location to integrate it into airspace configuration.

3.3.2.8.5.4 Actors

- Airspace User Operations WOC
- Mission scheduler
- Mission Planner

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- AMC
  - Airspace manager
  - Airspace designer
- Operational Nodes
  - Airspace User Operations
  - ASM (Sub-regional/National)

3.3.2.8.5.5 Preconditions

DMA type 1 and 2 location/configuration accepted through EFI is refined with latest updates and analysed against the latest updates of the ATC volumes.

3.3.2.8.5.6 Post conditions

DMA type 1 and 2 location/configuration is refined.

3.3.2.8.5.7 Success end state

Refined DMA type 1 and 2 location/configuration fits into mission objectives

3.3.2.8.5.8 Failed end state

Refined DMA type 1 and 2 location/configuration degrades mission objectives

3.3.2.8.5.9 Notes

DMA type 1 and 2 location/configuration is refined one day prior the day of operations based on the updates of the mission and configuration of the ATC volumes

3.3.2.8.5.10 Trigger

Mission updates and ATC volumes updates.

3.3.2.8.5.11 Main Flow

Mission planner revises DMA type 1 and 2 configuration/location against mission updates and ATC volumes updates.

3.3.2.8.5.12 Alternative flows

N/A

3.3.2.8.5.13 Failure Flows

N/A

3.3.2.8.6 UC ASM-06: CDM for allocation of DMA type 1 and 2;

3.3.2.8.6.1 Scope

Mission planner collaborates with Airspace manager to allocate updated DMA type 1 and 2

3.3.2.8.6.2 Level

User Goal

3.3.2.8.6.3 Summary

AMC after receiving DMA type 1 and 2 configuration/location updates and ATC volumes configuration updates works with WOC to optimise airspace configuration.

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3.3.2.8.6.4 Actors

- Airspace User Operations WOC
  - Mission scheduler
  - Mission Planner
- AMC
  - Airspace manager
  - Airspace designer
- FMP
  - Flow manager
- Operational Nodes
  - Airspace User Operations
  - ASM (Sub-regional/National)
  - ATFCM (Sub-regional/local)

3.3.2.8.6.5 Preconditions

Airspace manager develops ASM solution for conflict-free configuration based on impact analysis of DMA type 1 and 2 and ATC volumes updates provided by WOC and DAC actors. ASM solution is shared with WOC and DAC and triggers CDM between respective actors to optimise airspace configuration.

3.3.2.8.6.6 Post conditions

The ASM solution is shared with WOC for Mission planner consideration.

3.3.2.8.6.7 Success end state

CDM result satisfies both Mission objectives and conflict-free airspace configuration

3.3.2.8.6.8 Failed end state

CDM results degrade the Mission effectiveness or performance of the airspace configuration

3.3.2.8.6.9 Notes

CDM process for the DMA type 1 and 2 allocation purpose occurs the day before the day of operations

3.3.2.8.6.10 Trigger

Updates for DMA type 1 and 2 and ATC volumes provided by WOC and ATFCM sub-regional/local

3.3.2.8.6.11 Main Flow

AMC actors receive and analyse updates of the DMA type 1 and 2 and ATC volumes and CDM is initiated in order to allocate updated DMA and optimise airspace configuration

3.3.2.8.6.12 Alternative flows

N/A

3.3.2.8.6.13 Failure Flows

N/A

3.3.2.8.7 UC ASM-07: Integration of the allocated DMA type 1 and 2 into DAC and publication;

3.3.2.8.7.1 Scope

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Airspace manager analyses updates related to ATC volumes together with the DMA type 1 and 2 configuration agreed in CDM and informs Flow Manager about conflict-free airspace configuration.

3.3.2.8.7.2 Level

User Goal

3.3.2.8.7.3 Summary

AMC analyses airspace configuration with DMA type 1 and 2 and the ATC volumes and informs FMP

3.3.2.8.7.4 Actors

- Airspace User Operations WOC
  - Mission scheduler
  - Mission Planner
- AMC
  - Airspace manager
  - Airspace designer
- FMP
  - Flow manager
- Operational Nodes
  - Airspace User Operations
  - ASM (Sub-regional/National)
  - ATFCM (Sub-regional/local)

3.3.2.8.7.5 Preconditions

DMA type 1 and 2 updates are accepted by Airspace manager and allocated for further integration into DAC.

3.3.2.8.7.6 Post conditions

DAC is updated with allocated DMA type 1 and 2.

3.3.2.8.7.7 Success end state

DMA type 1 and 2 are integrated into DAC and published in NOP.

3.3.2.8.7.8 Failed end state

DAC with integrated DMA type 1 and 2 is published in the NOP but does not meet local performance expectations and additional measures may apply.

3.3.2.8.7.9 Notes

Integration of the allocated DMA type 1 and 2 into DAC is a final step before sharing of iSMT and publication of the DAC in NOP.

3.3.2.8.7.10 Trigger

DMA type 1 and 2 are allocated

3.3.2.8.7.11 Main Flow

AMC actors finalises allocation process of DMA type 1 and 2 configuration/location and informs DAC actors for further integration into airspace configuration and publication in NOP.

3.3.2.8.7.12 Alternative flows

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N/A

3.3.2.8.7.13 Failure Flows

N/A

3.3.2.8.8 UC-WOC-08: Share iSMT with DMA type 1 and 2.

3.3.2.8.8.1 Scope

This use case covers management of iSMT with DMA type 1 and 2 by WOC in the medium to short-term planning phase.

3.3.2.8.8.2 Level

User Goal

3.3.2.8.8.3 Summary

The State AU Operations Centre (WOC) creating/updating the iOAT FPL (also referenced as iSMT) is using as an input the early flight intent information, the developed initial 4D Mission Trajectory and allocated DMA type 1 and 2 for the mission. The latest available aeronautical and weather information is considered and after completion of the flight planning the iOAT FPL (iSMT) is filed and submitted to Regional ATFCM for processing and distribution. When all conditions are met, WOC by submitting the appropriate message type notifies Regional ATFCM that final agreed iSMT becomes the iRMT, which will be further distributed to all ATM actors concerned.

3.3.2.8.8.4 Actors

- Airspace User Operations [WOC] Roles
  - MET Data Operator
  - AIS Dynamic Data Operator
  - Mission Planner
  - Flight Data Operator
- Operational Nodes
  - Meteorological Service Provider
  - ATFCM Regional
  - ATFCM Sub-Regional/Local
  - Airspace User Operations [WOC]

3.3.2.8.8.5 Preconditions

- Mission needs have been defined
- iMT is updated with latest information
- Static & Dynamic AIS Data is available
- Weather Information is available
- DMA type 1 and 2 have been allocated and published in the NOP

3.3.2.8.8.6 Post conditions

- iOAT FPL is submitted validated and distributed to all ATM actors concerned

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3.3.2.8.8.7 Success end state

- iMT data is integrated into Regional Sub-regional and local ATFCM System

3.3.2.8.8.8 Failed end state

- N/A

3.3.2.8.8.9 Notes

This activity does not reflect transition form iSMT to iRMT considering the scope of the solution

3.3.2.8.8.10 Trigger

- Sharing of iMT data with ATM network

3.3.2.8.8.11 Main flow

- WOC submits iOAT FPL with iSMT data set to Regional ATFCM for processing verification and further distribution to all ATM actors concerned

3.3.2.8.8.12 Alternative flow

- N/A

3.3.2.8.8.13 Failure Flows

- N/A

3.3.2.8.9 UC-ATFCM-09: Local impact assessment of iSMT with DMA type 1 and 2 and local ATFCM solutions (TTO proposal);

3.3.2.8.9.1 Scope

Flow manager performs local impact assessment and develops ATFCM solution (TTO proposal) when iSMT with DMA type 1 and 2 become subject to refinement and update due to conflicting demand between DMA and ATC volume within DAC.

3.3.2.8.9.2 Level

User Goal

3.3.2.8.9.3 Summary

FMP analyses configuration of the ATC volume with updated traffic situation within DAC and detects a conflicting demand. To resolve the potential conflict Flow manager develops ATFCM solution with TTO proposal for the iSMT with DMA type 1 and 2.

3.3.2.8.9.4 Actors

- Airspace User Operations WOC
  - Mission scheduler
  - Mission Planner
- AMC
  - Airspace manager
  - Airspace designer
- FMP
  - Flow manager
- Operational Nodes

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- Airspace User Operations
- ASM (Sub-regional/National)
- ATFCM (Sub-regional/local)

3.3.2.8.9.5 Preconditions

Detection of the conflicting demand within DAC between iSMT with DMA type 1 and 2 and ATC volumes.

3.3.2.8.9.6 Post conditions

ATFCM solution with TTO proposal is shared with WOC.

3.3.2.8.9.7 Success end state

WOC receives ATFCM solution with TTO proposal.

3.3.2.8.9.8 Failed end state

WOC does not receive ATFCM solution with TTO proposal.

3.3.2.8.9.9 Notes

This activity is conducted in the short term planning phase and implies updates of the iSMT with DMA type 1 and 2.

3.3.2.8.9.10 Trigger

Detection of the conflicting demand between iSMT with DMA type 1 and 2 and ATC volumes

3.3.2.8.9.11 Main Flow

FMP performs local impact assessment of the traffic demand detects conflict and develops ATFCM solution.

3.3.2.8.9.12 Alternative flows

N/A

3.3.2.8.9.13 Failure Flows

N/A

3.3.2.8.10 UC ASM-10: CDM on local ATFCM solutions (TTO proposal) to iSMT with DMA type 1 and 2;

3.3.2.8.10.1 Scope

Submitted by Flow manager ATFCM solution (TTO proposal) is analysed by Mission planner and either is rejected or triggers CDM process on the update of iSMT with DMA type 1 and 2 within DAC.

3.3.2.8.10.2 Level

User Goal

3.3.2.8.10.3 Summary

WOC analyses impact of the ATFCM solution with TTO proposal on mission effectiveness and mission objectives and decides on the following course of actions; either reject it or participate into CDM process in order to optimise airspace configuration with due consideration to the latest updates.

3.3.2.8.10.4 Actors

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- Airspace User Operations WOC
  - Mission scheduler
  - Mission Planner
- AMC
  - Airspace manager
  - Airspace designer
- FMP
  - Flow manager
- Operational Nodes
  - Airspace User Operations
  - ASM (Sub-regional/National)
  - ATFCM (Sub-regional/local)

3.3.2.8.10.5 Preconditions

WOC receives ATFCM solution with TTO proposal.

3.3.2.8.10.6 Post conditions

iSMT is modified with new time value relevant to TTO proposal.

3.3.2.8.10.7 Success end state

ATFCM solution is accepted by WOC and iSMT is modified with new time value relevant to TTO proposal.

3.3.2.8.10.8 Failed end state

WOC rejects ATFCM solution with TTO proposal.

3.3.2.8.10.9 Notes

This activity is conducted in the short term planning phase and implies updates of the iSMT with DMA type 1 and 2.

3.3.2.8.10.10 Trigger

Detection of the conflicting demand between iSMT with DMA type 1 and 2 and ATC volumes

3.3.2.8.10.11 Main Flow

WOC performs impact assessment of the ATFCM solution and participates in CDM on the optimisation of the airspace configuration.

3.3.2.8.10.12 Alternative flows

N/A

3.3.2.8.10.13 Failure Flows

N/A

3.3.2.8.11 UC-ASM-10a: TTO over point along iSMT profile;

3.3.2.8.11.1 Scope

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ATFCM solution suggests TTO proposal over way point along trajectory flight route in order to mitigate negative impact on ATC configuration. Mission planner analyses the TTO and either rejects the proposed time over way point or accepts it and updates the iSMT with DMA type 1 and 2.

3.3.2.8.11.2 Level

User Goal

3.3.2.8.11.3 Summary

WOC analyses impact of the ATFCM solution with TTO proposal over way point along flight route on mission effectiveness and mission objectives and either rejects it or accepts it in order to mitigate adverse effect on the ATC volume.

3.3.2.8.11.4 Actors

- Airspace User Operations WOC
  - Mission scheduler
  - Mission Planner
- AMC
  - Airspace manager
  - Airspace designer
- FMP
  - Flow manager
- Operational Nodes
  - Airspace User Operations
  - ASM (Sub-regional/National)
  - ATFCM (Sub-regional/local)

3.3.2.8.11.5 Preconditions

WOC receives ATFCM solution with TTO proposal over way point along flight route

3.3.2.8.11.6 Post conditions

iSMT is updated with new time value relevant to TTO proposal.

3.3.2.8.11.7 Success end state

TTO proposal over way point along flight route is accepted by WOC and iSMT is updated with new time value.

3.3.2.8.11.8 Failed end state

WOC rejects TTO proposal over way point along flight route.

3.3.2.8.11.9 Notes

This activity is conducted in the short term planning phase and implies updates of the iSMT with DMA type 1 and 2.

3.3.2.8.11.10 Trigger

Detection of the conflicting demand between iSMT with DMA type 1 and 2 and ATC volumes

3.3.2.8.11.11 Main Flow

WOC performs impact assessment of the ATFCM solution with TTO proposal over way point along flight route.

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3.3.2.8.11.12 Alternative flows

N/A

3.3.2.8.11.13 Failure Flows

N/A

3.3.2.8.12 UC-ASM-10b: TTO over entry/exit point of ARES DMA type 1 and 2;

3.3.2.8.12.1 Scope

ATFCM solution suggests TTO proposal over entry/exit point of ARES DMA type 1 and 2 in order to optimise ATC configuration. Mission planner analyses the TTO over entry/exit point of ARES DMA type 1 and 2 and either reject it or participate in CDM in order to optimise airspace configuration.

3.3.2.8.12.2 Level

User Goal

3.3.2.8.12.3 Summary

WOC analyses impact of the ATFCM solution with TTO proposal over entry/exit point of ARES DMA type 1 and 2 on mission effectiveness and mission objectives and either rejects it or engages in CDM with AMC in order to optimise airspace configuration.

3.3.2.8.12.4 Actors

- Airspace User Operations WOC
  - Mission scheduler
  - Mission Planner
- AMC
  - Airspace manager
  - Airspace designer
- FMP
  - Flow manager
- Operational Nodes
  - Airspace User Operations
  - ASM (Sub-regional/National)
  - ATFCM (Sub-regional/local)

3.3.2.8.12.5 Preconditions

WOC receives ATFCM solution with TTO proposal over entry/exit point of ARES DMA type 1 and 2

3.3.2.8.12.6 Post conditions

iSMT is updated with new time value over entry/exit point of ARES DMA type 1 and 2.

