Civil-Military Coordination
Summary of contribution to SESAR Programme in 2019
Edition 1.0 - January 2020
## Abstract

The military contribution to SESAR projects and activities is an important activity of DECMA/CMC Division portfolio and in particular of MEPS experts participating in the EUROCONTROL working arrangements. MEPS and the military community experts concerned with SESAR 2020 Programme, will find in the document the summary of CMC experts contributions to the respective SESAR projects/solutions provided during 2019.

### Keywords

- Deployment
- SESAR
- R&D
- ATM Master Plan
- MEPS
- Summary
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EXECUTIVE SUMMARY

The military contribution to SESAR projects and activities is an important activity of DECMA/CMC Division portfolio. This activity is performed in coordination with the military community and in particular with MEPS experts participating in the EUROCONTROL working arrangements.

Civil-military coordination has to be considered transversal activity throughout the SESAR Programme. This peculiarity is reflected in the ATM Master Plan (ATM MP), European ATM Architecture (EATMA) and its key elements such as ambitions, objectives and needs, regulatory and standardisation roadmap, business case and risk management. These key elements are the pillars on which the future ATM system will need to be built with the participation of the entire ATM civil/military community.

The military community concurs with the SESAR Programme bearing in mind the notions of Operational improvements, interoperability, information sharing, Collaborative Decision Making, performance equivalence, planning, modelling and architecting, as reference guidelines for the participation in the SESAR projects and activities. The outcomes ranging from leading the development of studies, developing and contributing to operational concept, technical specifications, requirements collections and validation activities, to amending Operational Improvements and those necessary changes (Enablers) according to their levels of maturity. More generally all this activity impact the evolution of the European ATM Architecture (EATMA) as represented by the ATM Master Plan different roadmaps.

MEPS and the military community experts concerned with SESAR 2020 Programme will find in the document the summary of CMC expert’s contributions to the respective SESAR projects/solutions provided during 2019.

The summary is intended to maintain a stable and efficient exchange awareness of information amongst civil and military stakeholders on the modernisation of ATM systems connected with the European network.
1. INTRODUCTION

The military community is fully committed and integrated in the SESAR programme processes because of the different roles and responsibilities played in ATM. These roles are ANSPs (either for OAT or GAT), Airspace Users, Regulators, and Airport Operators.

In that perspective, the civil-military coordination has to be considered transversal throughout the SESAR initiative. This peculiarity is reflected in the ATM Master Plan (ATM MP), European ATM Architecture (EATMA) and its key elements such as performance, objectives and needs, regulatory and standardisation roadmap, business case and risk management. These key elements are the pillars on which the future ATM system will need to be built with the participation of the entire ATM civil/military community.

The military community concurs with this initiative bearing in mind the notions of interoperability, information sharing, Collaborative Decision Making, performance equivalence, planning, modelling and architecting, as reference guidelines for the participation in those SESAR projects and activities. The outcomes ranging from leading the development of studies, developing and/or contributing to technical specifications, requirements collections and validation activities, to amending Operational Improvements and those necessary changes (Enablers) according to their levels of maturity. More generally all this activity impact the European ATM Architecture (EATMA) evolution as represented by the ATM Master Plan roadmaps.

This is a continuous process requiring monitoring of change requests and interaction between stakeholders.

1.1 Purpose

The military contribution to SESAR projects and activities is an important activity of DECMA/CMC Division portfolio. This activity is performed in coordination with the military community and in particular with MEPS experts participating in the EUROCONTROL working arrangements.

MEPS and the military community experts concerned with SESAR 2020 Programme will find in the document the summary of CMC expert’s contributions to the respective SESAR projects/solutions provided during 2019.

1.2 Objectives

The summary is intended to maintain a stable and efficient exchange of information amongst the military, on the modernisation of ATM systems connected with the European network.
2. CLARIFYING KEY NOTIONS

This section aims to highlighting those relevant information on the European ATM Master Plan, its structural levels, the European ATM Architecture and the European ATM Portal. It includes also a small explanation of the SESAR Solutions lifecycle and link with maturity status.

2.1 European ATM Master Plan (ATM MP)

The European ATM MP is the agreed strategic roadmap that delivers ATM research and development into deployment. It is the key instrument for prioritisation of the SESAR R&D and deployment activities and provides the basis for timely, coordinated and synchronised deployment of new ATM functionalities. The ATM MP framework is composed of sets of information, structured around three distinct but interlinked levels built on a pre-defined set of linked elements of information (not encompassing the modelled contextual aspect of the changes), captured in a database. The biannual, updated versions of this database is called Data Sets. The term Integrated Roadmap is used only for a sub-set of the Data Set covering Operational Improvement Steps and Enablers only.

Level 1 (L1) and Level 3 (L3) – are delivered as documents for formal Stakeholders approval.

ATM MP L1 is the document updated by the Master Planning Group, normally every three years, set up in conjunction with the ATM MP Campaign. It involves European ATM stakeholders and endorsed by the Council of the European Union. The MP document outlines the SESAR Vision and the associated Performance Ambitions; priorities (Essential Operational Changes); the deployment roadmap (how and when the SESAR solutions can be deployed; impact assessment (potential benefits and investments needs); and the main risks and mitigating actions associated with the execution of the European ATM Master Plan.

L1 intends to be used for strategic long–term planning by the policymaking bodies and stakeholders at executive level. It is also known as Executive View. The content of the ATM MP document is available for download and/or consultation in digital form on eATM Portal (public and working) in the Executive overview section of the website.

ATM MP L2 provides a detailed outlook of SESAR development activities to achieve SESAR Vision. It encompasses the following information:

➤ definition and description of SESAR Solutions and indication of their current and forecasted E-OCVM/TRL\(^1\) maturity status;
➤ detailed description of the changes in the operational/business concept;
➤ stakeholder relationships that are subject to validation in specific Operating Environment within the R&D scope;
➤ expected performance benefits;
➤ changes to technical and infrastructure systems, services, human competences and institutional aspects to be synchronously implemented to realise the operational required performance.

