SESAR

2018

European ATM Master Plan Level 3

Implementation View

Plan 2018

EUROPEAN UNION

EUROCONTROL

European ATM Master Plan Level 3

Implementation View

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EXECUTIVE SUMMARY

What is the role of the European ATM Master Plan Level 3 Implementation Plan?

This Implementation Plan constitutes the "Implementation view" or Level 3 of the European ATM Master Plan (MP).

The Implementation Plan brings together and provides the framework for the commonly agreed actions to be taken by ECAC stakeholders, in the context of the implementation of SESAR.

These actions are consolidated in the form of 'Implementation Objectives', addressing those elements in SESAR which have reached the necessary operational and technical maturity and for which stakeholders have expressed an interest in their operational introduction. Implementation Objectives address validated SESAR Solutions and also account for the existing (EU) regulations in ATM.

The evolution of the Implementation Plan for 2018

- **The Level 3 as part of the overall Master Plan update campaign**

As an integral part of the Master Plan, the Level 3 strives for full consistency of its Implementation Objectives with the elements that inform it: Operational Changes, SESAR Solutions and Deployment Scenarios described in the Executive View (Master Plan level 1) and detailed in the Planning and Architecture View (Master Plan Level 2). In addition, coordination with the SESAR Deployment Manager allows keeping alignment with the Deployment Programme.

This edition of the Implementation Plan has been developed as part of the overall Master Plan update campaign. Some of its sections have already benefitted from the cross-fertilisation from the work carried out in the campaign; however some elements of the overall Master Plan were not fully stable or agreed at the time of delivery of this document. For this reason, the Implementation Plan may require further adaptations either prior to its submission to the SJU Admin Board and/or to be incorporated in the 2019 edition.

- **Improve the monitoring on SESAR 1 Solutions implementation**

One of the main drivers of the Implementation Plan is to provide the SJU and the ATM community with a full view of the overall lifecycle of the SESAR Solutions. Striving for this, the Implementation Plan 2018 edition, focuses to incorporate as much as possible the results of the SESAR 1 Programme, thus allowing for a more accurate monitoring of the deployment of the SESAR Solutions linked to Implementation Objectives.

Monitoring the deployment of SESAR 1 Solutions is important and contributing for the first time visibly to the update of the draft Master Plan Level 1 2018. The Level 3 needs to continue enabling this key task..

- **Contributing to the extension of SESAR to the ECAC area**

The ambition of the Master Plan remains to reach all the States within the ECAC area. For this, EUROCONTROL provides the working arrangements that serve as vehicle to extend the agreed implementation actions to the whole of ECAC.

In this 2018 edition, the applicability areas of a number of Objectives, in particular the PCP-related ones that were initially only applicable to the EU States (plus Norway and Switzerland) have been extended to cover all the ECAC area. These Objectives are associated to elements of the ICAO Global Air Navigation Plan (GANP), which reinforces the rationale for their extension beyond the EU membership. While for non-EU States the implementation of these Objectives is not regulated, their presence in the Implementation Plan will increase the awareness and buy-in of SESAR concepts beyond the EU and will enable their implementation monitoring.

- **Substantial changes to implementation objectives**

In the Implementation Plan, a 'substantial change' is a change that may affect the stakeholder commitment to implement an objective (e.g. implementation deadline, applicability area, etc.) and therefore requiring the highest level of consultation.

In line with the drivers for change described above, the objectives that have been substantially changed in this edition of the Implementation Plan are marked with a "(c)" in the tables in the following sections. The details of the changes can be seen in the individual objective Deployment Views in Section 4 of the document.

The strategic dimension of the Implementation Plan

The long-term vision of the SESAR project is enabled through the effective sharing of information between air and ground actors across the Network from a gate-to-gate perspective along with the optimisation of the enabling technical infrastructure, making greater use of standardised and interoperable systems, with advanced automation ensuring a more cost-efficient and performance-based service provision.

This long-term vision is expressed through the SESAR Target Concept and is supported by SESAR through the implementation of a number of operational changes. The Implementation Plan addresses planned and expected evolutions in the mid-term horizon by structuring its strategic view by "**Major ATM Changes**". This concept, firstly introduced in the Level 3 Report 2015, breaks down the four Key Features (**Optimised ATM network services**; **Advanced air traffic services**; **High-performing airport operations**; **Enabling aviation infrastructure)** into more concrete elements and provides a logical grouping of the implementation objectives. This allows for a better understanding of the current status and future evolution of the different lines of change of the Master Plan as a whole, and the Level 3 in particular.