3.3.2.8.12.7 Success end state

TTO proposal over entry/exit point of ARES DMA type 1 and 2 is accepted by WOC and iSMT is updated with new time value.

3.3.2.8.12.8 Failed end state

WOC rejects TTO proposal over entry/exit point of ARES DMA type 1 and 2.

3.3.2.8.12.9 Notes

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This activity is conducted in the short term planning phase and implies updates of the iSMT with DMA type 1 and 2.

3.3.2.8.12.10 Trigger

Detection of the conflicting demand between iSMT with DMA type 1 and 2 and ATC volumes

3.3.2.8.12.11 Main Flow

WOC performs impact assessment of the ATFCM solution with TTO proposal over entry/exit point of ARES DMA type 1 and 2 and participates in CDM for airspace optimisation.

3.3.2.8.12.12 Alternative flows

N/A

3.3.2.8.12.13 Failure Flows

N/A

3.3.2.8.13 UC-WOC-11: Revise Update iSMT with local ATFCM solution.

3.3.2.8.13.1 Scope

Mission planner revises iSMT with DMA type 1 and 2 and updates iOAT FPL with new time value either over way point along flight route or over ARES entry/exit point.

3.3.2.8.13.2 Level

User Goal

3.3.2.8.13.3 Summary

WOC updates iSMT with DMA type 1 and 2 with new time values either over way point along flight route or over ARES entry/exit point.

3.3.2.8.13.4 Actors

- Airspace User Operations WOC
  - Mission scheduler
  - Mission Planner
- AMC
  - Airspace manager
  - Airspace designer
- FMP
  - Flow manager
- Operational Nodes
  - Airspace User Operations
  - ASM (Sub-regional/National)
  - ATFCM (Sub-regional/local)

3.3.2.8.13.5 Preconditions

WOC receives ATFCM solution with TTO proposal.

3.3.2.8.13.6 Post conditions

iSMT is modified with new time value relevant to TTO proposal.

3.3.2.8.13.7 Success end state

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ATFCM solution is accepted by WOC and iSMT is modified with new time value relevant to TTO proposal.

3.3.2.8.13.8 Failed end state

WOC rejects ATFCM solution with TTO proposal.

3.3.2.8.13.9 Notes

This activity is conducted in the short term planning phase and implies updates of the iSMT with DMA type 1 and 2.

3.3.2.8.13.10 Trigger

Accepted by WOC TTO proposals either over way point along flight route or over ARES entry/exit point.

3.3.2.8.13.11 Main Flow

WOC updates iSMT with new time values facilitating the optimisation of the airspace configuration.

3.3.2.8.13.12 Alternative flows

N/A

3.3.2.8.13.13 Failure Flows

N/A

3.3.3 Differences between new and previous Operating Methods

Activities (in EATMA) that are impacted by the SESAR Solution	Current Operating Method	New Operating Method
– Define an ARES in accordance with mission needs – Define ARES – Provide ASM support (AMC)	Current operating method is divided in two phases: – one is dealing with ARES (static or VPA) booking one day before the day of operations with limited CDM capabilities regarding flexible parameters and system support – another one with Flight planning integrating booked ARES in the FPL description Day -1 – H-ops	**Develop early flight intent for MT with DMA Type 1 and 2 (D-7-D-1)** This operating method reflects WOC mission development process with ARES new design principle DMA type 1 and 2 and sharing it at early stage as a prerequisite for the management of the integrated military ATM demand with higher level of flexibility facilitating early airspace configuration optimisation and enhanced situation awareness on military ATM demand. Key changes: • ad-hoc definition of DMA in accordance with the actual

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		mission requirements and airspace configuration needs • what-if capability of ASM tool supporting early adaptation of flight intent to airspace configuration needs
– Provide ASM support (AMC) – De-conflict ARES versus ATC volumes – Analyse and update ARES change proposal – Refine/Update ARES	**Receive final ARES agreed with WOC** Current operating method is focusing on the allocation and publication of ARES (static/VPA) in the AUP/EAUP. The ASM process does not foresee the ARES optimisation for static type of ARES and provides limited flexibility for ARES based on VPA design due to the limited scope of the geographical location. Therefore, military operational stakeholders have limited flexibility to accommodate ARES at geographical location that fits to the specific mission objectives while airspace configuration has limited options for the optimisation and adaptation to the traffic flows and ATC volumes.	**Allocate ARES DMA Type 1 and 2 (D-1 – D-Ops)** The ARES (DMA type 1 and 2) allocation is a continuation of EFI and based on historical data and collaborative planning results as well as collaboration between respective ATM actors via CDM to ensure optimal balance between civil and military demand and efficient airspace user operations with minimum impact on the ATM network performance. The new operating method is supported by automated means connecting WOC mission support system through user-friendly interface with DAC as a single ATM actor with integrated ASM ATFCM and ATS functionalities. Key changes: • Flexibility of DMA parameters enables optimization of airspace reservation / restriction to the dynamicity of airspace configuration • WOC system support enables an integrated impact assessment of DMA change proposals to military mission effectiveness and participation in CDM for DAC
– Create/Update iSMT – Submit iSMT	**Submit OAT FPL (D-1-H-ops).** Submission of OAT FPL to local ATM actors delivers limited information regarding military IFR	**Sharing Mission Trajectory iSMT (D-1-H-ops).** This operating method indicates already validated process that

	flight intention with ARES if included and not used for ATFCM purposes considering this type of flights irrelevant for capacity and traffic flow management in medium to short term planning phase.	includes the finalization of the development of the iMT, the creation and update, submission, validation and distribution of an iSMT through the iOAT FPL mechanism. The exchange of iSMT via OAT FPL with NM and ATC was already validated as feasible in SESAR 2020 wave1. DMA type 1 and 2 integration into the OAT FPL does not bring essential changes into the process at this stage of SESAR.
– Create/Update iSMT – Submit iSMT – Provide local impact assessment – Reception of the validated iSMT/iRMT – Refine/Update ARES – Analyse and update ARES change proposal	**Management of iSMT (D-1-H-ops).** The iSMT management includes the finalization of the development of the iMT, the creation and update, submission, validation and distribution of an iSMT through the iOAT FPL mechanism. It also includes transition of iSMT to iRMT when all necessary conditions are met and all involved stakeholders have agreed to the transition of iSMT to iRMT upon decision of WOC and in agreement with all pertinent ATM actors. This method covers last minute change to RMT update of trajectory profile and integration of ATM constraints when applicable proposed by NM function at regional level	**iSMT Management with planning ATM constraint (TTO) (D-1-H-ops).** The new operating method is relevant to the application and management of the planning ATM constraint to iSMT with allocated ARES (DMA type 1 and 2) and involves pertinent ATM actors. The target time may apply to either allocated ARES (DMA type 1 and 2) or to the iSMT flight route when such trajectory is eligible to constraint management in the planning phase at sub-regional/local level. This operating method focuses on the sub-regional/local DAC function and does not escalate the constraint management to the regional NM function Key changes: • CDM on TTO to iSMT for enabling local ATFCM to alleviate capacity issues related to the accommodation of traffic demand • Technical capability of WOC and DAC tools to enable adaptation of iSMT to agreed TTO from both the mission effectiveness and DAC perspectives

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Table 6: Differences between new and previous operating methods

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4 Safety, Performance and Interoperability Requirements (SPR-INTEROP)

4.1 Requirements related to Operational Node Airspace User operations (WOC)

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-OP04.2001
Title	Develop Early Flight Intent with DMA type 1 and 2
Requirement	The Mission Planner shall be able to receive and analyse flight schedules to initiate the development of an Early Flight Intent.
Status	Validated
Rationale	The Mission planner receives weekly/daily flight schedules and analyses objectives and operational requirements per mission type to initiate development of the Early Flight Intent for missions requiring DMA type 1 and 2.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Develop Early Flight intent with DMA type 1 and 2
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-OP04.2002
Title	Develop Early Flight Intent with DMA type 1 and 2
Requirement	The Mission planner shall select missions requiring DMA type 1 and 2 and initiate the development of EFI.
Status	Validated
Rationale	The Mission planner selects missions requiring DMA type 1 and 2, analyses mission objectives and requirements specific to DMA configuration and geographical location and develops EFI.

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Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Develop Early Flight intent with DMA type 1 and 2
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-OP04.2003
Title	Develop Early Flight Intent with DMA type 1 and 2
Requirement	The Mission planner shall be able to design DMA type 1 and 2 in accordance with system support algorithms.
Status	Validated
Rationale	The Mission uses system support algorithms for DMA design and configures 3D volume of airspace per DMA type that meets the operational requirements and objectives of the planned missions. Each DMA type designed by the mission planner receives a unique identifier ID that it used along DMA lifecycle from allocation until termination.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Develop Early Flight intent with DMA type 1 and 2
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-OP04.2004

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Title	Develop Early Flight Intent with DMA type 1 and 2
Requirement	The Mission planner shall be able to define geographical location of DMA type 1 and 2 according to mission operational requirements.
Status	Validated
Rationale	The Mission planner defines geographical location of the DMA type 1 and 2 according to the mission objectives and operational requirements upon thorough analysis of the Aeronautical information and historical data related to ATC volumes provided by the Sub-regional /local Flow Manager.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Develop Early Flight intent with DMA type 1 and 2
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-OP04.2005
Title	Share Early Flight Intent with DMA type 1 and 2
Requirement	The Mission planer shall be able to share Early Flight Intent with DMA type 1 and 2 with ASM Sub-regional/National
Status	Validated
Rationale	The Mission planner shares the Early Flight Intent with Airspace manager triggering allocation of the military ATM demand in the network operations plan (NOP) at early stage (D-7).
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40

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<ALLOCATED_TO>	<Activity>	Share Early Flight intent with DMA type 1 and 2
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-OP04.2006
Title	ASM solution for the update of Early Flight Intent with DMA type 1 and 2
Requirement	In case of conflicting demands, the Mission planner shall be able to receive from Airspace manager and analyse an ASM solution to update the Early Flight Intent with DMA type 1 and 2
Status	Validated
Rationale	The Mission planner receives an alert of a detected conflict from Airspace manager and as a follow up an ASM solution with proposal to de-conflict request for DMA type 1 and 2 from requests of other airspace users.
Category	<Operational> <Safety>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	ASM solution for the updates of Early Flight Intent with DMA type 1 and 2
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-OP04.2007
Title	Reject the ASM solution for the update of Early Flight Intent with DMA type 1 and 2
Requirement	If ASM solution has adverse effect on the mission objectives, the Mission planner shall be able to reject ASM solution and inform Airspace manager

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Status	Validated
Rationale	The Mission planner analyses the ASM solution for the Early Flight Intent update and in case of adverse effect on the mission objectives and mission effectiveness rejects the ASM solution while applying priority rules and informs Airspace manager.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	ASM solution for the updates of Early Flight Intent with DMA type 1 and 2
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-OP04.2008
Title	Accept ASM solution for the update of Early Flight Intent with DMA type 1 and 2
Requirement	If ASM solution has no adverse impact on the mission effectiveness and mission objectives, the Mission planner shall be able to accept ASM solution and update Early Flight Intent.
Status	Validated
Rationale	The Mission planner analyses the ASM solution against EFI request and if it has no adverse effect on the mission objectives and mission effectiveness, accepts and finalises it by updating EFI accordingly
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	ASM solution for the updates of Early Flight Intent with DMA type 1 and 2

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<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-OP04.2009
Title	Create iSMT
Requirement	The Mission planner shall create iSMT based on Early Flight Intent information with DMA type 1 and 2.
Status	Validated
Rationale	The Mission planner collects and analyses the latest mission planning updates and the latest traffic flow information and creates iSMT with 2D route and integrated DMA based on Early Flight Intent information. iSMT is shared with pertinent ATM and relevant non-ATM actors concerned via IOAT FPL.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Create/update iSMT
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP04.2010
Title	Refine/update DMA type 1 and 2
Requirement	The Mission planner shall be able to refine/update DMA type 1 and 2 with the latest mission planning updates
Status	Validated
Rationale	The Mission planner analyses the latest updates to the mission, the ATC volumes provided by sub-regional/local ATFCM based on latest traffic flow information, and refines/updates DMA parameters. The DMA type 1 and 2 updates are shared with sub-regional/National ASM in order to finalise the allocation of the DMA type 1 and 2 within the scope of DAC

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Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Refine/update DMA type 1 and 2
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP04.2011
Title	Receive and analyse ASM solution for DMA type 1 and 2 updates
Requirement	The Mission planner shall be able to receive and analyse the ASM solution for the DMA type 1 and 2 updates initiated by ASM Sub-regional/National.
Status	Validated
Rationale	The Mission planner receives from Airspace manager proposal to update DMA type 1 and 2 and analyses impact on mission trajectory objectives. According to the results of the impact assessment, the Mission planner accepts ASM solution and updates DMA type 1 and 2, rejects ASM solution or submits counter proposal by initiating the CDM process with Airspace manager.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Asses ASM solution
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP04.2012

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Title	CDM on the ASM solution
Requirement	The Mission planner shall be able to perform CDM on ASM solution with ASM Sub-regional/National
Status	Validated
Rationale	The Mission planner initiates CDM with local Airspace manager and provides a counter proposal to the ASM solution. The counter proposal contains modification of DMA type 1 and 2 configuration/location within the threshold of the flexible parameters. If the modification of the flexible parameters exceeds the threshold of the flexible parameters it could be accepted by both actors, should this modification has no adverse effect neither on mission effectiveness nor on DAC performance targets.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Update DMA type 1 and 2
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP04.2013
Title	Finalise the allocation of DMA type 1 and 2
Requirement	The Mission planner shall finalise the allocation of DMA type 1 and 2 for further integration into Mission trajectory description.
Status	Validated
Rationale	Upon mutual agreement reached in CDM the Mission planner modifies DMA type 1 and 2 parameters for final allocation and publication by ASM Sub-regional/National in the NOP and further integration into the airspace configuration. The allocated DMA receives status reference allocated ARES and will be integrated into MT description.
Category	<Operational>

[REQ Trace]