L2 intends to be used for:

➤ Providing further contextual details on individual changes supporting the outline evolution of the European ATM architecture.
➤ Providing further details on dependencies between individual changes supporting the outline evolution of the European ATM architecture that needs to be implemented collectively or in a predefined and coordinated sequence.
➤ Providing an outlook of the progress of R&D activities and their maturity status.
➤ Providing details of the composition of the Deployment Scenarios that underpin the ATM MP L1 roadmaps.

Currently this is known as Architecture & Planning view and is available for consultation in the Research and Deployment View section of the eATM Portal (public – reduced information and working – full details).

\(^1\) See section 2.4 for detail on the SESAR Solution Lifecycle
**ATM MP L3** provides a detailed planning view of SESAR deployment activities that take place within the goal of implementing SESAR Vision. It describes ‘Implementation Objectives’, each one of them grouping different ‘Lines of Action’ for the main categories of ATM Stakeholders responsible for deployment of SESAR Solutions that have reached E-OCVM V3/TRL 6. These solutions are deployed as Common Projects.

L3 content is represented in two main documents: Implementation plan and Implementation report and is available for consultation in the Deployment View section of the eATM Portal (public and working).

L3 intends to be used for the continuous 5 to 10 years stakeholder planning term by ATM stakeholders’ organisations and for monitoring the progress of their implementation. It is also known as the Implementation View. It is important to note that the Implementation view documents are further decomposed into Strategic, Deployment and Engineering views.

**2.2 European ATM Architecture (EATMA)**

**EATMA framework** is an enterprise architecture framework composed of a structure (also called meta model or information model), development method, data change management process, working arrangements and the architecture repository toolset which captures the content for populating the structure.

The purpose of EATMA framework is to support decision making to:

- optimise research and development undertaken by SESAR 2020 Solution Projects to ensure that effort is focused on developing the concepts and tools necessary within an integrated environment, to meet the needs of future European ATM, and to
- optimise planning of the industrialisation and deployment of these concepts and technologies to ensure that they provide improvements in ATM performance against the targets set by the European Commission thus supporting the development of a robust and realisable ATM Master Plan.
EATMA framework is fully described in a single formal document, updated annually in the context of S2020: EATMA Guidance Material document.

Presently, the EATMA structure compiles information for performance, operational, system and human resources and service elements to define individual ATM solutions and to provide integrated views of the future ATM system. The content populating the EATMA structure is modelled by the S2020 Solutions in a central architecture repository and is accessible to all relevant partners.

**2.3 European ATM Portal**

The role of the European ATM Portal (www.eatmportal.eu) is to visualise different ATM MP Levels content in a user-friendly way, fit for the needs of distinct ATM stakeholders groups or roles (in the form of different web page Viewpoints).

The three levels of the European ATM MP are represented in separate web site sections, showing relevant pre-filtered subset of EATMA content, enhanced with different monitoring map tools and analysis pages.

Two versions of the portal are maintained: public and working. The working version is restricted in access and provides the full information of the EATMA and Implementation Objectives repositories. It is updated weekly. The public portal is updated following the updates of the European ATM MP L1 and L3. It provides reduced EATMA content information.
2.4 SESAR Solutions Lifecycle

The whole SESAR Solutions development lifecycle aims to structure and perform work at project level and progressively increase SESAR Solution maturity, with the final objective of delivering a SESAR Solution packages for industrialisation and deployment.

SESAR maturity criteria to be applied to assess the maturity status of the SESAR Solutions are based on European – Operational Concept Validation Methodology (E-OCVM) version 3.0 and Technology Readiness Levels (TRL) provided by Horizon 2020, adapted to SESAR 2020 programme.

Exemples of other key ATM system development activities

- Requirement development
- Concept development
- Technical development and Verification
- Integration
The maturity criteria address **E-OCVM levels V1, V2 and V3** for SESAR ATM Solutions and **TRL levels TRL2, TRL4 and TRL6** for SESAR Technological Solutions.

**Gates and phases of the SESAR Solution Development Lifecycle**
3. CONTENT OF THE CONTRIBUTION

3.1 Summary

The experts of CMC division together with state military representatives MEPS, contributed to the respective SESAR solutions and transversal activities of SESAR 2020 Wave 1.

The following topics were addressed in the SESAR Solutions:

➤ Dynamic Mobiles Areas in the context of advanced airspace management and dynamic airspace configuration (DAC) to support AFUA;
➤ Mission Trajectory driven processes in the context of Airspace Users Operations (to better integrate military IFR operations into the ATM network operations through iOAT FPL);
➤ SWIM green profile improving civil/military interoperability of ground systems;
➤ CNS solutions optimizing the reuse of existing military capabilities and reducing the need for exemptions.

Each of the above-mentioned topics has reached a certain level of maturity during SESAR 1 and further improvements are expected for SESAR 2020. An initial deployment is identified in the SDM Deployment programme within the ATM functionality AF 1: Extended AMAN and PBN in high density TMA; AF 3 Flexible Airspace Management and Free Route and AF 4: Network Collaborative Management (Flow & NOP).

During 2019 most tasks addressing civil/military issues are performed on mission trajectory. The operational model was modelled to cover V3 of the OSED developed and validated by Pj.07-03 contributors. Architecture elements to support the mission trajectory driven processes were updated to represent different use cases during the mission trajectory lifecycle (See Appendix B Modelling for more details).

After Pj.07-03/PJ.18-01 Maturity Gate the OI Steps Wave 2 have been de-allocated. Further work has been done by PJ18.01 and PJ.07-03 to link elements of the system and the operational architectures.

One of the most important achievement was validated prototype of improved OAT FPL properly processed in IFPS and distributed to the ATM actors concerned (ATS, AD, NM, etc) for further use in their systems. It proved that military demand can be shared between relevant stakeholders in a harmonised way through advanced technological solutions.

SESAR V3 edition of the Operational Service and Environment Definition (OSED) addressing the processes for Mission Trajectory management was developed. Based on operational use cases, an operational architecture was developed by modelling operational nodes and activities. The technical related aspects was addressed by the SESAR V3 edition of the Technical Specification/Interface Requirements Specification (TS/IRS) on Mission Trajectory management.

