



### **Contextual note – SESAR Solution description form for deployment planning**

#### **Purpose:**

*This contextual note introduces a SESAR Solution (for which maturity has been assessed as sufficient to support a decision for industrialization) with a summary of the results stemming from R&D activities contributing to deliver it. It provides to any interested reader (external and internal to the SESAR programme) an introduction to the SESAR Solution in terms of scope, main operational and performance benefits, relevant system impacts as well as additional activities to be conducted during the industrialization phase or as part of deployment. This contextual note complements the technical data pack comprising the SESAR deliverables required for further industrialization/deployment.*

*This document reflects the Contextual Note for SESAR Solution PJ.07-03 “Sharing mission trajectory data with NM and ATC via an improved OAT Flight Plan (iOAT FPL)”, which completed V3 (TRL6) in the context of SESAR 2020 activities on Mission Trajectory Driven Processes.*

#### **Improvements in Air Traffic Management (ATM)**

SESAR 2020 PJ.07 addressed the overall mission trajectory concept defining and describing the overall operational Mission Trajectory driven processes with the support of operational experts from the involved stakeholders: the Network Manager and the different State Airspace Users, Military Wing Operation Centres, ANSPs and Airspace Management Cells.

Within the context of the work on this mission trajectory concept, some elements achieved V3/TRL6 and have been documented in solution **PJ.07-03 “Sharing mission trajectory data with NM and ATC via an improved OAT Flight Plan (iOAT FPL)”**, which is described in this contextual note and is focused on the management of the iOAT FPL in the planning phase and its distribution to NM and ATC units.

The scope of solution PJ.07-03 includes the following elements:

- The management of mission trajectory (MT) with variable profile areas (VPA) type of airspace reservations (ARES) as shared via iOAT FPL in the planning phase.
- The ARES conceptual evolution allowing more precise identification of ARES Entry and Exit location and time, to support the increased quality of the trajectory prediction in the corresponding wing operations centre (WOC), network manager (NM) and ATC systems. This includes the evolutions of the VPA module reference as integral part of the evolved iOAT FPL syntax & concept.
- The B2B services for iOAT FPL filing from WOC to NM as well as for the iOAT FPL distribution from NM to ATC. B2B services were as well successfully validated to connect Regional ATFCM (NM) and local ATC FMP systems.

Solution PJ.07-03 “Sharing mission trajectory data with NM and ATC via an improved OAT Flight Plan (iOAT FPL)” is applicable to TMA, En-Route, and Network operating environments (as defined in SESAR’s ATM Master Plan) and represents a key step towards an efficient civil-military cooperation and coordination (contribution to civil/military interoperability KPA). It

also delivers safety and human performance benefits. Other benefits in capacity, punctuality and predictability are expected but were not validated by the exercise focused on the planning phase. The solution.

Note that AFUA aspects and related CDM processes are not in the scope of solution PJ.07-03 as these have been already developed and validated at V3/TRL6 level of maturity in SESAR 1 programme (solution #31) or in SESAR 2020 (solution PJ.07-W2-40).

Since PJ.07 addressed a wider scope, the supporting technical documents contain other elements that are not part of solution PJ.07-03. They are kept since they are necessary to address and fully understand the overall picture and the context for solution **PJ.07-03 “Sharing mission trajectory data with NM and ATC via an improved OAT Flight Plan (iOAT FPL)”**.

### Operational Improvement Steps (OIs) & Enablers

List of applicable OI Steps:

- **AOM-0303:** Pan-European OAT Transit Service
- **AOM-0304-A:** Improved and Harmonised OAT Flight Plan
- **AUO-0215:** Sharing iSMT through improved OAT flight plan.

List of applicable Enablers:

**Required/developed** by SESAR solution PJ.07-03: they represent the core of what solution PJ.07-03 is.

- **AOC-ATM-14:** Upgrade of WOC system to handle improved OAT flight plans.
- **ER APP ATC 143:** Upgrade of ATC System to handle Improved OAT Flight Plan.
- **ER APP ATC 168:** Enable ATC System to manage improved OAT flight plans with inherent ARES information (reservation restrictions) in accordance with VPA design principle.
- **NIMS-35:** Flight Planning management sub-system enhanced to process improved OAT flight plans.
- **MIL-STD-03:** Update of IFPS User Manual to include OAT Specificities in the Flight Plan (Improved OAT flight plan).
- **MIL-STD-04:** Procedure to implement EUROAT rules.

**Required/used** by SESAR solution PJ.07-03: these are considered assumptions /background for the SESAR solution PJ.07-03.

- **AAMS-10a:** Initial airspace management system enhanced with commonly applied GAT/OAT handling (required/use).
- **AIMS-06:** Ground-Ground AIS provision to ASM (required/use).

- **AIMS-19b:** Aeronautical Information system is interfaced to receive and distribute aeronautical information electronically to military systems. Only covered State AU is data user of EAD (static data) (required/used).
- **MIL-0501:** Specifications for the interoperability of military ground systems with SWIM
- **MIL-0502:** Upgrade of military ground systems to allow bi-directional exchanges with non-military IP networks.
- **CTE-C06d:** Gateway for CIV/MIL Interoperability
- **SWIM-INFR-05a:** General SWIM Services infrastructure Support and Connectivity.
- **SWIM-NET-01a:** SWIM Network Point of Presence.