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Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Update DMA type 1 and 2
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP04.2014
Title	Reject ASM solution for DMA type 1 and 2 updates
Requirement	The Mission Planner shall be able to reject ASM solution for DMA type 1 and 2 updates in case it has an adverse effect on Mission objectives/effectiveness.
Status	Validated
Rationale	When Mission planner recognises that ASM solution for DMA type 1 and 2 update has an adverse impact on mission objectives/effectiveness he rejects it and a notification for the rejection is sent to ASM sub-regional/National.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	DMA type 1 and 2 updates
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP04.2015
Title	Finalise development of iSMT
Requirement	The Mission planner shall finalise the development of the iSMT with reference allocated DMA type 1 and 2
Status	Validated

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Rationale	The Mission planner finalises the development of iSMT through integration of the reference allocated DMA type 1 and 2 data into trajectory description and initiates filing of the iOAT FPL.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Submit iSMT
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP04.2016
Title	TTO proposal for iSMT over way/significant point
Requirement	The Mission planner shall be able to receive and analyse TTO proposal for iSMT over way/significant point from ATFCM Sub-regional/local
Status	Validated
Rationale	The Mission planner upon reception from ATFCM sub-regional/local of the planning ATM constraint TTO over way/significant point along the flight route conducts impact assessment and analyses whether proposed TTO has no adverse effect on iSMT objectives/effectiveness.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Analyse TTO proposal for iSMT
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

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Identifier	REQ-07-W2-40-SPRINTEROP- OP04.2017
Title	TTO proposal for iSMT over DMA entry/exit point
Requirement	The Mission planner shall be able to receive and analyse TTO proposal for iSMT over DMA entry/exit point
Status	Validated
Rationale	The Mission planner receives proposal for Target Time over DMA entry/exit points and analyses whether proposed time value remains within the threshold of the flexible parameters of the allocated DMA type 1 and 2 or exceeds the predefined threshold. If the proposed target time value exceeds the threshold, the Mission planner will analyse impact on iSMT objectives and mission effectiveness and provide a solution to Airspace manager.
Category	<Operational> <Safety>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Analyse TTO proposal for iSMT
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP04.2018
Title	Analyse TTO proposal for iSMT with DMA type 1 and 2
Requirement	The Mission Planner shall be able to analyse and assess the TTO proposal within the threshold of the predefined flexible parameters, and either accept or reject it.
Status	Validated
Rationale	If TTO proposal exceeds the thresholds of the predefined flexible parameters, the Mission planner analyses impact on iSMT objectives/effectiveness and if the suggested time value has no adverse effect on the iSMT the Mission planner may accept such proposal and update the iSMT accordingly. If suggested time value has negative impact on iSMT objectives, the Mission planner rejects the proposal and notifies ATFCM Sub-regional/local.
Category	<Operational> <Safety>

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[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Analyse TTO proposal for iSMT
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP04.2019
Title	Reject TTO proposal for iSMT with DMA type 1 and 2
Requirement	The Mission planner shall be able to reject the TTO proposal for iSMT with DMA type 1 and 2 and notify to the ATM actors concerned.
Status	Validated
Rationale	The Mission planner analyses impact of target time on mission effectiveness/objectives and rejects TTO proposal due to adverse impact on iSMT and the notification is sent to ATFCM Sub-regional/local.
Category	<Operational> <Safety>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Analyse TTO proposal for iSMT
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP04.2020
Title	Refine/update iSMT with DMA type 1 and 2
Requirement	The Mission planner shall be able to refine/update iSMT with accepted TTO proposal.

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Status	Validated
Rationale	The Mission planner updates iSMT with new time values relevant to proposed target time. The updates should be submitted through the messages related to the iOAT FPL.
Category	<Operational> <Safety>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Refine/update iSMT
<ALLOCATED_TO>	<Role>	Mission Planner
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO04.1001
Title	Exchange of ATC Volumes
Requirement	The Airspace User Operations (WOC) shall be connected to the Sub-regional/local ATFCM to receive ATC volumes.
Status	Validated
Rationale	The ATC volumes data exchange between WOC and Sub-regional/local ATFCM using system to system interface.
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange> Submit	Assess AoR Impact -> Develop EFI-> Submit EFI
<ALLOCATED_TO>	<Functional Block>	Flight Planning Flight Operations Management

[REQ]

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Identifier	REQ-07-W2-40-SPRINTEROP-IO04.1002
Title	Exchange of ATC Volumes
Requirement	The Airspace User Operations (WOC) shall receive the ATC volumes data from the Sub-regional/local ATFCM using ATC volume API format (JSON).
Status	Validated
Rationale	The ATC volumes data exchange between WOC and Sub-regional/local ATFCM using system to system interface.
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Assess AoR Impact -> Develop EFI-> Submit EFI
<ALLOCATED_TO>	<Functional Block>	Flight Planning Flight Operations Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO04.1003
Title	Exchange of ATC Volumes
Requirement	The Airspace User Operations (WOC) shall receive the ATC volumes data from the Sub-regional/local ATFCM through REST API gateway.
Status	Validated
Rationale	The ATC volumes data exchange between WOC and Sub-regional/local ATFCM using system to system interface.
Category	<Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40

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<ALLOCATED_TO>	<Information Exchange>	Assess AoR Impact -> Develop EFI-> Submit EFI
<ALLOCATED_TO>	<Functional Block>	Flight Planning Flight Operations Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO04.1004
Title	Exchange of DMA type 1 and 2 request
Requirement	The Airspace User Operations (WOC) shall be connected to the Sub-regional/National ASM to enable exchange of DMA type 1 and 2 request.
Status	Validated
Rationale	The DMA type 1 and 2 data exchange between WOC and Sub-regional/National ASM using system to system interface.
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Assess AoR Impact -> Submit EFI
<ALLOCATED_TO>	<Functional Block>	Flight planning Flight Operations Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO04.1005
Title	Exchange of DMA type 1 and 2 request
Requirement	The Airspace User Operations (WOC) shall exchange DMA type 1 and 2 request data with the Sub-regional/National ASM using Airspace Reservation API format (JSON).
Status	Validated
Rationale	The DMA type 1 and 2 data exchange between WOC and Sub-regional/National ASM using system to system interface.
Category	< Interoperability >

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[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Assess AoR Impact -> Submit EFI
<ALLOCATED_TO>	<Functional Block>	Flight planning Flight Operations Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO04.1006
Title	Exchange of DMA type 1 and 2 request
Requirement	The Airspace User Operations (WOC) shall exchange the ARES DMA type 1 and 2 data with the Sub-regional/National ASM through REST API gateway.
Status	Validated
Rationale	The DMA type 1 and 2 data exchange between WOC and Sub-regional/National ASM using system to system interface.
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Assess AoR Impact -> Submit EFI
<ALLOCATED_TO>	<Functional Block>	Flight planning Flight Operations Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO04.1007
Title	Exchange of TTO proposal
Requirement	The Airspace User Operations (WOC) shall be connected to the Sub-regional/local ATFCM to enable exchange of the TTO proposal.
Status	Validated
Rationale	The TTO proposal data exchange between WOC and Sub-regional/local ATFCM using system to system interface.

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Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Submit iSMT -> Assess AoR Impact Assess AoR Impact -> Submit iSMT Revise iSMT ->
<ALLOCATED_TO>	<Functional Block>	Flight planning Flight Operations Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO04.1008
Title	Exchange of TTO proposal
Requirement	The Airspace User Operations (WOC) shall receive the TTO proposal data from the Sub-regional/local ATFCM using API format (JSON).
Status	Validated
Rationale	The TTO proposal data exchange between WOC and Sub-regional/local ATFCM using system to system interface.
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Submit iSMT -> Assess AoR Impact Assess AoR Impact -> Submit iSMT Revise iSMT ->
<ALLOCATED_TO>	<Functional Block>	Flight planning Flight Operations Management

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[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO04.1009
Title	Exchange of TTO proposal
Requirement	The Airspace User Operations (WOC) shall receive the TTO proposal data from the Sub-regional/local ATFCM through REST API gateway.
Status	Validated
Rationale	The TTO proposal data exchange between WOC and Sub-regional/local ATFCM using system to system interface.
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Submit iSMT -> Assess AoR Impact Assess AoR Impact -> Submit iSMT Revise iSMT ->
<ALLOCATED_TO>	<Functional Block>	Flight planning Flight Operations Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IE04.1001
Title	Receive ATC volumes

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Requirement	The Airspace User Operations (WOC) shall be able to receive the ATC volumes from the ATFCM (Sub-regional/local). Source: Sub-regional/local ATFCM Recipient: WOC Content: ATC volumes Size: TBD Timelines: Minutes Security: Low Trigger: Historical data analysis for DMA definition
Status	Validated
Rationale	For DMA definition purposes, the WOC analyses data related to ATC volumes provided by the Sub-regional /local Flow Manager regularly/on demand.
Category	IER

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Receive data regarding ATC volumes

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IE04.1002
Title	Send ARES DMA type 1 and 2 request
Requirement	The Airspace User Operations (WOC) shall be able to submit the ARES request with DMA type 1 and 2 to the ASM (Sub-regional/National). Source: WOC Recipient: Sub-regional/National ASM Content: ARES/DMA type 1 and 2 Size: TBD Timelines: Minutes Security: Low Trigger: ARES request completion
Status	Validated

Rationale	The WOC submits ARES request in the formalised format to the Sub-regional/national Airspace Manager in order to request allocation of the military ATM demand in the network operations plan.
Category	IER

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Submit request for DMA type 1 and 2

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IE04.1003
Title	Receive ARES DMA type 1 and 2 request status
Requirement	The Airspace User Operations (WOC) shall be able to receive the status of the ARES request from the ASM (Sub-regional/National). Source: Sub-regional/local ATFCM Recipient: WOC Content: ARES/DMA request status Size: TBD Timelines: Minutes Security: Low Trigger: ARES request completion
Status	Validated
Rationale	The Sub-regional/national Airspace Manager acknowledges the reception from WOC of the ARES/DMA request.
Category	IER

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Receive DMA type 1 and 2 request status

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[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IE04.1004
Title	Receive ARES request with DMA type 1 and 2 change proposal
Requirement	The Airspace User Operations (WOC) shall be able to receive the ARES request change proposal with DMA type 1 and 2 from the ASM (Sub-regional/National). Source: Sub-regional/local ATFCM Recipient: WOC Content: ARES DMA type 1 and 2 change request Size: TBD Timelines: Minutes Security: Low Trigger: Conflict detection
Status	Validated
Rationale	The Sub-regional/national Airspace Manager informs WOC about the conflicts between DMA type1 and 2 and other AU demand for ARES and proposes ASM solution (ARES request change proposal) for de-confliction.
Category	IER

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Receive DMA type 1 and 2 change request

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IE04.1005
Title	Send ARES request with DMA type 1 and 2 change proposal status

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Requirement	The Airspace User Operations (WOC) shall be able to submit the ARES request change proposal status to the ASM (Sub-regional/National). Source: WOC Recipient: Sub-regional/local ATFCM Content: Change proposal status Size: TBD Timelines: Minutes Security: Low Trigger: ARES request change proposal reception
Status	Validated
Rationale	The WOC acknowledges the reception of the ARES request change proposal from Sub-regional/national Airspace Manager by sending the ARES request change proposal status.
Category	IER

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Submit status of the change proposal

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IE04.1006
Title	Receive TTO proposal
Requirement	The Airspace User Operations (WOC) shall be able to receive the TTO proposal from the ATFCM (Sub-regional/local). Source: Sub-regional/local ATFCM Recipient: WOC Content: TTO proposal Size: TBD Timelines: Minutes Security: Low Trigger: Update of the iSMT with DMA type 1 and 2
Status	Validated

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Rationale	Triggered by Sub-regional /local ATFCM the update of the iSMT with DMA Type 1 and 2, the WOC receives TTO proposal either over ARES entry/exit point or over way point/significant point along flight route.
Category	IER

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Submit/update iSMT

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IE04.1007
Title	Submit TTO proposal status
Requirement	The Airspace User Operations (WOC) shall be able to send the TTO proposal status to the ATFCM (Sub-regional/local). Source: WOC Recipient: Sub-regional/local ATFCM Content: Status of TTO proposal Size: TBD Timelines: Minutes Security: Low Trigger: Update of the iSMT with DMA type 1 and 2
Status	Validated
Rationale	The WOC acknowledges the reception of the TTO proposal from Sub-regional /local ATFCM by sending the TTO proposal status
Category	IER

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Submit/update iSMT

4.2 Requirements related to Operational Node Airspace Management Sub-regional/National (AMC)

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[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-OP01.1001
Title	Collect requests for DMA type 1 and 2 (D-7 to D-1)
Requirement	The Airspace manager shall be able to receive, process Early Flight Intents, and extract DMA type 1 and 2 request
Status	Validated
Rationale	The Airspace manager collects Early Flight Intents submitted by WOC in a standardised format and extracts requests for DMA type 1 and 2 for further processing and analysis.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Collect and aggregate requests for DMA Type 1 and 2
<ALLOCATED_TO>	<Role>	Airspace manager
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP01.1002
Title	Impact assessment of DMA type 1 and 2 (D-7 to D-1)
Requirement	The Airspace manager shall conduct local impact assessment upon reception of the DMA type 1 and 2 requests.
Status	Validated
Rationale	To achieve a conflict free airspace configuration the Airspace manager, upon reception of the DMA type 1 and 2 requests, analyses DMA configuration and associated flexible parameters against historical data of the ATC volumes and traffic flows provided by ATFCM Sub-regional /local. He also analysis requested geographical location of DMA type 1and 2 against requests of other airspace users within respective area of responsibility (FIR, ATC sectors, etc.)
Category	<Operational> <Safety>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Conduct impact assessment on DMA Type 1 and 2
<ALLOCATED_TO>	<Role>	Airspace manager
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP01.1003
Title	ASM solution for de-confliction (D-7 to D-1)
Requirement	If conflict between requests is detected the Airspace manager shall be able to develop an ASM solution for the de-confliction of AU demand.
Status	Validated
Rationale	The Airspace manager analyses conflicting AU demand and develops the ASM solution with proposal for WOC to modify/update DMA type 1 and 2 configuration/location.
Category	<Operational> <Safety>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Propose ASM solution for de-confliction
<ALLOCATED_TO>	<Role>	Airspace manager
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-OP01.1004
Title	ASM solution for de-confliction (D-7 to D-1)
Requirement	If ASM solution is accepted by WOC the Airspace manager shall be able to participate in CDM with Mission Planner on optimisation of the DMA type 1 and 2 configuration/location.
Status	Validated