Air Traffic Flow and Capacity Management (ATFCM)

Air traffic flow and capacity management (ATFCM) endeavours to optimise traffic flows according to air traffic control capacity while enabling airlines to operate safe and efficient flights. The implementation of the ATFCM major ATM change will see a deeper integration of all the operational stakeholders with regard the information sharing, with the NM playing a central role as information integrator in the creation of a more agile still more predictable Network.

The aim of this major ATM change is to pave the way from local-centric operations planning and decision making to the SESAR target concept of flight and flow-centric operations where airspace users fly their preferred trajectories in a context where all actors share and access information enabling a full collaborative decision-making process.

The Implementation Plan addresses ATFCM through six implementation objectives and one additional SESAR Solution.

Pre-SESAR	- Collaborative Flight Planning [FCM03]	
	- Short-Term ATFM Measures - Phase 1 [FCM04.1]	
SESAR 1	- Traffic Complexity Assessment [FCM06] (c)	PCP
	- Calculated Take-Off Times to Target Times for ATFCM Purposes [FCM07]	PCP
	- Short-Term ATFM Measures - Phase 2 [FCM04.2] (c)	PCP
	- Enhanced ATFM Slot Swapping [FCM09]	
	- User-Driven Prioritisation Process (UDPP) - Departure [Sol #57]	

(c) Substantial change

Network operations planning

The Network Operations Plan (NOP) is a consolidated network flow and capacity overview, enabling operational partners to anticipate or react to any events and to increase their mutual knowledge of the situation from the strategic phase to the real-time operation phase and into post operations analysis. The operations planning process consolidates forecasts and plans from all partners involved in ATM operations (ANSPs, airports, airport operators, military) and from the NM. Starting with the strategic planning of capacities, the process moves to an operational level with the development of derived seasonal, weekly and daily plans (the so-called 'NOP Coordination'). The seasonal part of the NOP is extracted from it and is electronically hosted on the network operations portal of the NM.

The aim of this major ATM change is to pave the way from local-centric operations planning and decision making to the SESAR Target Concept of flight and flow-centric operations where all actors share and access information enabling a full collaborative planning and decision-making process.

This is reflected in the current Plan through two implementation objectives:

Pre-SESAR	- Collaborative Flight Planning [FCM03]	

SESAR 1	-	Interactive Rolling NOP [FCM05]	PCP

Advanced Flexible Use of Airspace (AFUA)

The basic principle of flexible use of airspace (FUA) is that airspace should no longer be designated as military or civil but should be considered as a single continuum and used flexibly on a day-to-day basis. All users can have access, and on the basis of actual needs, their requests should be managed to achieve the most efficient use of airspace.

Through a closer civil-military partnership and exchange of real-time airspace management (ASM) information, advanced FUA (AFUA) will enhance the efficiency of airspace use providing the possibility to manage airspace reservations more flexibly in response to airspace user requirements. In an increasingly complex environment, AFUA will enable the implementation of other SES and SESAR concepts, in particular free route airspace.

The implementation objectives which cover this major ATM change are:

Pre-SESAR	-	Harmonise OAT and GAT Handling [AOM13.1]		
SESAR 1	-	ASM Support Tools [AOM19.1]		PCP
	-	ASM Management of Real Time Airspace Data [AOM19.2]		PCP
	-	Full Rolling ASM/ATFCM Process [AOM19.3]		PCP
	-	Management of Pre-Defined Airspace Configurations [AOM19.4]	NEW	PCP

Enhanced Arrival Sequencing

Arrival manager (AMAN) tools improve sequencing and metering of arrival aircraft by integrating with the ATC systems and providing controllers with advisories to create an optimal arrival sequence, reducing holding and low-level vectoring.

Through this major ATM change, arrival sequencing is expected to move from local AMAN tools taking into account local constraints to a full integration of AMAN with the en-route environment, including multiple airports and taking into account network considerations by also assessing the impact on other traffic flow.

The Implementation Plan addresses enhanced arrival sequencing through four implementation objectives and two additional SESAR Solutions.