In case of Transversal Projects the effort focused mainly on content integration and master planning tasks. More details on both Solution and Transversal projects are provided in the next sections.

3.2 Transversal Projects

These projects ensure the strategic steering of SESAR as a whole in line with Policy priorities and consolidating the results produced by SESAR Solution projects (to strengthen top-down view and ensure coherence and consistency of results).

The focus of the transversal projects is to coordinate and integrate operational and technological solution content (architecture, system engineering) and as such support and guide the execution of the transversal processes (e.g. Safety, security assessment, CBA, etc.). This to ensure completeness, consistency and coherency from a holistic perspective and to support Programme execution and solution projects developments for delivering the SESAR Solutions in line with the ATM Master Plan.

In SESAR 2020 there are three transversal projects:

➤ PJ20 Master Plan maintenance
➤ PJ19 Content integration
➤ PJ22 Validation and Demonstration Engineering
3.2.1 Transversal Projects

CMC Division expert's contribution was required to improve the SESAR system engineering data management framework (SE-DMF). The effort was required to overcome several mistakes and shortcomings.

3.2.2 SESAR PJ20 Master Plan Maintenance

3.2.2.1 sWP2.4 Deployment Scenario Activity

CMC Division expert's contributed to deliver the "Master Plan Dates Calculation Process and new attributes definition for Deployment Scenario integration in EATMA - Phase III (10/01/2019)" specification supporting the alignment of level 1 and level 2 of ATM MP and contributing to Architecture Issue 49.

In the context of this sWP some change requests to align Deployment Scenarios and Stakeholder roadmaps between Master Plan Level 2 and Level 1 were developed (see section 3.4).

3.2.2.2 sWP2.3 Data Generation & Coordination

CMC Division expert's contributed to deliver the Standardisation Roadmap 2019 v 0.8.

3.2.3 SESAR PJ19 Content Integration

3.2.3.1 PJ19.2 ATM Operation

CMC Division experts are member of CONOPS 2019 drafting team. Their contribution focused on military aspects of the target ATM concept highlighting military specifics per concept element and contributing to common understanding of the operational characteristics of ATM in the future European airspace.

3.2.3.2 PJ19.3 Systems & Services

CMC Division experts' contributed to:
- review the European ATM Architecture Description Document (several change requests were developed);
- ensure the overall consistency and compatibility of Security Risk Assessments across the whole SESAR programme;
- maintain the Security Risk Assessment methodology and support the properly usage of the methodology within the concerned SESAR solution;
- Develop the security poster for the SESAR Innovation Days event.

3.2.3.3 PJ19.4 Performance Management

CMC Division experts' contribution addressed the development of civil-military performance assessment within SESAR Performance Framework. In this context the main actions were:
- develop the "Military airspace requirements within the SESAR 2020 Performance Framework – initial findings" report;
- ensure that the civil-military aspects of performance assessment are coordinated within concerned projects;
- ensure that the results are aggregated into the "SESAR Performance Assessment and Gap Analysis Report (PAGAR);
- draft the initial study on future military airspace requirements, focusing on the 5th generation of fighter aircraft in Europe.

In the more general context of this SESAR project CMC Division experts’ contributed to:
- review the Security Risk Assessment reports of Solutions PJ.03a.01, 03a.03 and 03a.04
- definition of Cyber-security Performance Indicators
- review and complete Maturity Assessments of Solutions : PJ.07-02, PJ.08-01, PJ.09-01, PJ.09-02, PJ.09-03
- Assess and prepare Gap Analysis Report for Security (PAGAR 2019) for all V1, V2, V3 steps of SESAR Solutions
- Create databases and dashboards to follow the progress of Solutions for the gap analysis
- Coordinate between projects on (cyber) security activities.

3.2.3.4 PJ19.5 Support & Evolution of Content Integration Framework

CMC Division experts' contributed to:
- Develop the Architecture Issue 49 (AI 49) document “EATMA framework enhancement with ATM MP L1 and L3 elements”
- Update Architecture Guidance Material to integrate AI 49 changes to EATMA
- Develop the EATMA Meta Model updated according to AI 49
- Develop the White Paper explaining the AI 49 benefits in support of ATM Master Plan next updating campaign and SESAR solutions deployment in general.

The integration of AI 49 changes into EATMA Meta Model will happen during 2020 after the migration of the modelling application. Matter of fact the current version of MEGA version 1.3 is no longer maintained. In addition, more extensive security requirements are coming into force. For these reasons, the MEGA tool needs to be migrated to latest version 2.1.

Architecture Issue 49 - EATMA Framework Enhancement with ATM MP L1 and L3 Deployment information

Purpose of AI 49 is to integrate and align ATM MP L1 and L3 deployment elements into EATMA structure to have one commonly defined and managed framework.

The outcome of this architectural issue is a proposal for an enhanced EATMA framework /meta-model to be considered the common reference information model for both ATM MP and EATMA. The proposal will cover all identified entities, their definitions, attributes and relationships.

It was agreed with Pj19 and Pj20 coordinators and SJU programme management that the work on AI 49 is carried out in two steps:

1. Definition/update of the enhanced EATMA structure (elements, definitions, relationships and dependencies between elements of the same kind).
2. Definition/update of governance and change management processes, the overall architecting and development process and the usage of the new structure (i.e. support of Use Cases and methodologies defined by SJU, by Pj19, Pj20 and by the Solutions).

First step being performed and completed in timeframe of S2020 W1. It is captures by the present document and the main outcome will be reflected in EATMA Guidance document (2019).

Second step will be performed at the start of the S2020 W2 programme as they it affect the S2020 W2 projects and partners and need to be elaborated and reviewed in this context. The rollout will be a subject of agreement between Pj19/Pj20 and SJU. The outcome of the second step will be reflected in EATMA Guidance document (2020).
3.3 Solution Projects

These projects deliver one or more SESAR Solutions. A solution project can be an enabling project delivering a Technological Solutions or an ATM Solution project delivering an ATM Solutions.

