

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.

Improvements in Air Traffic Management (ATM) - High Productivity Controller Team Organisation in En-Route (including eTMA¹) (1PC – 2ECs)

The SESAR Solution PJ.10-01a1 “High Productivity Controller Team Organisation in En-Route (including eTMA)” consists of developing new concepts of operation and identifying the nature of system support required for operating in team structures that are not the usual Planner/Executive (1PC – 1EC) two-person ATC sector team. In particular, the Multi-Sector Planner (MSP) where a Planner Controller has responsibility for the airspace under the executive control of two independent Executive Controllers (1PC – 2ECs).

The SESAR Solution “High Productivity Controller Team Organisation in En-Route (including eTMA)” focused on the typical one Planner Controller to 2 Executive Controllers MSP organization and concentrate on the efficient and safe distribution of tasks for traffic and separation management across the team. The present Contextual Note is focused on the high productivity team organisation in eTMA (lower En Route sectors) as well as in En Route.

Traditionally ATC operations are based on a team composed of two Air Traffic Controllers ensuring each of the role of Planning Controller and Executive Controller.

The role of the MSP can be seen as a "super Planner Controller" whose responsibility it is to plan efficient flight profiles through the Multi Sector Area (MSA) under his control as well as ensuring the efficient distribution of workload across the Executive Controllers. Demand and capacity balancing are considered, but the main objective aims at the tactical provision of separation between aircraft. To this end the MSP will be able to organise traffic in the Multi Sector Area so that workload is balanced between the Executive Controllers in particular also by suppressing coordinations that exist today between the sectors of the MSA as having the role of Planner Controller for all these sectors. .

¹ This contextual note concerns the activities performed in SESAR2020 Wave 1. Therefore as a result from SESAR 1 and SESAR2020 Wave 1, it is considered that the V3 maturity for MSP (1PC to 2ECs) covers the full En Route environment.

This SESAR Solution “High Productivity Controller Team Organisation in En-Route (including eTMA)” developed operating procedures such that the Planning Controller provides support to two Executive Controllers operating in different sectors. Traditional inter-sector coordination procedures are maintained, although the internal boundaries (those between Executives in the same MSP group) will be entirely the responsibility of the MSP and will therefore not require any co-ordination dialogue – the Planner will just set the boundary transfer level (which may be amended by the Executives as necessary). In this configuration, the Planning Controller (MSP) ensures suitable coordination agreements between sectors and assists in managing the workload of the Executive Controllers, thus ensuring that potentially critical traffic situations and the associated workload are manageable.

This solution relies on improved separation management support tools (Conflict Detection and Resolution, Monitoring Aids ...) that were developed in the frame of the solution PJ.10-02a.

This SESAR solution is in the continuity of SESAR1 projects. iMSP (1PC – 2ECs) has been addressed in SESAR1 and the maturity at the end of SESAR1 was V3 (for CM-0301) in En Route airspace. The SESAR solution covers the MSP configuration 1PC – 2ECs in eTMA (CM-0304b) and in En Route (CM-0303a) including an advanced set of controller support tools and in particular intersector/centre coordination tools. Therefore the MSP concept (1PC – 2ECs) in En Route airspace including eTMA airspace is expected to reach V3 maturity in Wave 1.

Operating Environment:

- High/very high/Medium complexity eTMA (lower En-Route sectors) environment
- High/very high/Medium complexity En-Route environment.

The operational environment is suited to support scheduled, non-scheduled, general aviation and training flights. Military flights will be supported as long as they are treated as GAT traffic. Harmonization and integration aspects with local ATFCM processes need to be taken into account.

Operational Improvement Steps (OIs) & Enablers

Operational Improvements

- **CM-0303a** Enhanced Sector Team Operations Adapted to New Responsibilities in En-route, 1 Planning to two Tactical Controllers team structure
- **CM-0304b** Sector Team Operations Adapted to New Responsibilities in the eTMA, 1 Planning to two Tactical Controllers team structure

Applicable Integrated Roadmap Dataset is DS19.

Enablers

- **ER APP ATC 96** ATC System Support to Permit a Single Planner Role Associated to eTMA
- **HUM-006** New staffing configuration/ Multi Sector Planner in TMA/eTMA

In order to fully cover MSP concept (1PC – 2ECs) and in line with the scope adaptation of the solution, a series of Change Requests are in process within the Dataset20 :

- CR 03345 : update CM-0304 to CM-0304a (TMA) and CM-0304b (eTMA) (Split CM-0304 to CM-0304a (TMA) and CM-0304b (eTMA))
- CR 03348 : create CM-0304b as split of CM-0304 to CM-0304a (TMA) and CM-0304b (eTMA) (Split CM-0304 to CM-0304a (TMA) and CM-0304b (eTMA))
- CR 03351 : rename solution PJ.10-01a to PJ.10-01a2 (MSP 1PC – nECs).
- CR 03352 : create solution PJ.10-01a1 (MSP 1PC – 2ECs in eTMA). Link to CM-0304b
- CR 03845 : update the title of Solution PJ.10-01a1
- CR 03846 : create CM-0303a covering MSP (1PC – 2ECs) in En-Route (solution PJ.10-01a1)

Background and validation process

The SESAR Solution “High Productivity Controller Team Organisation” has been validated through a series of activities including a gaming exercise and Real Time Simulation in SESAR 1:

- Gaming exercise:
 1. **EXE-04.07.08-VP-587: conducted by AENA**
 The validation consisted on a table-top game based on Spanish airspace (Barcelona ACC) and included several en-route sectors that were combined into one MSA. This table-top game had the following objectives:
 Assess the role definition and their responsibilities.
 Assess the collaborative processes between controllers (the “Collaborative Control” concept).
 Evaluate whether the tools expected to be made available to the Controllers would provide the necessary support and information.
- Real Time Simulations:
 2. **EXE-04.07.08-VP-304: conducted by NATS :**
 The activity addresses OFA 03.03.04 (Sector Team operations) and Operational Improvement (OI) CM-0301 (Sector Team Operations Adapted to New Roles for Tactical and Planning), and aimed to validate the Multi-Sector Planning (iMSP) concept at the E-OCVM V3 level (pre-industrial development & integration).
 The real time simulation, aimed to validate iMSP (a one Planner to two Executive Controllers team structure based on the NERC-iFACTS concept) at the E-OCVM V3 level (pre-industrial development & integration) in order to demonstrate that the developed concepts and enablers work coherently together and are capable of delivering the required benefits.

In SESAR 2020, The SESAR Solution was validated in Wave 1 through V3 validation activities performed in Q4 2018.

A Real Time simulation in extended TMA has been performed to validate the concept of a Multi Sector Planner coordinating with 2 Executive Controllers

Real Time Simulations have been performed on one platform:

Skyguide platform:

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OIs CM-0304b was validated on the Skyguide "skysim" platform.

Exercises tested different configurations for Multi Sector Planning addressing also high complexity levels in eTMA environment in order to fine tune the optimal operational configuration and measure benefits of the new role.

Results and performance achievements

The main findings from the validation of Solution PJ.10.01a1 can be summarised as follows at V3 maturity level:

- The Multi Sector Planning organisation having one Planner Controller for two Executive Controllers was evaluated as acceptable operationally in the medium/high Complex Extended TMA environment;
- A fuel burn reduction per flight observed in the extended TMA with the introduction of MSP has been measured;
- The flight predictability increased during MSP operations;
- An improvement on cost effectiveness was observed with a reduction of total man-hours of ATCO when the MSP is in operation;
- Good feedbacks were given by the participants to validations (ATCOs) on the Multi Sector Planning concept, notwithstanding the need to update controller support tools and CWP layout in order to ensure safe operations;

Recommendations and Additional activities

The main recommendations for next phase can be summarised as follows:

- The **performance trends** observed in the Zurich ACC environment should be extended to other ACCs in order to better evaluate the full benefit of the solution
- **Roles and responsibilities need also to be clarified** in the target MSP environment. This depends also on local implementation where planning and executive roles could differ.
- It has also to be noted as recommendations that :
 - The configuration of the sectors that have been validated does not cover "layered" sectorisation. This should be further taken into consideration if implementing MSP in such sectors configuration.
 - As in eTMA, CPDLC usage is not mandatory, CPDLC impact has to be further investigated in En-Route sectors within an area where CPDLC is mandatory.

- Cost Benefit Analysis (CBA) has to take into account local constraints (traffic, capacity, complexity...).
- The physical layout configuration for MSP with two Executive Controllers has to be carefully studied in order to avoid a physical distance between CWP's that could alter efficiency between the MSP and both Executive Controllers.
- The 4 eyes / 4 ears "principle" favouring the situational awareness of the controller team could be affected with the MSP configuration. This has to be carefully taken into account when deploying MSP concept.

Actors impacted by the SESAR Solution

En-Route and eTMA Air Traffic Controllers.

- Improved task sharing
- Better distribution of human resources
- Improved cost efficiency due to flexibility in sourcing and deployment of human resources

The new operating methods are a direct result of enhancements to the planning tools, such as the aforementioned solution, which improve the efficiency of the planning and decision-making process. They are not expected to be applicable to all sectors at all traffic levels, but a number of sectors can be combined in this way and operate efficiently at reasonably high traffic levels.

A further phase of solution development is extending the new team structure beyond one planner supporting two tactical controllers, to several tactical controllers under the responsibility of a single planner controller. This evolution will require developing the way in which boundaries are defined between planning and tactical control.

Impact on Aircraft System

In order to facilitate MSP planning activities, the use of advanced CPDLC messages may require new CPDLC capabilities on board (complex route clearance, clearance in advance) and a modification of the CPDLC procedures (Executive Controller, Planner Controller) will be required.

Impact on Ground Systems

In order to facilitate MSP planning activities, some improvement and/or adaptation of the Controller Support tools will be required to gain full benefit of the concept, CWP layout and HMI will also need adaptation. Electronic Coordination between sectors (in the ACC and with adjacent sectors) is required to facilitate coordination activities of the MSP.

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Regulatory Framework Considerations

MSP as new ATC role, do not request new regulatory framework to ensure operational activities in a regulated frame

Standardization Framework Considerations

N.A.

Considerations of Regulatory Oversight and Certification Activities

As this solution deals with new role using new automated tools, the procedures for degraded mode and failure will have to be developed in line with the existing methods. In the case of degraded mode operations, care must be taken to ensure all involved actors are aware of what each other knows and sees.

However the main role and responsibilities having MSP are not changed, only organisation of tasks and delegation of tasks are adapted to new concept, therefore, no change in regulatory aspect or certification activities are foreseen. Training must be adapted to encompass MSP activities.

Solution Data pack

The Datapack for this Solution includes the following documents:

V3 Datapack (**eTMA V3** environment) and **V3** deliverables:

- D1.1.010 – (**eTMA V3** and *En Route V2*) OSED-SPR-INTEROP
- D1.1.020 – (**eTMA V3** and *En Route V2*) TS/IRS
- D1.1.060 – (**eTMA V3** and *En Route V2*) CBA
- D1.1.050 – (**eTMA V3** and *En Route V2*) VALR

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