Pre-SESAR	-	AMAN Tools and Procedures [ATC07.1]	
	-	Initial Extension of AMAN to En-route [ATC15.1] (c)	

SESAR 1	- Enhanced STCA for TMAs [ATC02.9]	
	- Extension of AMAN to En-route [ATC15.2] (c)	PCP
	- Flow Based Integration of Arrival and Departure Management [Sol #54]	
	- Enhanced STCA with Downlinked Parameters [Sol #69]	

(c) Substantial change

Performance Based Navigation (PBN)

ICAO's PBN concept has expanded area navigation (RNAV) techniques, originally centred upon lateral navigation accuracy only, to a more extensive statement of required navigation performance (RNP) related to accuracy, integrity and continuity along with how this performance is to be achieved in terms of aircraft and crew requirements. RNP relies primarily on the use of satellite technologies.

The PBN major ATM change will leverage on the advanced navigational capabilities of aircraft allowing the implementation of more flexible and environmentally friendly procedures. This will enable better access to airspace and airports and will lead to a reduction of the greenhouse gaseous emissions with a direct contribution to the decarbonisation of aviation.

The Implementation Plan addresses this topic through six implementation objectives.

Pre- SESAR	- Continuous Descent Operations [ENV01] (c)	
	- Continuous Climb Operations [ENV03] (c)	
	- RNAV 1 in TMA Operations [NAV03.1]	
	- RNP Approach Procedures with Vertical Guidance [NAV10] (c)	PCP
SESAR 1	- RNP 1 in TMA Operations [NAV03.2]	PCP
	- Optimised Low-Level IFR Routes in TMA for Rotorcraft [NAV12]	

(c) Substantial change

Free Route

Free route airspace (FRA) is a specified airspace within which users can freely plan a route between a defined entry point and a defined exit point, with the possibility of routeing via intermediate (published or unpublished) waypoints, without reference to the air traffic services (ATS) route network, subject of course to availability. Within such airspace, flights remain subject to air traffic control.

FRA is a way of overcoming the efficiency, capacity and environmental problems facing aviation, representing a key landmark in achieving free routing across the entire European airspace on the road to SESAR business trajectories and 4D profiles. The implementation of this concept of operations will have to be accompanied by the deployment or upgrade of several controller support

tools (e.g. medium term conflict detection, conflict resolution assistant, area proximity warning, etc.) which are critical for the successful implementation of free route.

To pave the way towards the implementation of FRA, the PCP Regulation established the implementation of direct routeing as an intermediate milestone. This milestone was successfully achieved in 2017 with direct routeing virtually deployed in all the applicable area. The associated implementation objective (AOM21.1) has therefore been removed from the Plan although it is kept in the table below for traceability purposes.

The Implementation Plan includes five implementation objectives which cover this major ATM Change, plus one SESAR Solution.

Pre- SESAR	- Ground-Based Safety Nets [ATC02.8]	
	- Electronic Dialogue as Automated Assistance to Controller during Coordination and Transfer [ATC17]	
	- Direct Routing [AOM21.1] - Achieved	PCP
SESAR 1	- Free Route Airspace [AOM21.2]	PCP
	- Automated Support for Conflict Detection, Resolution Support Information and Conformance Monitoring [ATC12.1]	PCP
	- Multi-Sector Planning [ATC18]	
	- Enhanced STCA with Down-Linked Parameters [Sol #69]	

Collaborative Airport

Through this major ATM change, the airport will fully interface the landside with the ATM Network. In this framework, airport operations planning, monitoring, management and post-operations analysis tools and processes are built into the airport operations plan (AOP) and airport collaborative decision making (A-CDM) for normal, adverse and/or exceptional operating conditions. Four implementation objectives and two SESAR Solutions are in the Implementation Plan.

Pre-SESAR	- Airport CDM [AOP05]	
	- Airport Collaborative Environmental Management [ENV02] (c)	
SESAR 1	- Initial Airport Operations Plan [AOP11]	PCP
	- Interactive Rolling NOP [FCM05]	PCP
	- AOP and AOP-NOP Seamless Integration [Sol #21]	
	- CWP Airport – Low Cost and Simple Departure Data Entry Panel [Sol #61]	

(c) Substantial change

Surface Management

At busy airports the management of arrival and departures coupled with efficient and safe movement on the airport surface is a crucial part of managing an on-time airport. Improving airport surface operations is one of the key SESAR initiatives. Surface management provides critical

situational awareness, visibility, alerts, and decision support to the airport and its stakeholders. Five implementation objectives and three SESAR Solutions address this topic.