Solution projects assess the performance of their solutions using data obtained from exercises conducted using analytical models, fast-time models, real-time simulations and live trials or from past study and/or expert judgment if no results are yet available.

3.3.1 Pj06 Free Route Operations

CMC Division experts’ contribution mainly addressed the update of the Operational Service and Environment Definition (OSED) document of the solution.

3.3.2 Pj07.03 Mission Trajectory Driven Processes

CMC Division experts' contributed and participated to this project as follow:

➤ leading the development of the Technical Specification and contributing to several related documents namely Validation Plan (VALP), Validation Report (VALR), Cost Benefit Analysis (CBA), Safety Report, Performance Report, Human performance Report, Operational Service and Environment Definition (OSED);
➤ modelling of the OSED and the Technical Specification / Interface Requirement Specification (TS/IRS) in EATMA;
➤ contributing to the deliverables dealing with SWIM-TI Green Profile for G/G Civil Military Information Sharing including the requirements for Security Assessment Report (SRA).

Contribution to the integration of solution Pj18-01A into solution Pj07-03 and consequent remodelling activity to improve the operational and technical solutions diagrams.

These diagrams include information on the impacted nodes (NOV-2), the activities and their interactions (NOV-5), the capability configurations (NSV-1), the functional blocks and the interactions between the functions within these functional blocks (NSV-4). Please refer to Appendix B for more details on these modelling activities.

3.3.3 Pj08.01 – Pj08-02 Dynamic Airspace Configuration supporting Dynamic Mobile Areas

CMC Division experts’ contributed to this project as follow:

➤ integrating military airspace demand throughout A-FUA concept within the Advanced ASM processes of Trajectory-Based Operations;
➤ ensuring the coordination of national military project experts;
➤ developing the study on Moving Hazard Zones (introducing weather information into pre-tactical and tactical ASM planning phases by exploring some methods of quantification of expected weather impact on airspace configurations);
➤ supporting modelling activity .

3.3.4 Pj14.1.1 CNS environment evolution

CMC Division experts’ contributed to:

➤ developing and delivering Civil-Military ATM/CNS Information Exchanges (Parts 1 & 2) report;
➤ review the CNS evolution roadmap and strategy and Performance Based Integrated CNS deliverables.
3.3.5 Pj14-02-01 FCI Terrestrial Data Link

CMC Division experts’ contributed to:
➤ coordinate and contribute to L-band digital aeronautical communication system (LDACS) impact on military systems (notably JTIDS/MIDS Link 16) studies multiple deliverables including technical specifications;
➤ active participation at ICAO PT panel meetings, Multinational Working Group and NATO;
➤ the ongoing work in the framework for Security.

3.3.6 Pj14-02-04 FCI Network Technologies incl. voice solution and military interfacing

CMC Division experts’ contributed to:
➤ assess civil-military Information Exchange Gateway within the FCI (future communication infrastructure) deliverable;
➤ review of multiple deliverables on FCI Network and FCI Functional Requirements Document;
➤ several deliveries on the ongoing work for the Security.

3.3.7 Pj14-03-01 Ground Based Augmentation System - GBAS

CMC Division experts’ contributed to:
➤ assess “GBAS solutions towards a military precision approach and landing system strategy” deliverables;
➤ review of multiple deliverables on GBAS.

3.3.8 Pj14-03-02 Multi Constellation / Multi Frequency (MC/MF) GNSS

CMC Division experts’ contributed to:
➤ assess potential use of DFMC GNSS solutions for State aircraft operations;
➤ review of multiple deliverables on MCMF GNSS

3.3.9 Pj14-03-04 Alternative Position, Navigation and Timing

CMC Division experts’ contributed to:
➤ develop civil-military navigation interoperability deliverable: suitability of inertial systems on State aircraft to sustain emerging navigation requirements;
➤ review of multiple deliverables on A-PNT.

3.3.10 Pj14-04-01 Surveillance Performance Monitoring

CMC Division experts’ contributed to and review the Technical Specification and Validation plan

3.3.11 Pj14-04-03 (New use and evolution of Cooperative and Non-Cooperative Surveillance)

CMC Division experts’ contributed to and review Multi Tower Remote Surveillance and Secured Surveillance Systems studies.

3.3.12 Pj17-03 SWIM-TI Green Profile for G/G Civil Military Information Sharing

CMC Division experts’ contributed to ensure adequate technical consistency with military requirements. In particular:
➤ supporting the consultation, performing the civil-military coordination, resource aspects and technical steering;
3.4 Summary of OI Steps addressed by Change Requests

This section lists the Operational Improvements Steps and their Enablers highly impacting military operations and modified during the ATM Master Plan Data Set 18 campaign (see Appendix A for more details about these changes).

**AOM-0208-B - Dynamic Mobile Areas (DMA) of types 1 and 2**
This OI Step has been associated to Wave 2 and disconnected from Wave 1 solutions. [change request CR03608]

**AOM-0303 - Pan-European OAT Transit Service**
During the modelling of the operational architecture, the OI step AOM-0303 has been linked to activities as architectural elements modelling use cases in activity diagrams [change request CR02419].

**AOM-0304-A - Mission Trajectories in Step 1**
Following the review of the architecture of Pj-07-03 (NOV-2 and NOV-5’s), the list of activities linked to the OI Steps needs to be updated. Changes are:

- Create/Update iSMT
- Provide
- Enrich ASM Support (Regional)
- Provide ASM Support (AMC)
- Submit iSMT Demand Forecast with Incoming iSBT/iSMT
  [change request CR03562]

**AOM-0304-B - Integrated management of Mission Trajectory in trajectory based operations environment**
This OI Step AOM-0304-B is in the scope of Wave 2. Consequently the activity ‘Create/Update iSMT’ is to be linked to AOM-0304-A instead of AOM-0304-B. [change request CR03561]

**AOM-0805 - Collaborative Airspace Configuration**
This OI Step has been associated to W2 and disconnected from W1 solutions. [change request CR03611]