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Rationale	The Airspace manager participates in CDM with WOC within the scope of ASM solution and tries to optimise configuration of airspace with agreed DMA type 1 and 2 configuration location within the threshold of flexible parameters provided by WOC for each DMA type.
Category	<Operational>

[REQ]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Propose ASM solution for de-confliction
<ALLOCATED_TO>	<Role>	Airspace manager
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP01.1005
Title	Conflict-free airspace configuration (D-7 to D-1)
Requirement	The Airspace designer shall be able to simulate a conflict-free configuration with DMA type 1 and 2 configuration/location agreed in CDM between Mission planner and Airspace manager.
Status	Validated
Rationale	The Airspace designer simulates a conflict-free configuration of the airspace based on the information regarding updated ATC volumes and DMA type 1 and 2 configuration/location.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Simulate conflict-free configuration of airspace
<ALLOCATED_TO>	<Role>	Airspace manager
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

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[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP01.1006
Title	Conflict-free airspace configuration (D-7 to D-1)
Requirement	The Airspace manager shall be able to exchange with WOC data related to DMA type 1 and 2 configuration location in the context of the simulated conflict-free airspace configuration.
Status	Validated
Rationale	The Airspace manager upon the finalisation of the simulation of the conflict-free airspace configuration submits to Mission planner data related to agreed DMA type 1 and 2 configuration location and updates DAC database for further publication in NOP.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Share simulation results
<ALLOCATED_TO>	<Role>	Airspace designer
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP01.1007
Title	Impact assessment of DMA Type 1 and 2 updates (D-1 to D-Ops)
Requirement	Airspace manager shall be able to receive updates for DMA type 1 and 2 and conduct impact assessment on airspace configuration.
Status	Validated
Rationale	Upon reception of the DMA type 1 and 2 updates from WOC the Airspace manager conducts local impact assessment against latest airspace demand of other AU and ATC volumes based on latest traffic Demand and ATC sector planning.
Category	<Operational> <Safety>

[REQ Trace]

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Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Conduct impact assessment on DMA Type 1 and 2 updates
<ALLOCATED_TO>	<Role>	Airspace manager
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP01.1008
Title	ASM solution for DMA Type 1 and 2 updates (D-1 to D-Ops)
Requirement	Airspace manager shall be able to provide ASM solution for DMA type 1 and 2 updates in the context of DAC
Status	Validated
Rationale	When DMA type 1 and 2 updates induce conflicts with other airspace demand, the Airspace manager modifies DMA within the threshold of flexible parameters and simulates configuration of airspace that meets AU request and local performance targets.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Propose ASM solution for DMA Type 1 and 2 updates
<ALLOCATED_TO>	<Role>	Airspace manager
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP01.1009
Title	CDM on DMA type 1 and 2 updates (D-1 to D-Ops)
Requirement	Airspace manager shall be able to engage in CDM with WOC on optimisation of the DMA type 1 and 2 configuration/location
Status	Validated

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Rationale	Airspace manager analysis WOC counterproposal with modified DMA type 1 and 2 parameters and simulates configuration of airspace that meets local performance targets and mission objectives. If counterproposal for modification of DMA type 1 and 2 exceeds the threshold of flexible parameters Airspace manager analyses impact on local performance targets and consults priority rules.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Assess DMA Type 1 and 2 counter-proposal
<ALLOCATED_TO>	<Role>	Airspace manger
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP01.1010
Title	Allocation of DMA type 1 and 2 (D-1 to D-Ops)
Requirement	Airspace manger shall be able to integrate agreed DMA type 1 and 2 configuration/location in DAC.
Status	Validated
Rationale	Upon agreement in CDM on DMA type 1 and 2 final configuration and geographical location, the Airspace manager informs Flow manager regarding latest changes in airspace configuration, and integrates agreed DMA in DAC.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Integrate in the DAC and Publish DMA 1 and 2 in the NOP
<ALLOCATED_TO>	<Role>	Airspace manager

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<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO01.1001
Title	Exchange of ATC Volumes data
Requirement	The ASM Sub-regional/National shall be connected to ATFCM Sub-regional/Local to receive data regarding ATC volumes.
Status	Validated
Rationale	Data exchange between ASM Sub-regional/National and Sub-regional/local ATFCM using technologies as defined for the ATC volumes data exchange.
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Provide ASM support (AMC) -> Local impact assessment
<ALLOCATED_TO>	<Functional Block>	Cooperative Airspace Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO01.1002
Title	Exchange of ATC Volumes data
Requirement	The ASM Sub-regional/National shall be connected to ATFCM Sub-regional/Local via system to system interface to receive data regarding ATC volumes.
Status	Validated
Rationale	ATC volumes data exchange between ASM Sub-regional/National and Sub-regional/local ATFCM using system to system interfaces and API data format (JSON).
Category	< Interoperability >

[REQ Trace]

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Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Provide ASM support (AMC) -> Local impact assessment
<ALLOCATED_TO>	<Functional Block>	Cooperative Airspace Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP -IO01.1003
Title	Exchange of ATC Volumes data
Requirement	The ASM Sub-regional/National shall be connected to ATFCM Sub-regional/Local via system-to-system interface to receive data regarding ATC volumes.
Status	Validated
Rationale	ATC volumes data exchange between ASM Sub-regional/National and Sub-regional/local ATFCM using system to system interface and through REST API gateway.
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Provide ASM support (AMC) -> Local impact assessment
<ALLOCATED_TO>	<Functional Block>	Cooperative Airspace Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP -IO01.1004
Title	Exchange of ARES request with DMA type 1 and 2
Requirement	The ASM Sub-regional/National shall be connected to the Airspace Users Operations WOC to exchange DMA type 1 and 2 data.
Status	Validated

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Rationale	Data exchange between ASM Sub-regional/National and Airspace Users Operations WOC using technologies as defined for the ATC volumes data exchange.
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Provide ASM support (AMC) -> Refine/Update ARES
<ALLOCATED_TO>	<Functional Block>	Cooperative Airspace Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO01.1005
Title	Exchange of ATC Volumes data
Requirement	The ASM Sub-regional/National shall be connected to the Airspace Users Operations WOC via system-to-system interface to exchange DMA type 1 and 2 data.
Status	Validated
Rationale	ATC volumes data exchange between ASM Sub-regional/National and Airspace Users Operations WOC using system to system interface and API format (JSON)
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Provide ASM support (AMC) -> Refine/Update ARES
<ALLOCATED_TO>	<Functional Block>	Cooperative Airspace Management

[REQ]

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Identifier	REQ-07-W2-40-SPRINTEROP-IO01.1006
Title	Exchange of ATC Volumes data
Requirement	The ASM Sub-regional/National shall be connected to the Airspace Users Operations WOC via system-to-system to interface to exchange DMA type 1 and 2 data.
Status	Validated
Rationale	ATC volumes data exchange between ASM Sub-regional/National and Airspace Users Operations WOC using system to system interface and through REST API gateway
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Provide ASM support (AMC) -> Refine/Update ARES
<ALLOCATED_TO>	<Functional Block>	Cooperative Airspace Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO01.1007
Title	Exchange of ATC Volumes data
Requirement	The ASM Sub-regional/National shall be connected to the Airspace Users Operations WOC to exchange airspace configuration data with allocated DMA type 1 and 2.
Status	Validated
Rationale	Data exchange between ASM Sub-regional/National and Airspace Users Operations WOC using technologies as defined for the ATC volumes data exchange.
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40

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<ALLOCATED_TO>	<Information Exchange>	Provide ASM support (AMC) -> Refine/Update ARES
<ALLOCATED_TO>	<Functional Block>	Cooperative Airspace Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO01.1008
Title	Exchange of ATC Volumes data
Requirement	The ASM Sub-regional/National shall be connected to the Airspace Users Operations WOC via system-to-system interface to exchange airspace configuration data with allocated DMA type 1 and 2.
Status	Validated
Rationale	ATC volumes data exchange between ASM Sub-regional/National and Airspace Users Operations WOC using system to system interface and API format (JSON).
Category	<Interoperability>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Provide ASM support (AMC) -> Refine/Update ARES
<ALLOCATED_TO>	<Functional Block>	Cooperative Airspace Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO01.1009
Title	Exchange of ATC Volumes data
Requirement	The ASM Sub-regional/National shall be connected to the Airspace Users Operations WOC via system-to-system interface to exchange airspace configuration data with allocated DMA type 1 and 2.
Status	Validated

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Rationale	ATC volumes data exchange between ASM Sub-regional/National and Airspace Users Operations WOC using system to system interface and through REST API gateway
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Provide ASM support (AMC) -> Refine/Update ARES
<ALLOCATED_TO>	<Functional Block>	Cooperative Airspace Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP -IE01.1001
Title	Receive ATC volumes
Requirement	The ASM Sub-regional/National shall be able to receive ATC volumes data from ATFCM Sub-regional/local Source: ATFCM Sub-regional/local Recipient: ASM Sub-regional/National Content: ATC volumes Size: TBD Timelines: Minutes Security: Low Trigger: Local impact assessment of DMA typ1 and 2 request
Status	Validated
Rationale	The ASM Sub-regional/National receives ATC volumes data and analyses DMA type 1 and 2 request in the context of Airspace configuration
Category	IER

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Receive ATC volumes data

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[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP -IE01.1002
Title	Receive DMA type 1 and 2 status request
Requirement	The ASM Sub-regional/National shall be able to receive the status of the DMA type 1 and 2 request from the Airspace Users Operations WOC Source: Airspace Users Operations WOC Recipient: ASM Sub-regional/National Content: Status of the DMA type 1 and 2 request Size: TBD Timelines: Minutes Security: Low Trigger: DMA type 1 and 2 request reception
Status	Validated
Rationale	The Sub-regional/National Airspace Manager acknowledges the reception from WOC of the DMA type 1 and 2 request.
Category	IER

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Receive data regarding DMA type 1 and 2 status

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IE01.1003
Title	Submit ASM solution

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Requirement	The ASM Sub-regional/National shall be able to submit ASM solution for DMA type 1 and 2 updates to Airspace Users Operations WOC Source: ASM Sub-regional/National Recipient: Airspace Users Operations WOC Content: DMA type 1 and 2 updates Size: TBD Timelines: Minutes Security: Low Trigger: EFI with DMA type 1 and 2 de-confliction
Status	Validated
Rationale	The ASM Sub-regional/National submits ASM solution with conflict –free proposal for DMA type 1 and 2 updates
Category	IER

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Submit DMA type 1 and 2 updates

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IE01.1004
Title	Submit Airspace configuration
Requirement	The ASM Sub-regional/National shall be able to submit Airspace configuration with allocated DMA type 1 and 2 to Airspace Users Operations WOC Source: ASM Sub-regional/National Recipient: Airspace Users Operations WOC Content: Airspace configuration with allocated DMA type 1 and 2 Size: TBD Timelines: Minutes Security: Low Trigger: Allocated DMA type 1 and 2 within DAC
Status	Validated

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Rationale	The ASM Sub-regional/National submits Airspace configuration with integrated DMA type 1 and 2 to Airspace User Operations WOC
Category	IER

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Submit Airspace Configuration

[REQ]

4.3 Requirements related to Operational Node Air Traffic Flow and Capacity Management Sub-regional/Local ATFCM

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-OP03.2001
Title	DAC historical data
Requirement	Flow manager shall be able to update WOC with DAC historical data on the regular basis or on demand
Status	Validated
Rationale	Flow manger regularly or on demand updates WOC with historical data of ATC volumes configurations based on historical traffic demand and ATC sectors configurations.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Provide DAC historical data
<ALLOCATED_TO>	<Role>	Flow manager
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

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Identifier	REQ-07-W2-40-SPRINTEROP- OP03.2002
Title	ATC volumes updates (D-1 to D-Ops)
Requirement	Flow manager shall be able to update ASM Sub-regional/National with latest information regarding ATC volumes.
Status	Validated
Rationale	Flow manager updates Airspace manager with the latest available information regarding ATC volumes based on traffic demand evolution and ATC sector planning within AoR
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Provide updated ATC volumes based on traffic demand evolution and ATC sectors planning
<ALLOCATED_TO>	<Role>	Flow manager
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP03.2003
Title	Refine ATC volumes (D-1 to D-Ops)
Requirement	Flow manager shall share refined ATC volumes with WOC and ASM Sub-regional/National on the regular basis or on demand
Status	Validated
Rationale	Flow manger refines ATC volumes in accordance with latest updated information regarding traffic demand and ATC sector planning and shares it with WOC and ASM Sub-regional/National
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40

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<ALLOCATED_TO>	<Activity>	Provide ATC volumes updates
<ALLOCATED_TO>	<Role>	Flow manager
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP03.2004
Title	Local impact assessment (D-1 to D-Ops)
Requirement	Upon reception of the iSMT with DMA type 1 and 2 the Traffic manager shall analyse impact on traffic flows and ATC sectors configurations in the context of DAC
Status	Validated
Rationale	Upon reception of the iSMT with DMA type 1 and 2, Local Traffic manager initiates impact assessment against latest updates on traffic demand and ATC sectors configurations and analyses whether the iSMT with DMA type 1 and 2 could cause an impact on traffic flows and ATC sectors configurations in the context of DAC.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Provide local impact assessment
<ALLOCATED_TO>	<Role>	Local Traffic manager
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP03.2005
Title	Planning ATM constraint (TTO) (D-1 to D-Ops)
Requirement	Local Traffic manager shall be able to aggregate and apply ATFCM solution to iSMT with DMA type 1 and 2
Status	Validated

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Rationale	Traffic manager upon conflict detection cherry-picks trajectories eligible to planning ATM constraints (TTO) to de-conflict AU demand and to mitigate adverse effect on local DAC performance targets. Once iSMT with DMA type 1 and 2 is selected the Traffic manager can propose ATFCM solution with TTO either over way point along flight route or over entry/exit point of DMA type 1 and 2
Category	<Operational> <Safety>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Propose TTO for iSMT
<ALLOCATED_TO>	<Role>	Local Traffic manager
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP03.2006
Title	Planning ATM constraint (TTO) (D-1 to D-Ops)
Requirement	Local Traffic manager shall be able to propose a target time (TTO) over DMA type 1 and 2 entry/exit point
Status	Validated
Rationale	Local Traffic manager upon detection of the conflict within DAC selects iSMT with DMA type 1 and 2 and through “What-If” functionalities simulates a use case with application of the Target time over DMA entry/exit point. If the use case delivers positive result mitigating the conflict, then the Traffic manager advice WOC to consider the modification of the estimated time over DMA entry/exit point within DAC and inform ASM Sub-regional/National.
Category	<Operational> <Safety>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Propose TTO for iSMT
<ALLOCATED_TO>	<Role>	Local Traffic manager