Pre-SESAR	- A-SMGCS Surveillance (former Level 1) [AOP04.1]	
	- A-SMGCS Runway Monitoring and Conflict Alerting (RMCA) [AOP04.2]	
	- Improve Runway Safety by Preventing Runway Excursions [SAF11]	
SESAR 1	- Improve Runway and Airfield Safety with Conflicting ATC Clearances (CATC) Detection and Conformance Monitoring Alerts for Controllers (CMAC) [AOP12]	PCP
	- Automated Assistance to Controller For Surface Movement Planning and Routing [AOP13] (c)	PCP
	- RunWay Status Lights [Sol #01]	
	- Enhanced Traffic Situational Awareness and Airport Safety Nets for the Vehicle Drivers [Sol #04]	
	- Guidance Assistance through Airfield Ground Lighting [Sol #47]	

(c) Substantial change

Enhanced operations in the vicinity of the runway

The operations in the vicinity of the runway, namely those referring to the final approach phase, can be optimised by a series of improvements related to separation management. While maintaining the safety levels, these improvements will offer benefits in terms of capacity and flight efficiency, contributing as well to savings in terms of costs and mitigation of the environmental impact, providing benefits to airlines, ANSPs and airports.

One implementation objective and one SESAR Solution address this major ATM change.

Pre-SESAR	- Time-Based Separation [AOP10]	PCP
SESAR 1	- Precision Approaches using GBAS CAT II/III Based on GPS L1 [Sol #55]	

Pre-SWIM and SWIM

System wide information management (SWIM) represents a complete paradigm change in how information is managed along its full lifecycle and across the ATM system. Its aim is to provide information users with relevant and commonly understandable information. This means making the right information available at the right time to the right stakeholder. SWIM brings the industry based information technology approach of service orientated architecture (SOA) to the European ATM system, whereby all stakeholders access, share and process information through services and SWIM-enabled applications. Through this major ATM change, information exchange will move from a peer-

to-peer (legacy) infrastructure to an agile, high quality and secure information sharing environment, flight object related, enabling seamless operations and full digitalisation.

The Implementation Plan covers this topic through seven implementation objectives and two SESAR Solutions.

Pre-SESAR	- Common Flight Message Transfer Protocol [ITY-FMTP]	
	- Ensure Quality of Aeronautical Data and Aeronautical Information [ITY-ADQ]	
	- Electronic Terrain and Obstacle Data (eTOD) [INF07]	
SESAR 1	- NewPENS [COM12]	PCP
	- Extended Flight Plan [FCM08]	PCP
	- Information Exchanges Using SWIM Yellow TI Profile [INF08.1] (c)	PCP
	- Information Exchanges Using SWIM Blue TI Profile [INF08.2]	PCP
	- Digital Integrated Briefing [Sol #34]	

(c) Substantial change

Data Link

Data link (DL) is an essential enabler for the implementation of trajectory-based operations (TBO) which will see the sharing of the same information between airborne and ground systems through the business-mission trajectory lifecycle. Thanks to the data link-based TBO, flight and flow centric operations will be possible in a network context allowing the implementation of new concepts of operation. It can be therefore said that there can be no Single European Sky without data link!

One implementation objective and one SESAR Solution cover this major ATM change:

Pre-SESAR	- Initial ATC Air-Ground Data Link Services [ITY-AGDL] (c)	
SESAR 1	- Air Traffic Services (ATS) Datalink Using Iris Precursor [Sol #109]	

(c) Substantial change

CNS Rationalisation

Development of the CNS rationalisation part of the infrastructure key feature is one of the main priorities for the ATM Master Plan update 2018, with multiple preparatory activities taking place or being due to start under the SESAR 2020 banner. It is expected that the current, somehow independent, activities supporting the CNS rationalisation, will be consolidated in an overarching, far-reaching strategic approach. Pending the availability of the above-mentioned strategy, the current strategic view is focussing on the developments already being carried out in the pre-SESAR phase, further consolidated by the PCP regulation.

Six Implementation Objectives and one SESAR Solution address this topic.