**AOM-0809-A - Initial Sector Design and Configurations Unconstrained by Predetermined Boundaries**
This OI Step has been associated to W2 solution and disconnected from W1 solution. [change request CR03612]

**AUO-0210 - Participation in CDM through iSMT and Target Time (TTO) negotiation**
During the modelling of the operational architecture, the OI step AUO-0210 has been linked to activities as architectural elements modelling use cases in activity diagrams. [change request CR02421]

**AUO-0211 - WOC Management of iRMT via improved OAT FPL**
Following the review of the architecture of Pj-07-03 (NOV-2 and NOV-5’s), the list of activities linked to the OI Steps needs to be updated. Changes are:

- Assess Mission Impact
- Assess Impact on Mission
- Promulgate iRMT
- Return To Base
- Publish IRMT in the NOP
- Validate iSMT

Deleted activity:
- Reception of improved OAT Flight Plan Information
  [change request CR03560]
AUO-0215 - Sharing iSMT through improved OAT flight plan  
During the modelling of the operational architecture, the OI step AUO-0215 has been linked to activities as architectural elements modelling use cases in activity diagrams. [change request CR02422]

AUO-0228 - Agreed iRMT  
During the modelling of the operational architecture, the OI step AUO-0215 has been linked to activities as architectural elements modelling use cases in activity diagrams. [change request CR02420]

CM-0102-B - Dynamic Airspace Management based on complexity  
This OI Step has been associated to W2 and disconnected from W1 solutions. [change request CR03613]
APPENDIX A CHANGE REQUESTS

This paragraph highlights the Operational Improvements and those Enablers which have been subject to modification during the DS18 campaign having a high impact on military operations.

To facilitate the reading, the following are the elements through which each change request for the OI Step and the enablers is described:

<table>
<thead>
<tr>
<th>Change Rationale:</th>
<th>What has been changed and the reasons for change.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status:</td>
<td>At which level of update the CR is at end of DS18.</td>
</tr>
<tr>
<td>Impacted Solution:</td>
<td>The identifier and title of existing Solution impacted by the change request.</td>
</tr>
<tr>
<td>Impacted OI Step:</td>
<td>The identifier and title of existing OI Step impacted by the change request.</td>
</tr>
<tr>
<td>Impacted Enabler:</td>
<td>The identifier and title of existing enabler impacted by the change request.</td>
</tr>
<tr>
<td>OI Step Description:</td>
<td>New or existing impacted enabler.</td>
</tr>
<tr>
<td>Solution Description:</td>
<td>The impacted solution.</td>
</tr>
<tr>
<td>Enabler Description:</td>
<td>The new or existing impacted enabler.</td>
</tr>
<tr>
<td>Enabler Maturity Level:</td>
<td>Level of maturity achieved by a SESAR Solution. These levels are in accordance with the maturity phases (V-levels) of the European operational concept validation methodology (E-OCVM). These levels are mapped to the technology readiness levels scheme (TRL), details of which can be found in section 2.4.</td>
</tr>
<tr>
<td>Enabler Dates:</td>
<td>V3 End: The end date of the V3 phase: Pre-Industrial Development &amp; Integration IOC: Initial Operational Capability Date.</td>
</tr>
<tr>
<td>Impact Analysis for Military</td>
<td>Impact of the Change Request on Military.</td>
</tr>
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</table>
### OI Steps

<table>
<thead>
<tr>
<th>CR 02419</th>
<th>Update AOM-303 - Links to PJ07-03 activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Change Rationale:</strong></td>
<td>NOV-2 and NOV-5 diagrams have been created (PJ07-03 modelling). Mapping between OI Steps needs to be created.</td>
</tr>
<tr>
<td><strong>Status:</strong></td>
<td>The Change Request has been in preparation.</td>
</tr>
<tr>
<td><strong>Impacted OI Step:</strong></td>
<td>AOM-0303 Pan-European OAT Transit Service.</td>
</tr>
<tr>
<td><strong>OI Step Description:</strong></td>
<td>A pan-European OAT-IFR Transit Service (OATT5) is in place, which connects national structures and delivers a flexible service facilitating OAT-IFR flights across Europe. OATT5 provides timely and flexible availability of adequate routing and services to military mission for short transit into military training/exercise areas, and long-haul transit across States. Additionally, pre-defined scenarios are available to facilitate increased military OAT transit demands in the event of large-scale military operations and exercises (ATM Contingency Plans).</td>
</tr>
<tr>
<td><strong>OI Step Maturity Level:</strong></td>
<td>V2</td>
</tr>
<tr>
<td><strong>OI Step Dates:</strong></td>
<td>V3 - End: 31/12/2020</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CR 02420</th>
<th>Update AUO-0228 - Links to PJ07-03 activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Change Rationale:</strong></td>
<td>NOV-2 and NOV-5 diagrams have been created (PJ07-03 modelling). Mapping between OI Steps needs to be created.</td>
</tr>
<tr>
<td><strong>Status:</strong></td>
<td>The Change Request has been initialised.</td>
</tr>
<tr>
<td><strong>Impacted OI Step:</strong></td>
<td>AUO-0228 Agreed iRMT.</td>
</tr>
<tr>
<td><strong>OI Step Description:</strong></td>
<td>The iRMT will be the partial implementation of the MT, which is the reference used by all ATM partners during the flight execution for flights using ARES airspaces. The management of iRMT (improved OAT FPL) will address in particular the exchange of improved OAT flight plan to ATC.</td>
</tr>
<tr>
<td><strong>OI Step Maturity Level:</strong></td>
<td>V2</td>
</tr>
<tr>
<td><strong>OI Step Dates:</strong></td>
<td>V3 - End: 31/12/2020</td>
</tr>
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### CR 02421