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<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP03.2007
Title	Planning ATM constraint (TTO) (D-1 to D-Ops)
Requirement	Local Traffic manager shall be able to propose a target time over (TTO) way point along flight route to iSMT with DMA type 1 and 2
Status	Validated
Rationale	Local Traffic manager upon detection of the conflict within DAC selects iSMT with DMA type 1 and 2 and through "What-If" functionalities simulate application of the Target time over way point associated with entry into ATC sector. If simulation delivers positive result mitigating the conflict, then the Traffic manager advice WOC to consider the modification of the flight route profile with estimated time over entry point into ATC sector.
Category	<Operational> <Safety>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Propose TTO for iSMT
<ALLOCATED_TO>	<Role>	Local Traffic manager
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP- OP03.2008
Title	Planning ATM constraint (D-1 to D-Ops)
Requirement	If proposed TTO is rejected by WOC the Traffic manager shall be able to acknowledge it and cherry-pick another trajectory eligible to planning ATM constraint.
Status	Validated

Rationale	Upon reception of the rejection of ATFCM solution with TTO proposal from WOC, Local Traffic manager cherry-picks another eligible trajectory e.g. SBT and simulates application of the planning ATM constraints to optimise impact on airspace configuration.
Category	<Operational>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Acknowledge TTO rejection
<ALLOCATED_TO>	<Role>	Local Traffic manager
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route - High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP -IO03.1001
Title	Exchange of ATC Volumes
Requirement	The ATFCM Sub-regional/Local shall be connected via system to system interface to ASM Sub-regional/National and Airspace user operations WOC to provide data regarding ATC volumes.
Status	Validated
Rationale	The ATFCM Sub-regional/Local ensures exchange of the ATC volumes data on regular basis or on request and provision of this data to ASM Sub-regional/National and Airspace user operations WOC.
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Provide ASM support (AMC) -> Local impact assessment
<ALLOCATED_TO>	<Functional Block>	Cooperative Airspace Management

[REQ]

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Identifier	REQ-07-W2-40-SPRINTEROP-IO03.1002
Title	Exchange of ATC Volumes
Requirement	The ATFCM Sub-regional/Local shall be connected to ASM Sub-regional/National and Airspace user operations WOC to provide data regarding ATC volumes using API format (JSON). .
Status	Validated
Rationale	Data exchange between ATFCM Sub-regional/Local ASM Sub-regional/National and Airspace Users Operations WOC using technologies as defined for the ATC volumes data exchange.
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Provide ASM support (AMC) -> Local impact assessment
<ALLOCATED_TO>	<Functional Block>	Cooperative Airspace Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO03.1003
Title	Exchange of ATC Volumes
Requirement	The ATFCM Sub-regional/Local shall be connected to ASM Sub-regional/National and Airspace user operations WOC to provide data regarding ATC volumes through REST API gateway.
Status	Validated
Rationale	Data exchange between ATFCM Sub-regional/Local ASM Sub-regional/National and Airspace Users Operations WOC using technologies as defined for the ATC volumes data exchange.
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40

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<ALLOCATED_TO>	<Information Exchange>	Provide ASM support (AMC) -> Local impact assessment
<ALLOCATED_TO>	<Functional Block>	Cooperative Airspace Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO03.1004
Title	Exchange of ATFCM solution
Requirement	The ATFCM Sub-regional/Local shall be connected to Airspace User Operations WOC to exchange ATFCM solution with TTO proposal.
Status	Validated
Rationale	Data exchange between ATFCM Sub-regional/Local ASM Sub-regional/National and Airspace Users Operations WOC using technologies as defined for the ATC volumes data exchange.
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Provide ASM support (AMC) -> Local impact assessment
<ALLOCATED_TO>	<Functional Block>	Cooperative Airspace Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO03.1005
Title	Exchange of ATFCM solution
Requirement	The ATFCM Sub-regional/Local shall be able to exchange TTO proposal data with Airspace User Operations WOC using API format (JSON).
Status	Validated
Rationale	Data exchange between ATFCM Sub-regional/Local and Airspace Users Operations WOC using technologies as defined for the ATC volumes data exchange.

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Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Provide ASM support (AMC) -> Local impact assessment
<ALLOCATED_TO>	<Functional Block>	Cooperative Airspace Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IO03.1006
Title	Exchange of ATFCM solution
Requirement	The ATFCM Sub-regional/Local shall be able to exchange TTO proposal data with Airspace User Operations WOC through REST API gateway
Status	Validated
Rationale	Data exchange between ATFCM Sub-regional/Local and Airspace Users Operations WOC using technologies as defined for the ATC volumes data exchange.
Category	< Interoperability >

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Provide ASM support (AMC) -> Local impact assessment
<ALLOCATED_TO>	<Functional Block>	Cooperative Airspace Management

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IE03.1001
Title	Submit ATC volumes

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Requirement	The ATFCM Sub-regional/local shall be able to submit ATC volumes to the Airspace User Operations (WOC) and ASM Sub-regional/National. Source: Sub-regional/local ATFCM, Recipient: Airspace User Operations (WOC) Sub-regional/National ASM Content: ATC volumes Size: TBD Timelines: Minutes Security: Low Trigger: Airspace configuration
Status	Validated
Rationale	The ATFCM Sub-regional/local submits ATC volumes to Airspace Users Operations WOC and Sub-regional/National ASM on a regular basis or on request facilitating definition of Airspace Configuration.
Category	IER

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Receive data regarding ATC volumes

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-IE03-1002
Title	Submit ATFCM solution with TTO proposal

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Requirement	The ATFCM Sub-regional/local shall be able to submit TTO proposal to iSMT. Source: Sub-regional/local ATFCM Recipient: WOC Content: TTO proposal Size: TBD Timelines: Minutes Security: Low Trigger: iSMT update
Status	Validated
Rationale	The ATFCM Sub-regional/local performs iSMT impact assessment on DAC performance and submits ATFCM solution with TTO proposal to Airspace User Operations WOC.
Category	IER

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Receive data regarding ATC volumes

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP -IE03.1003
Title	Receive TTO proposal status
Requirement	The ATFCM Sub-regional/local shall be able to receive the TTO proposal status from the Airspace Users Operations Source: WOC Recipient: Sub-regional/local ATFCM Content: TTO status Size: TBD Timelines: Minutes Security: Low Trigger: ATFM solution with TTO proposal
Status	Validated
Rationale	The ATFCM Sub-regional/local receives status of the TTO proposal from Airspace User Operations WOC.

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Category	IER

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Information Exchange>	Receive data regarding ATC volumes

4.4 Performance requirements

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-PF04.1001
Title	Performance assessment (Quantitative)
Requirement	The solution shall provide evidence of the quantitative assessment of the impact/benefits of the solution for military and civil operational stakeholders
Status	Validated
Rationale	For the military operational stakeholder, the performance measurements cover all aspects related to the effectiveness of military mission. For the civil operational stakeholders, the performance measurements reflect the contribution to the ATM performance apportioned to the solution.
Category	PERFORMANCE

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Performance>	Civil-Military Cooperation and Coordination

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-PF04.1002
Title	Performance assessment (Qualitative)

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Requirement	The solution shall provide evidence of the quantitative assessment of the impact/benefits of the solution for military and civil operational stakeholders
Status	Validated
Rationale	Predefined criteria will be used in experts' judgement to properly assess the impact/benefits of the solution in the performance areas where quantitative assessments are not feasible.
Category	PERFORMANCE

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Performance>	Civil-Military Cooperation and Coordination

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-PF04.1003
Title	En-route airspace capacity
Requirement	The quantitative performance assessments shall be able to provide evidence of 3,5% capacity increase at local level
Status	Validated
Rationale	The dynamic optimization of DMAs throughout DAC processes enables the configuration of ATC sectors closer to the throughput required to accommodate the traffic demand.
Category	PERFORMANCE

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Performance>	Civil-Military Cooperation and Coordination

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-PF04.1004
Title	Predictability

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Requirement	The quantitative performance assessments shall be able to provide evidence of a 0,06% reduction of trajectories deviations from the initial flight plan for the impacted flights at ECAC level
Status	Validated
Rationale	Continuous sharing of information on military demand with DMA type 1 and 2 throughout the entire planning cycle supports the configuration of the elements of airspace structures in DAC to accommodate traffic demand as close as possible to AUs preferences for trajectories. Improved awareness on military ATM demand supports fewer modifications to AU request throughout DAC planning processes.
Category	PERFORMANCE

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Performance>	Civil-Military Cooperation and Coordination

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-PF04.1005
Title	Flight times
Requirement	The quantitative performance assessments shall be able to provide evidence of a reduction by 1 minute/impacted flight for the of En-route phase of the impacted flights at ECAC level.
Status	Validated
Rationale	Optimization of DMA configuration/location enabled by DMA flexible parameters allows DAC to accommodate traffic demand with fewer re-routings or changes to the requested trajectory profiles. Furthermore, implementation of DMA 1 and 2 leads to reduced/minimized overbooking of ARES and consequently to a higher numbers of direct/free route flights that potentially could exploit available airspace resource released. That leads to the reduction of the flight timers compared to the application of static design principles for ARES.
Category	PERFORMANCE

[REQ Trace]

Relationship	Linked Element Type	Identifier

<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Performance>	Civil-Military Cooperation and Coordination

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-PF04.1006
Title	Fuel efficiency
Requirement	The quantitative performance assessments shall be able to provide evidence of 0,010% reduction in fuel consumption of the impacted flights for the En-route flight phase at ECAC level, respectively a reduction of 0,75 kg for each impacted flight.
Status	Validated
Rationale	More airspace available to flight planning in the area of ANSP responsibility with the possibility of more direct routes and optimized re-routings supports AUs in performing their preferred routes, in both vertical and horizontal profiles, with a reduction of the en-route flight times compared to the application of static principles for ARES. Optimized profiles and reduced flight times leads to a better management of fuel consumption.
Category	PERFORMANCE

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Performance>	Civil-Military Cooperation and Coordination

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-PF04.1007
Title	Environment
Requirement	The quantitative performance assessments shall be able to provide evidence of 0,001 kg CO2/flight saving for the impacted En-route flight phase at ECAC level
Status	Validated
Rationale	Reduced flight times and optimized fuel consumption have a direct positive impact on the reduction of CO2 emissions.
Category	PERFORMANCE

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[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Performance>	Civil-Military Cooperation and Coordination

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-PF04.1008
Title	ANS Cost Efficiency
Requirement	The quantitative performance assessments shall be able to provide evidence of increased ATCO Productivity – Flights per ATCO -Hour on duty
Status	Validated
Rationale	Integration of DMAs into DAC planning processes and the continuous awareness on actual airspace status enable improved synchronization between ATC sector and ATCO planning processes. Reduction of ATC sector overload, enabled by the application of TTO to iSMT, supports configurations without increasing the number of sectors (reducing workload imbalance), thus ATCO numbers, which will allow “not to overreact” to the situation and to manage the demand with minimal operational cost.
Category	PERFORMANCE

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Performance>	Civil-Military Cooperation and Coordination

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-PF04.1009
Title	Effectiveness of Military Operation and Training

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Requirement	The quantitative performance assessments shall provide evidence of the safeguard /improvement of the effectiveness of military operation as follows: - 100% satisfaction for DMA allocated time and dimension - 4,6% increase of the mission time ensured within DMA against the total mission time -no deviation of mission total duration after TTO allocation
Status	Validated
Rationale	The optimization of DMAs throughout CDM for DAC processes and planning time constraints-TTO- to iSMT takes fully into account and preserves the mlitary mission requirements.
Category	PERFORMANCE

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Performance>	Civil-Military Cooperation and Coordination

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-PF04.1010
Title	Flexibility
Requirement	The quantitative performance assessments shall provide evidence of 0,1min reduction of the average delay for scheduled civil/military flights with change request and non-scheduled or late flight plan request
Status	Validated
Rationale	Integration of DMA type 1 and 2 in DAC throughout CDM provides civil and military AUs the possibility to preserve the parameters (time, volume of airspace, short notice adaptations) required for an effective execution of mission based on actual operational requirements.
Category	PERFORMANCE

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40

<ALLOCATED_TO>	<Performance>	Civil-Military Cooperation and Coordination

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-PF04.1011
Title	Safety
Requirement	The quantitative performance assessments shall provide evidence of 0,89% reduction of mid-air collisions for the impacted flights at ECAC level
Status	Validated
Rationale	Less complexity of traffic and the reduction of the planned trajectory conflicts enable a better planning of ATC sector capacity management, hence a reduction of the planned trajectory conflicts with a positive impact to safety.
Category	PERFORMANCE

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Performance>	Civil-Military Cooperation and Coordination

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-PF04.1012
Title	Human Performance
Requirement	The assessments performed shall provide qualitative evidence on the ability of human actors to perform their task efficiently and safely
Status	Validated
Rationale	The automation of human processes by the available tool support as well as the procedures and activities proposed, enable the operators to perform their tasks timely and accurately.
Category	PERFORMANCE

[REQ Trace]

Relationship	Linked Element Type	Identifier

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<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Performance>	Civil-Military Cooperation and Coordination

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-PF04.1013
Title	Security
Requirement	The qualitative assessments performed shall provide evidence of the same level of security as required today for the information exchange between the actors engaged in the processes associated to the solution
Status	Validated
Rationale	The solution does not bring any additional tools, actors or connectivity opportunities to those already tested in previous SESAR cycles, hence no additional security risks.
Category	PERFORMANCE

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Performance>	Civil-Military Cooperation and Coordination

4.5 Security Requirements

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-SC05.1001
Title	Confidentiality level
Requirement	WOC shall define a confidentiality level of MT related data
Status	validated
Rationale	The definition of the confidentiality level will allow WOC to distinguish to whom and what MT data can be submitted in order to avoid violation of confidentiality of military mission related data.
Category	SECURITY