#### Optional/Used by SESAR solution PJ.07-03:

- **AOC-ATM-15:** Upgrade of Wing Ops System Technical Architecture to provide Military Mission Trajectory Services.
- **SWIM-SUPT-01a:** SWIM Supporting Registry Provisions
- **SWIM-SUPT-03a:** SWIM Supporting Security Provisions
- **SWIM-SUPT-05a:** SWIM Supporting IP Network Bridging Provisions

### Background and validation process

This SESAR Solution has been validated through a series of activities including a Real-time Simulation of the main human tasks in the 3 operational nodes ATC, NM and WOC. A Human Performance analysis was conducted for the updated parts of the prototypes as part of the activities. A high-level summary of the validation is presented hereafter:

- Real Time Simulation:
  - Validation of the procedures and processes associated to the management of initial Mission Trajectory in the planning phase between WOC, NM and ATC. The geographical environment consisted of the FIRs Prague and Munich in Czech Republic and Germany. They apply to the sub-operating environments TMA – High complexity and En-Route – High complexity. The connection between ATC and WOC to remote NM applies to the sub-operating environment Network.
  - Assessment of the feasibility of iOAT FPL as a means to exchange flight intents between State Airspace Users, Network Manager, Airspace Manager and ATC.

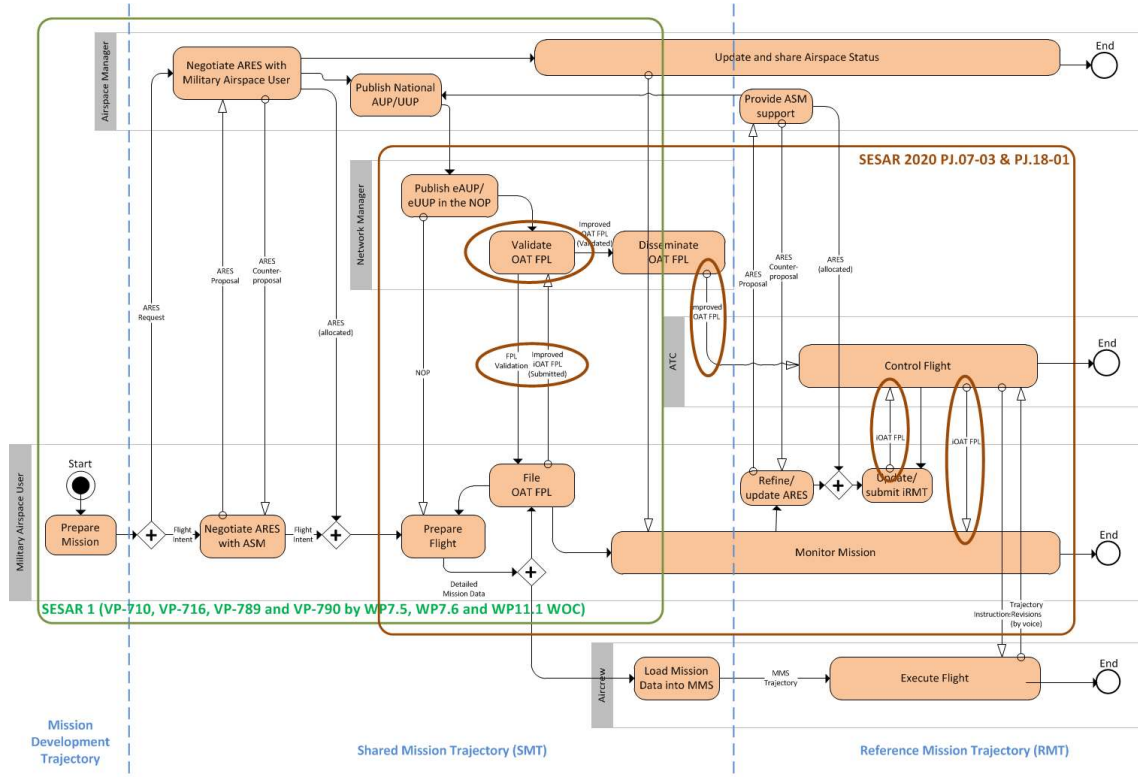


Figure: Activities and data flows related to Mission Trajectory driven Processes<sup>1</sup>

## Results and performance achievements

The solution PJ.07-03 brings a number of beneficial effects to the military AUs, which are listed below:

- Harmonised across ECAC states format of iOAT FPL for military IFR flights in controlled airspace.
- Confidence in harmonised ATS provision across ECAC states to military IFR flights.
- Ability to address military specific requirements for IFR flights operating in controlled airspace (AAR, Formation flights, usage of ARES of different types, RPAS etc.).

<sup>1</sup> Note that these diagrams describe the full scope addressed by PJ.07 in SESAR 2020 Wave 1 on the mission trajectory driven processes.