Pre- SESAR	- Aircraft Identification [ITY-ACID]	
	- Surveillance Performance and Interoperability [ITY-SPI]	
	- 8.33 kHz Air-Ground Voice Channel Spacing below FL195 [ITY-AGVCS2]	
	- Migrate from AFTN to AMHS [COM10]	
SESAR 1	- Voice over Internet Protocol (VoIP) [COM11]	PCP
	- NewPENS [COM12]	PCP
	- ADS-B Surveillance of Aircraft In Flight and on the Surface [Sol #110]	

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1. INTRODUCTION

The Level 3 of the European ATM Master Plan

This Implementation Plan establishes the "Implementation view" or Level 3 of the European ATM Master Plan (MP) and is connected to the 2 other levels, namely Level 2, Planning and Architecture view and Level 1 Executive view (see figure 1 below).

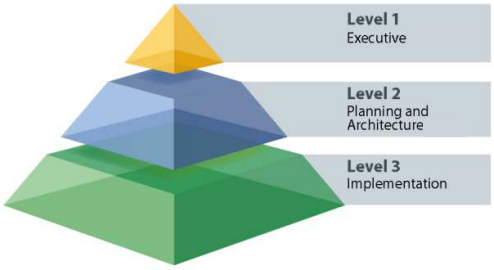


Figure 1 - The three levels of the European ATM Master Plan

The ATM Master Plan Level 3, Implementation Plan[1], brings together commonly agreed actions taken by ECAC stakeholders, and provides the framework for the implementation of SESAR. These actions are consolidated in the form of 'Implementation Objectives'.

The ECAC-wide agreement is reached through various steps involving all relevant stakeholders. It starts with the production of the Implementation Plan under the aegis of SESAR Project (PJ) 20 (Work Package 2.5); consultations are then carried out with the relevant technical EUROCONTROL Working Arrangements (e.g. Teams); once the technical content is considered sound both the EUROCONTROL Agency Advisory Body (AAB) and PJ20 are requested to comment; and finally an endorsement is sought with the EUROCONTROL Provisional Council to prepare EUROCONTROL's position at the SJU Admin Board where the document is approved.

The Implementation Objectives present operational, technical and institutional improvements, which contribute to the performance requirements for the key performance areas (KPAs) cost-efficiency, operational efficiency, capacity, environment, safety and security[2], as defined in the ATM Master Plan Level 1. They also reflect the outcome from the Planning and Architecture level (Level 2) when considering the integration of operational changes which have reached the necessary operational and technical maturity, and are supported by common agreement for their inclusion in the plan and, where applicable, their deployment. Finally, they account for the existing (EU) Regulations in ATM.

The MP Level 3 Implementation Plan, which is updated every year, takes into account the status of the deployment by integrating relevant elements from reporting processes described in the MP Level 3 Implementation Report.

Master Plan Level 3 2018 - Implementation Plan

The 2018 edition of the MP Level 3 has been developed in accordance with the working arrangements of the SESAR 2020 programme, in particular Work Package (WP) 2.5 – 'Implementation Planning and Reporting', under the auspices of Project 20 (PJ20) – 'Master Plan Maintenance'.

[1] Previously known as the European Single Sky ImPlementation Plan (ESSIP Plan).

[2] See Master Plan Executive View – Edition 2015, Figure 5 page 22.

The main focus for the 2018 Implementation Plan has been to give more visibility to the validated SESAR 1 Solutions associated with existing Implementation Objectives.

The 2018 edition strives to maintain its alignment with the Deployment Programme (DP) of the SESAR Deployment Manager (SDM) and to maximise its alignment with the ICAO Global Air Navigation Plan (GANP). It must be acknowledged that Level 3 addresses the full scope of the Master Plan's mature and deployable elements as Implementation Objectives, some of which relate to the PCP (Pilot Common Project) and its DP. For the PCP-related elements, i.e. those directly linked to the implementation of ATM sub-functionalities, the MP Level 3 is fully aligned with both the PCP Regulation and the DP. A few differences with the DP persist in the timescales associated with some of the PCP pre-requisites which, prior to the publication of the PCP Regulation, were committed and included in the MP Level 3 as part of the pre-SESAR phase due to their potential to deliver performance benefits.