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[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Submit counterproposal Refine /update ARES Submit iSMT
<ALLOCATED_TO>	<Role>	Mission planner Flight data operator
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route – Medium/High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-SC05.1002
Title	Confidentiality attributes of information elements
Requirement	WOC shall define confidentiality attributes of information elements of MT data for secure exchange of MT data.
Status	validated
Rationale	Confidentiality attributes will allow WOC to distinguish between different levels of confidential and prevent submission of MT related data with confidential information to pertinent ATM and relevant non-ATM actors.
Category	SECURITY

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Share Early Flight intent with DMA 1 and 2 Submit counterproposal Refine /update ARES Submit iSMT
<ALLOCATED_TO>	<Role>	Mission planner Flight data operator
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route – Medium/High Complexity

[REQ]

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Identifier	REQ-07-W2-40-SPRINTEROP-SC05.1003
Title	Encryption of submitted data
Requirement	Submitted by WOC MT related data shall be encrypted.
Status	validated
Rationale	Data exchange between WOC and pertinent ATM and relevant non-ATM actors through SWIM profiles must be encrypted in order to secure information exchanges.
Category	SECURITY

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Share Early Flight intent with DMA 1 and 2 Submit counterproposal Refine /update ARES Submit iSMT
<ALLOCATED_TO>	<Role>	Mission planner Flight data operator
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route – Medium/High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP-SC05.1004
Title	Confidentiality violation check
Requirement	WOC shall be able to check and prevent submission of MT confidential data to the nodes with lower confidentiality level
Status	validated
Rationale	Submission of MT data with defined confidentiality attributes to pertinent ATM and relevant non-ATM actors must be avoided in all circumstances
Category	SECURITY

[REQ Trace]

Relationship	Linked Element Type	Identifier

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<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	Share Early Flight intent with DMA 1 and 2 Submit iSMT
<ALLOCATED_TO>	<Role>	Mission planner Flight data operator
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route – Medium/High Complexity

4.6 Safety Requirements

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP -SF06.0001
Title	DAC local impact assessment
Requirement	Adequate SW assurance shall be ensured for the DAC tool functionalities addressing the impact evaluation of airspace configuration and simulations with “what-if”.
Status	<Validated>
Rationale	To prevent Local ATFCM errors in the evaluation of imbalance in view of hotspot identification taking into account the mission trajectories with potential for leading to the occurrence of Hz 03: Inappropriately granted/modified DMA type 1 and 2 request leading to overload
Category	<Safety>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	iSMT management with planning ATM constraint
<ALLOCATED_TO>	<Role>	Flow manager Local Traffic manager Capacity managere
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route – Medium/High Complexity

[REQ]

Identifier	REQ-07-W2-40-SPRINTEROP -SF06.0002

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Title	DAC HMI Visualisation
Requirement	DAC HMI shall allow clearly distinguish “what-if” function visualisation from real traffic situation.
Status	<Validated>
Rationale	To prevent Local ATFCM judgement errors DAC must be able to easily distinguish on the HMI the “what-if function” visualisation from the real traffic situation.
Category	<Safety>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.07-W2-40
<ALLOCATED_TO>	<Activity>	iSMT management with planning ATM constraint
<ALLOCATED_TO>	<Role>	Flow manager Local Traffic manager Capacity managere
<ALLOCATED_TO>	<Sub-Operating Environment>	En-Route – Medium/High Complexity

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5 References and Applicable Documents

5.1 Applicable Documents

Content Integration

[1] EATMA Guidance Material

[2] EATMA Community pages

[3] SESAR ATM Lexicon

Content Development

[4] Mission Trajectory Detailed Concept

System and Service Development

[5] tbc

Performance Management

[6] SESAR Performance Framework ed_ 01_00_01 - 2019 tbc

Validation

[7] European Operational Concept Validation Methodology E-OCVM Version3.0 tbc

System Engineering

[8] SESAR 2020 Requirements and Validations Guidelines

Safety

[9] SESAR Performance Framework ed_01_00_01

Human Performance

[10] tbc

Environment Assessment

[11] tbc

5.2 Reference Documents

[12]SESAR 2020 Concept of Operations Edition 2019, edition 01.00.00 May 2019

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[13]ED-78A GUIDELINES FOR APPROVAL OF THE PROVISION AND USE OF AIR TRAFFIC SERVICES SUPPORTED BY DATA COMMUNICATIONS.4

[14]SESAR 2020 W1. Solution PJ07-03 SPR-INTEROP/OSED for V3 Part I Edition 2019

[15]SESAR 2020 W1. Solution PJ07.03 Validation Report (VALR) for V3, edition 00.01.00, 27 September 2019

[16], SESAR 2020 W1. Solution PJ08-01 SPR-INTEROP/OSED for V2 Part I Edition 2019

[17]SESAR 2020 W1. Solution PJ08-01 Validation Report (VALR) for V2 edition 00.03.01, 05 July 2019

[18]SESAR Integrated Dictionary, http://www.eurocontrol.int/lexicon

[19] SESAR Operational Concept Document Edition 01 2022

[20] Civil-Military Collaborative Decision-Making in the future European Air Traffic Management Edition 1 2019

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Appendix A Cost and Benefit Mechanisms

A.1 Stakeholders identification and Expectations

Stakeholder	Involvement	Why it matters to stakeholder
Military / State AU (WOC)	AU and a primary beneficiary of MT and A-FUA implementation. Focused on avoiding any negative impact of the solution on the effectiveness of military mission.	Expectation: • enhance the flexibility of the ATM system to accommodate military ATM requirements including for short notice requests/changes (FLX) • access to the required airspace and flight profile suited to mission planning, throughout civil-military CDM, which balances between the given specific mission requirements and the performance expectation needs of the ATM system (CMCC) • upgrade of WOC mission support systems to process properly the initial MT information integrated with DMAs of types 1 and 2 (CMCC)
ANSP	Primary beneficiary of A-FUA implementation for the delivery of ASM and ATFCM functions at sub-regional/local level. Mainly concerned by improved accommodation of traffic demand and compliance with performance targets.	Expectation: • En-route capacity planning is improved thanks to a better management of traffic complexity enabled by the flexibility and dynamicity of DMAs of types 1 and 2 (CAP2) • improved traffic predictability in planning phase through the integration of shared MT, into the analysis and mitigation measures of traffic complexity (PRD1) • the flexibility of the ATM system is enhanced to accommodate civil and military ATM planning constraints and preferences/priorities (FLX)
Industry	Provider of technical systems and tools. Mainly interested in maximizing the usage of technical support outputs by operational processes.	Expectation: • concept and processes support practicable system and tool development • the prototypes are cost-effective and further industrialized
Network Manager	Interested in the implementation of the solution as close as possible to the requirements for the delivery of the regional ASM and ATFCM functions.	Expectation: • effective cooperation between all the stakeholders in moving towards an optimised airspace configuration • improved efficiency of sub-regional/local ASM-ATFCM and military requirements based CDM
Civil Airspace User	Directly affected by the implementation of the solution. Concerned by improved accommodation of GAT demand and preferences.	Expectation: • increased efficiency of flights • more flexible use of airspace structures

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European Commission	Participation through SJU in the coordination and monitoring of the activities for the implementation of the solution. Concerned by the adherence of the solution to apportioned ATM performance targets.	Expectation: • Particularly interested in costs and performance benefits to KPA's capacity, environment, operational efficiency, and flexibility

Table 7: Stakeholder's expectations

A.2 Benefits mechanisms

A.2.1 BIM layout

Column Title	Box Shape	Column Description
OI Step(s) **(or 'feature')**		Identifies the OI Step (or 'feature') that will bring changes to the world of ATM and briefly describes it
Impact Areas		Short description of a change brought about by the OI Step (or 'feature')
Performance Indicators / Metrics		Aspects which can be measured (or calculated from other metrics) to identify if the expected positive and negative impacts are actually realised. These need to be things that can be measured in the validation exercises.
Positive or Negative Impacts		Describes the expected positive or negative impacts
KPA / FA Impacted		The KPA which is related to the Impact, as defined in the B4.01 Performance Framework. FA is included as Human Performance and CBA may be the appropriate boxes, however they are not KPAs.

Table 8: Benefit and Impact Mechanism Syntax - Columns

The boxes in those columns are linked via numbered arrows that represent the mechanism

	The numbers provide links to the mechanism descriptions in the text.

Table 9: Benefit and Impact Mechanism Syntax - Columns

	A beneficial decrease e.g. a reduction in CO2 emissions (indicator) or a reduction in controller workload (positive impact)
	A detrimental increase e.g. an increase in CO2 emissions (indicator) or an increase in controller workload (negative impact)
	A beneficial increase e.g. an increase in no. of movements (indicator) or an increase in safety (positive impact)

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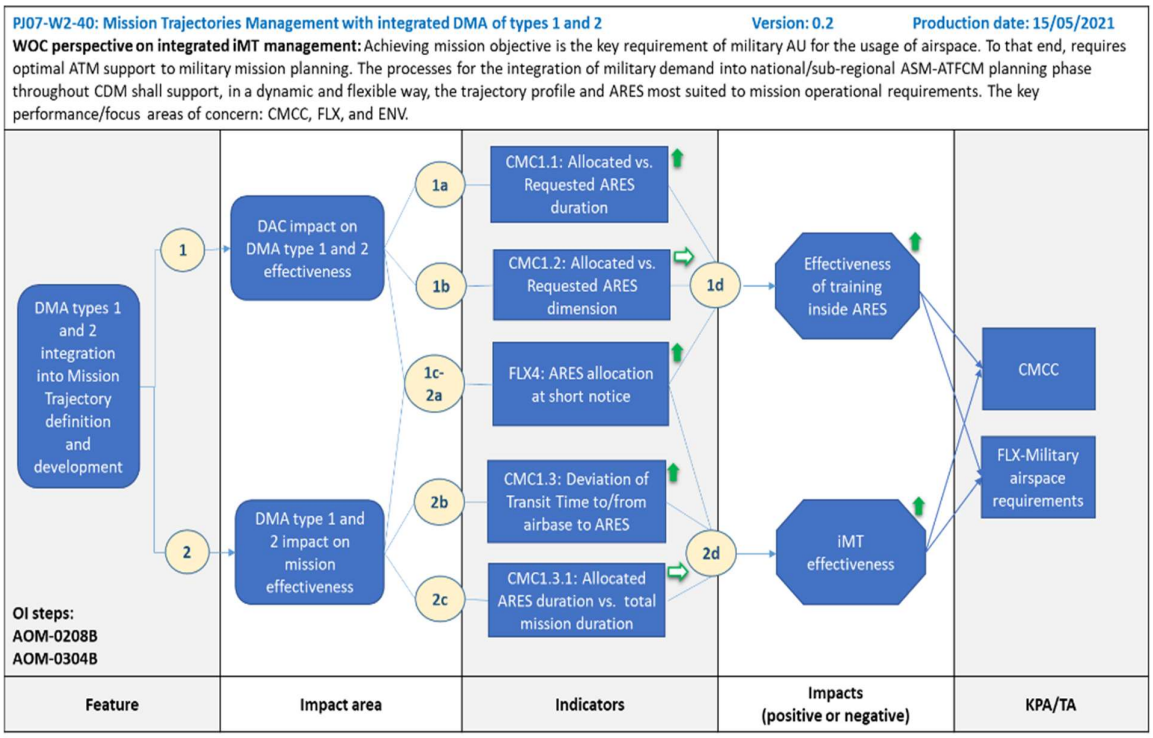
⬇	A detrimental decrease e.g. a reduction in no. of movements (indicator) or a reduction in safety (negative impact)
⇨	A change in the indicator, a positive or negative impact is expected but with current knowledge the direction is still not clear. Can be coloured to show the main expectation. It is preferable to use a direction arrow, however this is provided as a 'last resort', for example where input from a FA expert is required or if there are two possible hypotheses on the change which need to be explored in the validation activities.

A.2.2 WOC benefit mechanism



1	Change 1 description: Based on the flight intent shared by WOC, DMA 1 and 2 are allocated throughout integrated ASM-ATFCM based civil-military CDM process in DAC
1a	The duration of training inside an ARES is dictated exclusively by operational requirements. With DMAs, flexibility allows adjustments of airspace configuration to enable the AU to execute its mission as required. The time allocated is equal/ higher than requested
1b	The volume of airspace necessary for a training event in ARES is dictated exclusively by operational requirements. The different shapes proposed by DMA definition tool and integration of DMA in DAC throughout optimization of request do not alter the dimensions of airspace (horizontal, vertical, altitude block) requested by the AU

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1c	DAC processes enhanced by civil-military CDM provides to AU the possibility to dynamically adapt the parameters of DMA to the changes imposed by mission planning, including at short notice (up to one hour prior EOBT)
1d	Integration of DMA type 1 and 2 in DAC throughout CDM provides the AU the possibility to preserve the parameters (time, volume of airspace, short notice adaptations) required for an effective execution of mission based on actual operational requirements. (CMCC, FLX)
2	Change 2 description: DMA 1 and 2 are integrated with iMT and managed as 'Ad-hoc' ARES with flexible parameters (time, location, altitude block) and reflects with more accuracy the actual operational requirements throughout iMT lifecycle
2a	Short notice (up to one hour prior EOBT) changes to mission planning are enabled by the dynamicity and flexibility of DMA management in DAC
2b	The flexibility of DMA type 1 and 2 is suited to mission planning constraints. DMA location flexibility ensures the disposal of ARES at the required distance/flight time from/to a specific reference point. The consequent update to trajectory does not generate unacceptable deviations of transit time
2c	DMA time flexibility ensures an effective balance between the transit time and the time spent inside DMA within the total time planned for a mission
2d	DMA flexibility improves the conditions for the achievement of mission objectives by enabling optimization of trajectory profile development to better suit to various and changing operational requirements (CMCC, FLX)