**Update AUO-0210 - Links to PJ07-03 activities**

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</thead>
<tbody>
<tr>
<td>Status:</td>
<td>The Change Request has been initialised.</td>
</tr>
<tr>
<td>Impacted OI Step:</td>
<td>AUO-0210 Participation in CDM through iSMT and Target Time (TTO) negotiation.</td>
</tr>
<tr>
<td>OI Step Description:</td>
<td>Data describing iMT profile will be shared via the improved OAT Flight Plan in the medium/short term planning phase as a representation of iSMT. The data included in the iSMT will contain ATM related information specific to mission objectives. The iSMT will be progressively refined as time moves towards the execution phase and latest information affecting the flight becomes available. The sharing of these data may trigger the CDM process in order to balance the specific iMT requirements with the iBT requirements. The iterative negotiation process may result in the identification of a recommended Target Time in order to satisfy the ATM network performance expectations.</td>
</tr>
<tr>
<td>OI Step Maturity Level:</td>
<td>V2</td>
</tr>
<tr>
<td>OI Step Dates:</td>
<td>V3 - End: 31/12/2020</td>
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### CR 02422

**Update AUO-0215 - Links to PJ07-03 activities**

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<tr>
<th>Change Rationale:</th>
<th>NOV-2 and NOV-5 diagrams have been created (PJ07-03 modelling). Mapping between OI Steps needs to be created.</th>
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</thead>
<tbody>
<tr>
<td>Status:</td>
<td>The Change Request has been initialised.</td>
</tr>
<tr>
<td>Impacted OI Step:</td>
<td>AUO-0215 Sharing iSMT through improved OAT flight plan.</td>
</tr>
<tr>
<td>OI Step Description:</td>
<td>The initial data representing the MT (iSMT) will be shared through the ASM process in the medium/short term planning phase, in the form of flight intentions focused on ARES demand. These flight intentions will be progressively refined and enriched with mature information regarding military operational and technical requirements, following a layered collaborative planning process. As the planning process moves closer to the execution phase, the requested ARES will be allocated through the ASM process. The improved OAT flight plan (iOAT FPL) will be filed incorporating data related to the allocated ARES and will be based on latest MET and AIM data plus ATM constraints, if any. iOAT FPL will be shared with NM and will contain trajectory 3D profile and mission specific data (e.g. a unique ARES identifier, STAY information, formation flight details, RPAS elements). Any subsequent changes until transformation in iRMT will follow the flight plan management processes.</td>
</tr>
<tr>
<td>OI Step Maturity Level:</td>
<td>V2</td>
</tr>
<tr>
<td>OI Step Dates:</td>
<td>V3 - End: 31/12/2020</td>
</tr>
</tbody>
</table>
### CR 03560
#### Update AUO-0211 (PJ07-03) - Activities

**Change Rationale:**
Following the review of the architecture of PJ-07-03 (NOV-2 and NOV-5’s), the list of activities linked to the OI Steps needs to be updated.

- **Added activities:**
  - Assess Mission Impact
  - Assess Impact on Mission
  - Promulgate iRMT
  - Return To Base
  - Publish IRMT in the NOP
  - Validate iSMT

- **Deleted activity:**
  - Reception of improved OAT Flight Plan Information

**Status:**
The Change Request has been initialised.

**Impacted OI Step:**
AUO-0211 WOC Management of iRMT via improved OAT FPL.

**OI Step Description:**
The transition between iSMT and iRMT is performed at a certain moment in time defined at the national level, beyond which any additional negotiation process may jeopardise the accomplishment of the mission. iRMT will be published in NOP and will contain the 3D profile, ATM specific data, agreed upon CDM target times and associated tolerances. WOC may revise the IRMT in the execution phase through the management of the improved OAT FPL.

**OI Step Maturity Level:**
V2

**OI Step Dates:**
V3 - End: 31/12/2020

### CR 03561
#### Update AOM-0304-B Delete link to activity (PJ07-03)

**Change Rationale:**
The OI Step AOM-0304-B is in the scope of Wave 2. Consequently the activity ‘Create/Update iSMT’ is to be linked to AOM-0304-A instead of AOM-0304-B.

**Status:**
The Change Request has been initialised.

**Impacted OI Step:**
AOM-0304-B Integrated management of Mission Trajectory in trajectory based operations environment

**OI Step Description:**
In Trajectory based operations (TBO) environment Mission Trajectory will be integrated into ATM network operations through all phases of trajectory lifecycle (SMT/RMT). The MT profile will be described by a 4D dataset and shared with ATM network. In addition to the 4D dataset MT may contain 4D targets ATM constraints and associated tolerances and will be subject to trajectory management processes.

MT profile will be distinct from BT in order to address specific mission requirements e.g. ARES integrated into MT description, trajectory synchronization, formation join up and split up. Providing that ARES is integrated into MT profile it will be described by the 4D dataset, and then shared with ATM network. This data can be extracted from MT description by NM system and used as an input into DCB process. In order to secure the confidentiality aspects of the mission objectives, the 4D dataset describing the trajectory profile within ARES will not be shared.

**OI Step Maturity Level:**
V2

**OI Step Dates:**
V3 - End: 31/12/2020
CR 03562 Update AOM-0304-A activities (PJ07-03)

Change Rationale:
Following the review of the architecture of PJ-07-03 (NOV-2 and NOV-5’s), the list of activities linked to the OI Steps needs to be updated.
- Added activities:
  - Create/Update iSMT
  - Provide ASM Support (Regional)
  - Provide ASM Support (AMC)
  - Submit iSMT
  - Enrich Demand Forecast with Incoming iSBT/iSMT

Status:
The Change Request has been initialised.

Impacted OI Step:
AOM-0304-A Improved and Harmonised OAT Flight Plan.

OI Step Description:
Military activities planned for the long term by military Authorities will be shared with the ATM network. These activities will be further detailed to the level of individual flights for the medium-short term planning phase. An improved and harmonised OAT flight plan will represent the first description of the Mission Trajectory (MT) and will be integrated into the ATM network systems for processing and distribution. Mission Trajectory in Step1 will be the specific representation of the military flights which vary from the requirements for Business Trajectory or when their needs exceed these requirements. Demand for airspace reservation/restriction (ARES) will become an integral part of MT. ASM support tools in conjunction with congruent protocols and procedures will facilitate the automation of the data sharing and Collaborative Decision Making process (CDM) triggered either by Airspace Users or by NM. The negotiation process may result in agreed configuration of the airspace volume along with associated target times over the entry/exit points into ARES (TTO) to improve the Network performance.