- Adaptation of ATC and other support services to military needs including reduction of transit time and less congested environment between ADEP and the reserved area, thus improving mission effectiveness while maintaining safety levels.
- Ability to participate in collaborative planning and sharing of the Airspace resource.
- Quick access to the airspace at short notice through enhanced collaboration with all ATM actors.
- Mutual awareness on each other's demand Military/Military and Civil/Military.
- Automated processing of iOAT FPL across military infrastructure.
- Increased predictability in cross-border operations.
- Officially applied and agreed exemption policy for MT/iOAT FPL.
- Facilitation of single or combined RPAS operations.

As for civil GAT flights, beneficial effects can only be expected if military flights would adhere as well largely to the filed flight plan to assure a high level of traffic demand prediction quality.

The use of the proposed exemption mechanism for MT/iOAT FPL has been validated to be technically feasible. As exemptions need to be coordinated before flight plan submission between WOC and ATS, workload to elaborate such exemption request by ANS and operational applicability on a daily base depend on the number of military flights, which would request these exemption mechanisms. If the number remains low, the impact might be neglectable; if these mechanisms are requested more often the impact at ANS might be significant.

The solution brings potential benefits to the overall ATM network:

- Pro-active contribution to the optimisation of the airspace utilisation and improvement of the ATM network performance.
- Automation of human processes through implementation of the harmonised iOAT FPL.
- Enhanced awareness on true military demand.
- Collaborative planning through enhanced co-ordination of civil and military demand as early as possible to reduce workload and co-ordination efforts.
- Reduction of the complexity of the operational environment and thereby, reducing workload of civil and military ATCOs, e.g. less coordination, less crossing requests.
- Contribution at national level to the overall achievement of performance targets and indicators, including Capacity and Environment, while maintaining Mission Effectiveness.

- Flexibility of the entire ATM network with quick response to short term airspace requests.

Since the solution focused on the introduction of the iOAT FPLs into the relevant technical systems, i.e. NM/ETFMS, ATC-FMP/CHMI&TCM, operational benefits of those could not be observed. Potential performance effects on the SESAR KPAs mentioned above could not be measured due to the nature of the exercise, which focussed on the planning phase, where performance benefits can only be measured during execution phase. Furthermore, reliable performance measurements would require a much higher number of iOAT FPLs to have sufficient data for solid statistical result.

**Recommendations and Additional activities**

None.

**Actors impacted by the SESAR Solution**

Within the impacted operational nodes the following operational roles are impacted:

- Sub-Regional/Local Air Traffic Flow and Capacity Management
- En-Route/Approach ATS:
  - ACC/Approach Supervisor, Flight Data Operator, ATC Planning Role, ATC Sector Planning Controller, Complexity Manager, Local Capacity Manager, Multi Sector Planner, ATC Sector Executive Controller, Extended ATC Planner, Local Traffic Manager
- State Airspace User/WOC:
  - AIS Dynamic Data Operator, MET Data Operator, Mission Planner, Flight Data Operator, Mission Observer, Flight Crew

**Impact on Aircraft System**

This solution does not cover any A/C systems aspects. Only Ground-Ground Communication is in the scope of this solution.

**Impact on Ground Systems**

The solution impacts on and requires modifications of the WOC, NM and ATC ground systems.

The aim is to enable these three systems to transmit, receive and process the iOAT FPL. The scope only concerns the planning phase.

These functionalities include the checking of iOAT FPL data for consistency, correctness and security.

**Regulatory Framework Considerations**

See Section “Standardization Framework Considerations”.

### Standardization Framework Considerations

The following standards and regulations are applicable to this SESAR Solution:

- 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 Flight Plan, Volume 1 – OAT FPL Harmonisation, Edition 1.0, 18/08/2016
- EUROCONTROL Guidelines for a harmonised and improved OAT Flight Plan Volume 2 – Improvement requirements for OAT FPL
- Network Manager IFPS User Manual – Edition Number: 21.1; 24/10/2017
- 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
- The EUROAT standard has been proven being a valuable standard supporting harmonisation of military operations and research activities in the civil military aviation environment.

### Solution Technical deliverables

The applicable technical deliverables for this Solution include the following documents:

- SPR-INTEROP/OSED for V3 - PJ07-D4.2.010 Part I. The document contains the safety, performance, interoperability and operational requirements for the Mission Trajectory driven processes.
- SPR-INTEROP/OSED for V3 - PJ07-D4.2.010 Part II. The document contains the Safety Assessment Report.
- SPR-INTEROP/OSED for V3 - PJ07-D4.2.010 Part IV. The document contains the Human Performance Assessment Report.
- SPR-INTEROP/OSED for V3 - PJ07-D4.2.010 Part V. The document contains the Performance Assessment Report.

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- Validation Report for V3 - PJ07-D4.2.030. The document contains the Validation Report of the V3 validation exercise.
- Cost Benefit Analysis for V3 - PJ07-D4.2.040. The document contains the Cost Benefit Analysis.
- Technical Specification (TS/ISR) for V3/TRL-6 - PJ18-D2.1.110. The document contains the technical specification for the technical systems impacted by the solution.