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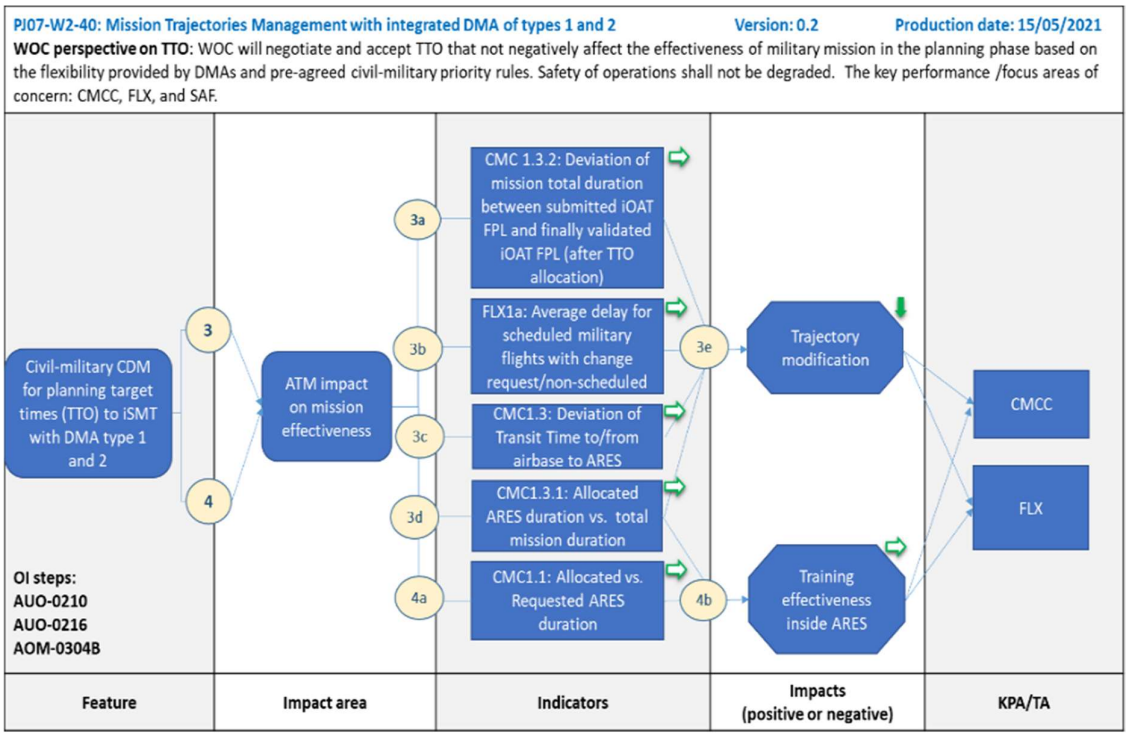

3	**Change 3 description:** WOC participates in CDM with DAC for optimizing the utilization of available capacity to accommodate BT and MT based on the iSMT with DMA 1 and 2 integrated into the local traffic demand. A planning target time (TTO) is allocated to iSMT with a consequent update of the entire trajectory profile
3a	TTO generates changes to the elapsed times of MT and EOBT. Based on DMA flexibility, the change of EOBT and/or DMA entry/exit times do not affect the duration of the flight required for the execution of the planned mission(s)
3b	Furthermore, the delay imposed by TTO to MT allows modifications to DMA allocation within the flexibility thresholds acceptable to the execution of the mission
3c	TTO over ARES entry point stays within the predefined flexibility by the airspace user with no effect on the duration of transit to/from airbase or to/from a consecutive ARES connected to the same MT.
3d	The flexibility of DMA type 1 and 2 is suited to mission planning constraints. DMA flexibility ensures the location and configuration of ARES at the required distance/flight time from/to a specific reference point. The consequent update to trajectory does not generate unacceptable deviations of transit time

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3e	Civil-military CDM on TTO results in a MT profile, which ensures the achievement of mission objectives as planned by the AU (**CMCC, FLX**)
4	**Change 4 description**: TTO is allocated to a point along the trajectory (e.g. ATC sector entry point) or for the entry/exit of DMA type 1 and 2 with impact on the time parameter of allocated DMA
4a	The duration of training inside an ARES is dictated exclusively by operational requirements. With DMAs, flexibility allows adjustments of airspace configuration to enable the AU to execute its mission as required. The time allocated is equal/ higher than requested
4b	Integration of TTO into the MT profile does not affect the AU the possibility to preserve the parameters (time, volume of airspace, short notice adaptations) required for an effective execution of mission inside DMAs based on actual operational requirements. (**CMCC, FLX**)

A.2.3 ANSP benefit mechanism

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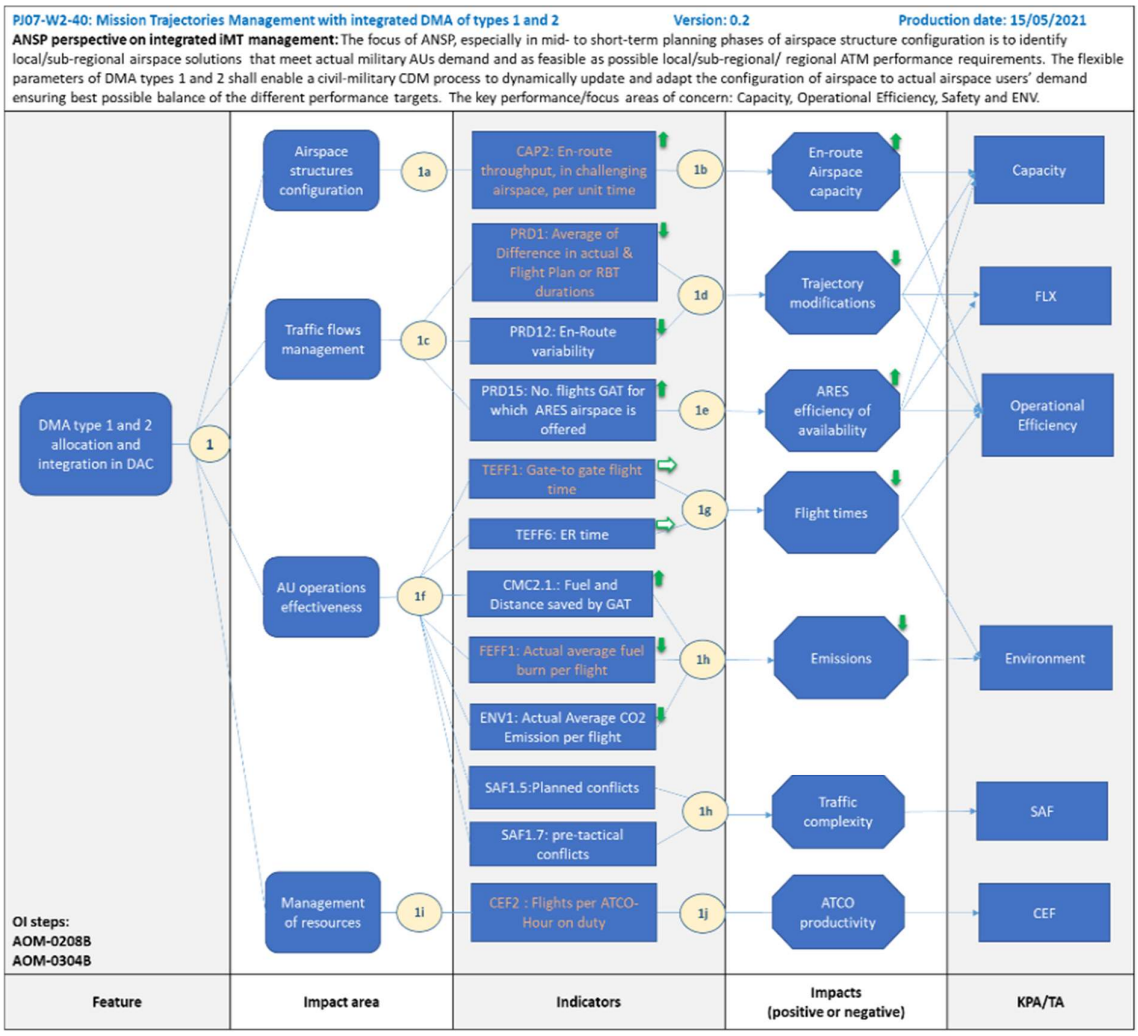

1	**Change 1 description**: DMA type 1 and 2 allocation is integrated into the dynamic airspace structures configuration through ASM-ATFCM based civil-military CDM
1a	With the DAC processes in place supported by civil-military CDM, DMA type 1 and 2 flexible parameters enable a dynamic exchange of information and configuration of airspace structures in line with the changes in the evolution of traffic demand
1b	DMA type 1 and 2 optimization of allocation in DAC enables dynamicity in the configuration of ATC sectors to accommodate the en-route traffic as close as possible to ASM and ATFCM performance needs. Airspace capacity is optimized with benefits to the efficiency of AU operations (**CAP, OEF**)

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1c	DAC fully integrates the traffic demand and ATFM performance requirements into the configuration of airspace structures. Early flight intent with DMA type 1 and 2 request is part of the dynamic process to adjust airspace structures to ATFM needs.
1d	Sharing of early flight intent with DMA type 1 and 2 and the civil-military CDM on DMA allocation enables less modifications to AU preferences for trajectories. Furthermore, DMA flexible parameters enable a dynamic adjustment of airspace reservation/restriction supporting the improvement of performance outputs of DAC for the accommodation of traffic demand (**CAP, FLX, OEF**)
1e	Implementation of DMA 1 and 2 leads to less ARES overbooking and consequently to a higher No. of GAT flights that potentially could cross the ARES airspace offered. It also supports better awareness on the actual status of airspace, thus improved predictability for the planning FRA operations (**CAP, FLX, OEF**)
1f	AUs planning needs and updates are fully considered throughout DAC processes. Traffic demand and associated network/sub-regional/local performance targets represent the main trigger for the configuration of airspace structures.
1g	DMA flexible parameters enable a dynamic adjustment of airspace reservation/restriction to FRA operations needs for direct routes with consequent benefit to the efficiency of operations – reduced deviations of trajectories and flight times – and the level of emissions(**OEF, ENV**)
1h	Efficient operations means more direct and shorter routes with optimized horizontal and vertical profiles, thus less fuel consumption. Less fuel consumption enables a reduction of CO2 emissions, which means a positive impact on environment (**ENV**)
1i	With the flexibility provided by DMA type 1 and 2, a better alignment between ATC sector configuration and the ATCO planning is enabled
1j	Flexible ATC sectorization supports configurations without increasing the number of sectors (reducing workload imbalance), thus ATCO numbers, which will allow “not to overreact” to the situation and to manage the demand with minimal operational cost (**CEF**)

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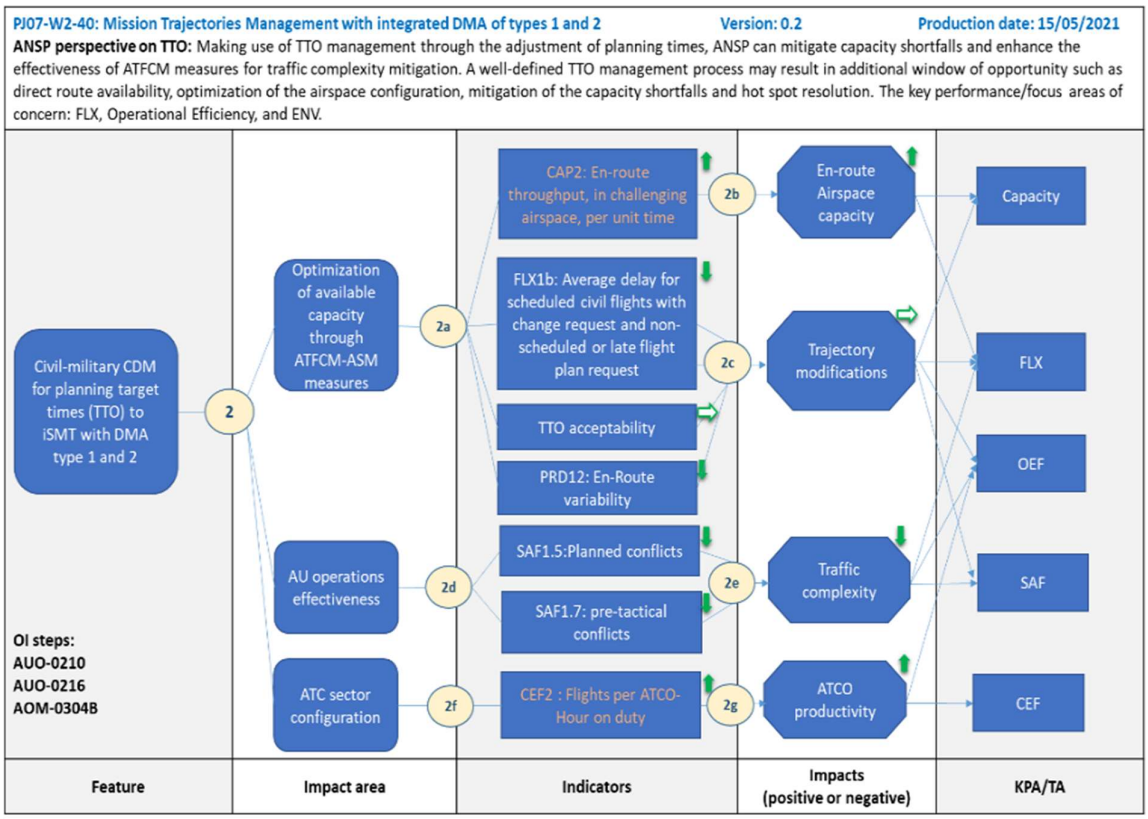

2	**Change 2 description**: iSMT shared with ANSP via iOAT FPL is integrated into traffic demand impact assessment, which triggers iterative collaboration between WOC and DAC-ATFCM through CDM, and hence facilitates the allocation of AUs demand. The result of this negotiation may lead to a TTO for iSMT . TTO adjusts and/or fixates a planned ETO a specific point in order to respond to ATC sector capacity optimization needs.
2a	TTO to iSMT supports integrated ASM-ATFCM measures to optimize available ATC sector capacity for traffic demand accommodation. A civil-military CDM process supports the identification of the iSMTs that enable alleviation of ATCF sector overloads as well as the consequent adaptation of DMA type 1 and 2.
2b	DMA type 1 and 2 optimization of allocation in DAC enables dynamicity in the configuration of ATC sectors to accommodate the en-route traffic as close as possible to ASM and ATFCM performance needs. Airspace capacity is optimized with benefits to the flexible use of airspace capacity (**CAP, FLX**)
2c	More airspace available to flight planning in the area of ANSP responsibility with the possibility of more direct routes and optimized re-routings ensures enhancement of the performance to both of airspace configuration capability to accommodate traffic demand (**CAP**) and to the operational efficiency of flight operations (**OEF**). Effective accommodation of short-notice flight plan requests is enhancing the ability of the ATM system to react in a more effective manner to short-notice traffic demand (**FLX**). Better management of capacity enables a reduction of the planned trajectory conflicts with a positive impact to safety (**SAF**)