For the Mission Trajectories which will use airspace reservations/restrictions (ARES), this specific information will be reflected in the dedicated improved OAT flight plan fields. Description of MT will thus include the unique identification of the airspace volume and associated estimates, e.g. elapsed time in ARES or TTOs agreed upon CDM process. Improved OAT flight plans will be integrated at European network level in the short term planning phase. Typically they will be delivered at the day of operations. Input, validation, acceptance and distribution of the OAT flight plans will be performed through network level services. Once validated in NM system, Shared MT will be published in Network Operations Plan (NOP) and will become the initial Reference Mission Trajectory (iRMT).

OI Step Maturity Level: V2

OI Step Dates: V3 - End: 31/12/2020
<table>
<thead>
<tr>
<th>CR 03608</th>
<th>Update AOM-0208-B (PJ.07-40)</th>
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<tbody>
<tr>
<td>Change Rationale:</td>
<td>To be associated to W2 solution - done;</td>
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<tr>
<td></td>
<td>To be disconnected from W1 solution;</td>
</tr>
<tr>
<td></td>
<td>Scope of the OI to be reviewed, in particular the DMAs description;</td>
</tr>
<tr>
<td></td>
<td>Rationale to be reviewed;</td>
</tr>
<tr>
<td></td>
<td>Maturity and V3 TD to be confirmed;</td>
</tr>
<tr>
<td></td>
<td>Deployment date to be corrected;</td>
</tr>
<tr>
<td></td>
<td>EN ownership to be completed;</td>
</tr>
<tr>
<td>Status:</td>
<td>The Change Request has been initialised.</td>
</tr>
<tr>
<td>Impacted OI Step:</td>
<td>AOM-0208-B Dynamic Mobile Areas (DMA) of types 1 and 2.</td>
</tr>
<tr>
<td>OI Step Description:</td>
<td>Dynamic mobile area (DMA) is an integral part of the MT described by a 4D data set. DMA constitutes a defined volume of airspace that satisfies specific operational requirements from different Airspace Users (AU). There are two types of DMA that have been identified as geographical centric: DMA Type 1 is a volume of airspace of defined dimensions described as an integral part of a MT at flexible geographical locations agreed upon in a CDM process satisfying Airspace Users requirements in terms of a time and/or distance constraint parameters from a reference point as specified by AU (e.g. Aerodrome of Departure). DMA Type 2 is a volume of airspace of defined dimensions described as an integral part of a MT and agreed upon in a CDM process satisfying the Airspace Users requirements. This volume of airspace can be planned and used at any geographical location along the trajectory. The MT profile description will allow extraction of DMA 4D dataset to be used as an input into NM system for DCB and DAC processes. It will facilitate NM to optimise ATM Network configuration while minimising the impact of DMA on the expected traffic.</td>
</tr>
<tr>
<td>OI Step Maturity Level:</td>
<td>V2</td>
</tr>
<tr>
<td>OI Step Dates:</td>
<td>V3 - End: 31/12/2020</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CR 03611</th>
<th>Update AOM-0805 (PJ.09-44)</th>
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</thead>
<tbody>
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<td>Change Rationale:</td>
<td>To be associated to W2 solution - done;</td>
</tr>
<tr>
<td></td>
<td>To be disconnected from W1 solution;</td>
</tr>
<tr>
<td></td>
<td>Maturity, V3 Target Date and Deployment Dates to be confirmed;</td>
</tr>
<tr>
<td></td>
<td>Enabler's link categories to be reviewed;</td>
</tr>
<tr>
<td></td>
<td>Link between OI and EATMA activities to be reviewed (possibly attributed to OI AOM-0208-B).</td>
</tr>
<tr>
<td>Status:</td>
<td>The Change Request has been initialised.</td>
</tr>
<tr>
<td>Impacted OI Step:</td>
<td>AOM-0805 Collaborative Airspace Configuration</td>
</tr>
<tr>
<td>OI Step Description:</td>
<td>Airspace configurations are activated through integrated collaborative decision making processes at national, sub-regional and regional levels. Procedures and system support tools shall be defined to enable to manage the airspace configurations as a continuum to meet the users' expectations.</td>
</tr>
<tr>
<td>OI Step Maturity Level:</td>
<td>V2</td>
</tr>
<tr>
<td>OI Step Dates:</td>
<td>V3 - End: 31/12/2020</td>
</tr>
</tbody>
</table>
CR 03612

**Update AOM-0809-A (PJ.09-44)**

**Cange Rationale:**
To be associated to W2 solution - done;  
To be disconnected from W1 solution;  
Maturity, V3 Target Date and Deployment Dates to be confirmed;  
Enabler’s link categories to be reviewed.

**Status:**  
The Change Request has been initialised.

**Impacted OI Step:**
AOM-0809-A Initial Sector Design and Configurations Unconstrained by Predetermined Boundaries.

**OI Step Description:**
En-route ATC sectors design principles based on dynamic definition and delineation of volumes of airspace vertically and/or horizontally in addition to traditional ATC sectors that enable more flexible and more dynamic approach for airspace configurations from planning to execution phases, which leads to increasing of the Network capability to continuously adapt to demand pattern changes and traffic flows volatility induced by an extensive implementation of free route operations.

**OI Step Maturity Level:**
V2

**OI Step Dates:**
V3 - End: 31/12/2020

CR 03613

**Update CM-0102-B (PJ.09-44)**

**Cange Rationale:**
To be associated to W2 solution - done;  
To be disconnected from W1 solution;  
Description to be reviewed to be more consistent with the OI title  
Maturity, V3 Target Date and Deployment Dates to be confirmed;  
Enabler’s link categories to be reviewed;  
No EATMA activity.

**Status:**  
The Change Request has been initialised.

**Impacted OI Step:**
CM-0102-B Dynamic Airspace Management based on complexity.

**OI Step Description:**
Following CM-0102-A supporting Dynamic Sectorisation for the purpose of workload and complexity optimisation at local level, this improvement relates to the Dynamic of Airspace Configuration in a more global approach through wider areas based on better information sharing. The objective is to manage the airspace as a continuum to meet the users’ expectations. It encompasses Airspace organisations based on combinations of airspace volumes, interfaces between En Route and TMA, Free route airspace structures, management of Variable Profile Areas, DMAs and Cross Border Areas in order to enable the User Preferred Routing concept and resolution of complexity and DCB issues. Dynamic configurations shall accommodate En-Route and TMA ATC environments at all complexity levels and support new operating methods.

Where automated system provides support for the assessment and comparison of different configurations, for the decision making process, taking into account different kind of parameters, and for the monitoring of the implemented solutions, in order to make best use of the available airspace and human resources at any given time.

**OI Step Maturity Level:**
V2

**OI Step Dates:**
V3 - End: 31/12/2020
APPENDIX B  MODELLING

Modelling activity is vital in Architecting. Developing physical model helps an architect to explore the potentials of the project as well as possibilities of having different solutions to stated problems. This appendix lists the EATMA sub views diagrams and architecture elements supporting the mission trajectory driven updated processes with the different use cases of mission trajectory lifecycle.

To see the sub views diagrams it is advised to have a look to SESAR V3 edition of the Operational Service and Environment Definition (OSED) and Technical Specification/Interface Requirements Specification (TS/IRS) on Mission Trajectory management.

Main EATMA elements within the layer they belong to
PJ.07.03 - Mission Trajectory Driven Processes

Nodes

(NOV-2) Optimised Airspace User Operations
There are several reasons for a revision of an iRMT, such as changes of rendezvous times, delays, route changes, changes of ARES entry / exit times or complete ARES changes. The revision of an iRMT can be triggered by several actors at all times the RMT exists. There are two additional operational activity views which improve the operating method, mainly the Mission Trajectory in Short Term and the Mission Trajectory in Execution Phase from SESAR 1.

Activities

(NOV-5) ATC triggered iRMT Revision
The iRMT can be triggered by ATC after departure. This functional process covers the revision needs of ATC for the RMT.

(NOV-5) Flight Deck triggered iRMT Revision
This functional process covers the revision needs of the Flight Deck for the RMT after departure.

Note: The term “Flight Deck” represents the operational node, and the term “Flight Crew” is the human role which performs all the activities on board of the State AU A/C. The Flight Deck activities are only described very rough to provide the complete picture. For more details refer to document package of related SESAR 2020 Solution.

(NOV-5) Mission Trajectory Management in Execution Phase
This section describes the operating method of the Mission Trajectory management in the execution phase based on results from SESAR 1 (see EATMA [4]).

This functional process covers the nominal execution of a MT, which may include an ARES reference, which is executed as stated in the iRMT.

(NOV-5) Mission Trajectory Management in Short Term
This section describes the operating method of the Mission Trajectory management in the short term planning phase based on results from SESAR 1 (see EATMA [4]).

This functional process includes the finalization of the development of the 4D Mission Trajectory, the creation and update, submission, validation and distribution of an iSMT by means of an improved OAT Flight Plan. After all involved stakeholders have agreed to the MT the isMT transitions to the iRMT upon decision of the WOC.

In SESAR 1 a CDM-process between the NM (MILO) and the national AMCs on the impact of the AUP and UUP using the available ASM and Network Impact Assessment tools was introduced. This CDM process is described in detail in the AFUA concept in SESAR 1 documents and not further described in solution PJ.07-03 documentation. The supporting ASM tools may also be used in the future to enrich the available planning data with more detailed mission information.

(NOV-5) WOC triggered iRMT Revision
This section describes the operating method of the Mission Trajectory revision triggered by WOC in the execution phase based on results from SESAR 1 (see EATMA [4]).

This functional process covers all of the revision needs, taking into account the AFUA concept as defined in SESAR 1. The ASM part is described here only to provide the complete picture and will not be detailed furthermore, as the AFUA concept and the related CDM processes are already validated V3 in SESAR 1.

Operational needs may require the WOC to revise an iRMT after departure for several reasons. Subject for changes could be:

➤ iOAT FPL without ARES
  • Change of WP/EET (e.g. time of a Rendezvous, etc.)
  • Change of EOBT (e.g. Delay)
  • Change of Route (e.g. change of ADES, change of WP, etc.)
➤ iOAT FPL with ARES
   • Entry and / or Exit time outside of EAUP/EUUP activation time
   • Change of ARES location (changing from allocated ARES1 to allocated ARES2, both ARES included in EAUP/EUUP)
   • Change of ARES location (changing from allocated ARES1 to not yet allocated ARES2 (ad hoc ARES))
   • Extension of ARES volume

The State AU internal procedures for information exchange of operational / tactical mission data between WOC and State AU A/C is under national control of the State AU and not in the scope of solution PJ.07-03.

Functions

[NSV-4] Provide Surveillance Data from ATC to WOC
This technical Use Case (UC) depicts the concerted functional blocks and functions and its linking resource interactions to cover the technical process exchanging surveillance data from the ATC system to the WOC function as a feedback.

[NSV-4] Revise Trajectory - From ATC to WOC
This technical Use Case (UC) depicts the concerned functional blocks and functions and its linking resource interactions to cover the technical process for the revision of the iRMT during execution phase. It contains the necessary functions to be performed to ensure consistency of data between the ATC system and the WOC system for the WOC to monitor the flight.

[NSV-4] Revise Trajectory - From WOC to ATC
This technical Use Case (UC) depicts the concerted functional blocks and functions and its linking resource interactions to cover the technical process for the revision of an iOAT flight plan during execution phase initiated from the WOC function.

[NSV-4] Process iOAT Flight Plan
[NSV-4] File iOAT Flight Plan from State AU Operations Centre through Regional ATFCM to ER ACC and APP ACC.

This technical Use Case (UC) depicts the concerted functional blocks and functions and its linking resource interactions to cover the technical process from initial flight planning in the WOC function via the Network Manager (NM) to the related ATC systems. It covers the planning phase up to the submission and distribution of the iOAT flight plan.