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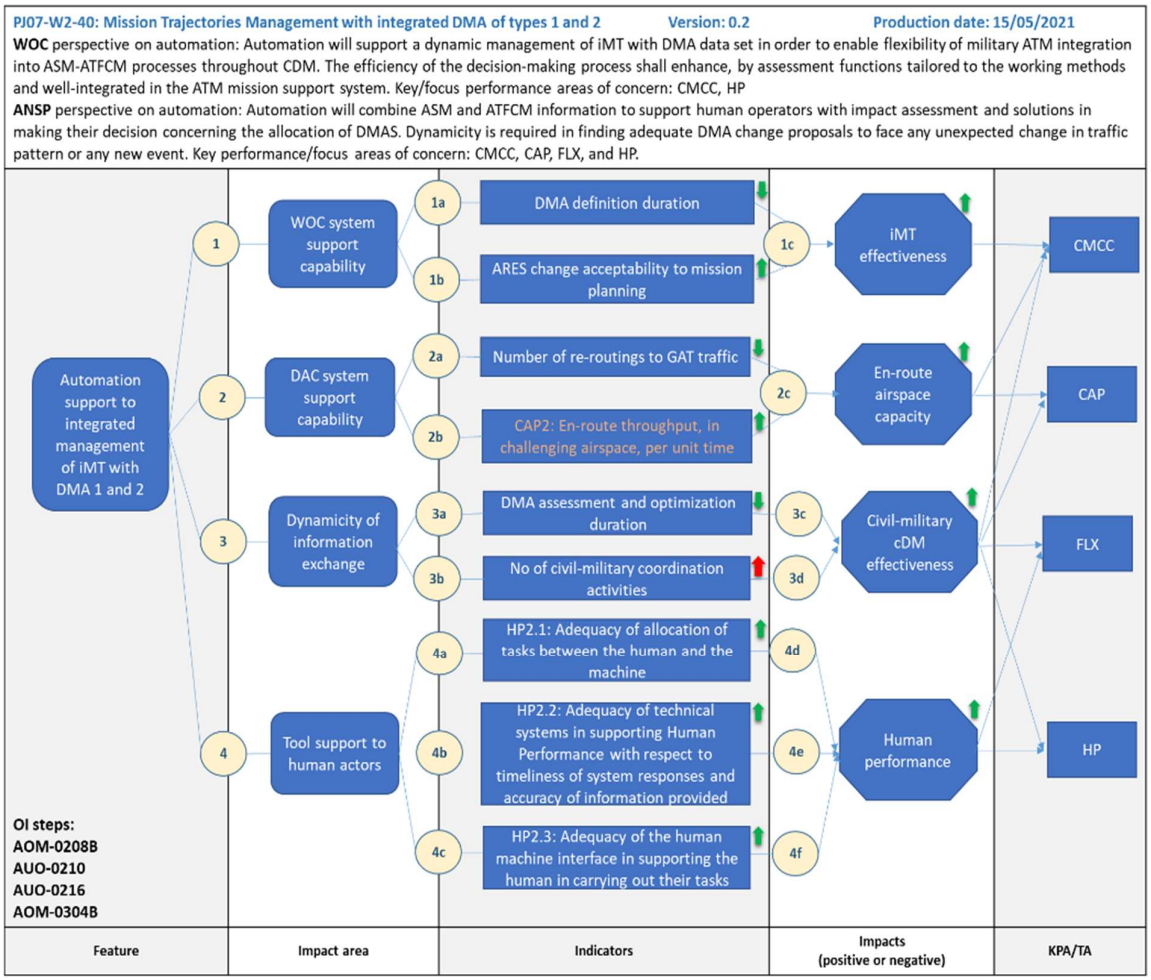
2d	With the re-routings generated by ARES, the number of conflicts between trajectories increases. TTO to iSMT with DMA type 1 and 2 supports a reduction of traffic complexity and reduction of the planned trajectory conflicts.
2e	Less complexity of traffic and the reduction of the planned trajectory conflicts enables planning of ATC and air operations with a positive impact to safety and the flexible use of available capacity (**SAF, FLX**)
2f	With the flexibility provided by DMA type 1 and 2, TTO supports the alleviation of traffic demand on ATC sector load throughout the optimization of traffic demand to cope with the ATC planning capabilities and constraints. ATFCM will have the opportunity to cherry pick the mission trajectories for which TTO generates a reduction of ATC sector overload.
2g	Reduction of ATC sector overload supports configurations without increasing the number of sectors (reducing workload imbalance), thus ATCO numbers, which will allow "not to overreact" to the situation and to manage the demand with minimal operational cost (**CEF**)

A.2.4 Joint WOC-ANSP benefit mechanisms



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1	**Change 1 description**: A DMA definition tool is available in WOC, providing automation support to ARES/DMA definition and display based on the ATM parameters set by mission planner in the iMT data set as well as an impact assessment capability for the ATM changes proposed to ARES/DMA.
1a	The time required for the identification of a suited airspace for reservation/segregation to mission purposes is reduced thanks to the automation of ARES definition.
1b	The flexible parameters integrated into ARES/DMA definition tool enables more options for changing the location of ARES in space (horizontal and vertical) and time while maintaining the mission parameters within operational acceptable limits.
1c	The timely provision of ARES/DMA definition and optimization enhances the capability of the ATM support system to enable dynamic identification of airspace for mission purposes including for short-notice requests/changes to mission planning (**CMCC**).
2	**Change 2 description**: The ASM/DAC tool provides new and more accurate outputs and information to managers related to the performance of the DMAs allocation. An Optimiser Tool will support assessments on the impact of a new DMA position (location, altitude, time) on the performance of traffic demand accommodation. A 'what-If' functionality will enable rapid assessment of DMA impact and rapid sharing of assessment results between CDM actors.
2a	The 'what-If' functionality of the ASM/DAC tool delivers options to place the DMAs in a location (horizontal vertical, time) where the civil traffic will be less affected leading to the possibility of more direct routes planning/less re-routings
2b	The What-If functionality will enable rapid assessment of different airspace configurations options and elements, including Network and local impact assessment, identification of optimum configurations and rapid sharing of assessment results between CDM actors. The flexibility and dynamicity of DMA location identified automatically by the tool enables the accommodation of a higher No. of flights within the area of responsibility of ANSP
2c	A reduced number of re-routings combine with a higher number of flights accommodated in the ANSP area of responsibility provide indication on the raise of opportunities to improve capacity to accommodate operational efficiency of flights (**CMCC, CAP**) *Note: The optimization algorithm minimises the parameters taking into account the weights and the priorities assigned by the user. Due to the mathematical constraints of optimization algorithm, it is not possible to optimize all the metrics at the same time; while some indicators are increased, other metrics can be decreased or remain unchanged: e.g. in some cases, the user prefers to increase the operational efficiency of flights while keeping/reducing the number of flights within the area of responsibility.*
3	**Change 3 description**: An integrated trajectory-DMAs data set is defined by WOC mission support system, dynamically updated and automatically shared amongst authorized functions
3a	Automated calculation of optimized DMA position reduces the time needed to assess the impact of DMA on performance targets and consequently to identify the required adaptation of parameters. It supports the operator to change in real time: the position, flight band and time of activation best suited to enhance the performance outputs of DMA.
3b	Automation support to ASM/DAC tool reduces also the time necessary to negotiate with the DMA "owner" the change proposals thanks to the automated modification of DMA parameters in the DMA data set shared with WOC.
3c	Reduction of the time necessary for CDM enables a raise in the number of coordinations per time unit, which could increase the operator workload without a proper tool support. However, any planned change coming from both civil and military actors is evaluated, its impact on the traffic flow management is assessed and new solutions are identified to accommodate changes in short time. Thus, the outcome of CDM is enhanced by a timely identification of a suitable solution to a higher number of ARES/DMA optimization needs. More ARES/DMA optimized enables more airspace available to flight planning in the
3d	

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	area of ANSP responsibility (CAP) with the possibility of more direct routes and optimized re-routings (**CAP**)
4	**Change 4 description**: The final decision remains ultimately with the human but automation further reduces human load, by reducing the options to be assessed for optimization to those best performance suited ones based on parameters previously set by the Human Actor.
4a	Tool support for the definition and or optimization of DMA enables the operator to define priorities and/or constraints that are fully considered by the algorithms used for computing solutions. It supports the operator to change in real time: the position, flight band and time of activation best suited to enhance the performance outputs of DMA (**HP, FLX**)
4b	Automated calculation of optimized DMA position reduces the time needed by the operator to identify the required adaptation of parameters. It supports the operator to change in real time: the position, flight band and time of activation best suited to enhance the performance outputs of DMA to both of situations: support to mission planning and support to traffic demand accommodation (**HP**)
4c	The user information requirements are satisfied and the design of output devices is compliant with operator needs (**HP**)
4d **4e** **4f**	An effective tool and automation support to mission planners and ATM managers, concerning • Timely and reliable options for decision-making • Dynamic update and visualisation of situation • A friendly-user interface Ensures optimal conditions to effective collaborative decision-making. Effective CDM on DMA allocation means a balanced and practicable result to both mission planning effectiveness (**CMCC, FLX**) and accommodation of traffic demand by ANSP (**CAP**).

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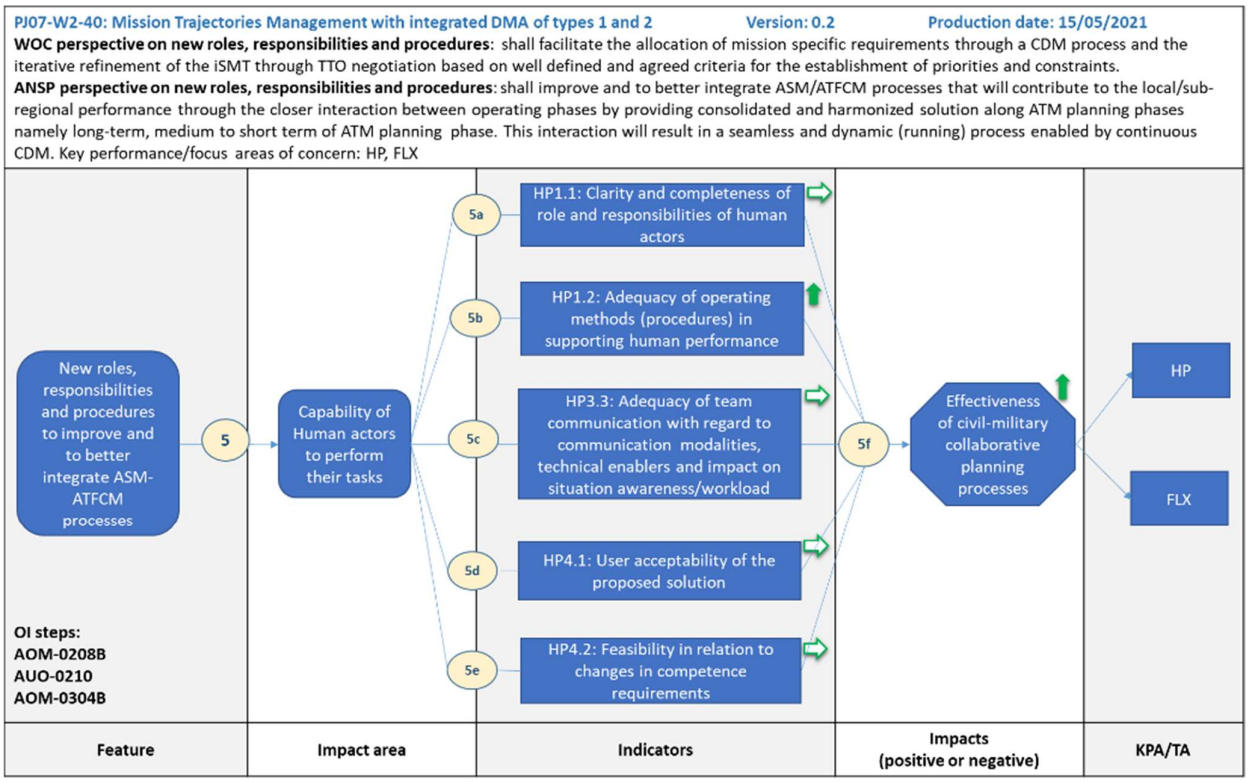

5	**Change 5 description**: The integration of definition and management of iMT with DMA types 1 and 2 that were addressed so far in different SESAR solutions entail additional roles, responsibilities and procedures to the actors in WOC and the ASM/DAC functions. ASM and ATFCM will be performed by a joint civil-military function integrated in different systems at local, sub-regional levels in a CDM mode. The aim is to maintain the capability of human actors to fulfil their tasks, while improving and better integrating ASM-ATFCM processes throughout CDM in supporting both a dynamic configuration of airspace and effectiveness of military mission planning.
5a	The implementation of the solution requires well-defined rules and competencies for engagement in collaborative processes as well as detailed procedures that needs to be clearly acknowledged by each human actor.
5b	The procedures associated to the new operating methods shall enable the human actors to execute their tasks within the limits of required performance.
5c	The communication amongst team members shall enable enhancement of situation awareness and the identification of predictive measures to solve issues.
5d	The solution to be implemented shall be well understood and accepted by the human actors.
5e	Any change in actor competence requirements shall follow an analysis of the impact on the capability of the actor to fulfil the new requirements with the available rules and technical support.
5f	Civil-Military Cooperation & Coordination is improved because the Military are now involved in the negotiation for airspace configuration processes. The fully integrated Airspace negotiation process increases the possibility

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	to use ARES volumes at short notice so the main reason for double booking or extended booking time of ARES for military training will be eliminated and the airspace will not be blocked from civil planning and use (**FLX**) Moreover, several scenarios can be evaluated together with Military actor and with the support of What-If Tool. It will be easier to identify solutions that do not affect the Mission Effectiveness (**HP**) Finally, any change request to planning, coming from both civil and military actors is evaluated, its impact is assessed and new solutions are identified to accommodate the changes (if possible) in short time (**FLX, HP**)

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