As in previous two editions, the 2018 Implementation Plan is structured in three different views:

- **Strategic view -** that provides a strategic outlook for each Major ATM Change within each SESAR Key Feature.
- **Deployment view -** that provides a summary of the main elements (what, who, when, where, references) vis-à-vis the operational change per Implementation Objective.
- **Engineering view -** that provides a complete description for each Implementation Objective including, detailed descriptions of stakeholder lines of action (SLoAs) and relevant supporting material. This view is available online, on the European ATM Master Plan Portal (https://www.eatmportal.eu/working/signin).

Since 2017, the Implementation Plan has also contained **'Risk management'** chapter that has been updated for this edition in accordance with risk management practices. This chapter was initially developed with the intention of supporting the framework of the overall Master Plan risk management process, as described in Chapter 7 of the Master Plan Executive View (Level 1) – Edition 2015. For its development, both a top-down and a bottom-up approach was followed. Firstly, the risks identified at Level 1 were analysed in terms of their impact and relevance to Level 3; the risks deemed relevant were included in the Level 3 risk chapter. Secondly, Level-3 specific risks were identified together with an assessment of impact and mitigation actions, ensuring their relevance at Programme level by linking them to the Level 1 risks; these risks are presented in the document.

Implementation Objectives Evolution

Implementation objectives have been kept stable for this edition of the Implementation Plan, pending forthcoming developments in the form of an updated regulatory framework and the evolution of the Master Plan Level 1.

The implementation of direct routing was achieved in 2017. Therefore, its related implementation objective has been removed from the Implementation Plan.

A new 'PCP' objective addressing the management of pre-defined airspace configurations was added in order to improve the alignment with SDM's DP.

Additionally, the objectives addressing continuous descent/climb operations and RNP approaches with vertical guidance have been comprehensively reviewed to bring them up-to-date with the latest developments at European level.

Finally, the applicability area of some objectives that previously were applicable only to the EU+ area have been extended to cover all ECAC States due to the link of these objectives with the ICAO Global Air Navigation Plan.

2. STRATEGIC VIEW

One of the main drivers of the Implementation Plan is to provide a full view of the overall lifecycle of the SESAR Solutions. The Implementation Plan 2018 edition focus is to incorporate as much as possible the results of the SESAR 1 Programme, thus allowing for a more accurate monitoring of the deployment of the SESAR Solutions linked to Implementation Objectives.

The long-term vision of the SESAR project is enabled through effective sharing of information between air and ground actors across the Network (from a gate-to-gate perspective), and supported by optimisation of the enabling technical infrastructure/s, making increased use of standardised and interoperable systems with advanced automation, ensuring a more cost-efficient and performance-based service provision.

This vision is expressed through the SESAR Target Concept and is supported through the implementation of operational changes in accordance with the strategic orientations defined by the four Key Features (described on the right).

For a more focused strategic perspective, the Strategic View is structured by "**Major ATM Changes**". This concept, first introduced in the Level 3 Report 2015, breaks down the four Key Features into more concrete elements and provides a logical grouping of the implementation objectives. This allows for a better understanding of the status and future evolution of the different lines of change of the Master Plan as a whole, and of Level 3 in particular.

The Major ATM Changes include several operational changes, grouped into blocks. The mapping on the following pages show how all the elements fit together into the overall picture of the Master Plan, and into each of the four Key Features.

Furthermore, each strategic view presents the improvements achieved in the pre-SESAR phase, addresses the operational changes brought by the PCP Regulation, and provides an indication of what is in the pipeline for deployment, including improvements emerging from the mature and performing SESAR Solutions from the SESAR 1 programme.

The four SESAR Key Features:

Optimised ATM network services

An optimised ATM network must be robust and resilient to a whole range of disruptions. It relies on having a dynamic, online collaborative mechanism, allowing for a common updated, consistent and accurate plan that provides reference information to all ATM actors. This feature includes activities in the areas of advanced airspace management, advanced dynamic capacity balancing and optimised airspace user operations, as well as optimised network management through a fully integrated network operations plan (NOP) and airport.

Advanced air traffic services

The future European ATM system will be characterised by advanced service provision, underpinned by the automated tools to support controllers in routine tasks. This feature reflects the move towards automation with activities addressing enhanced arrivals and departures, separation management, enhanced air and ground safety nets and trajectory and performance-based free routing.

High-performing airport operations

The future European ATM system relies on full integration of airports as nodes into the network. This implies enhanced airport operations, ensuring a seamless process through collaborative decision-making in normal conditions and, through the further development of collaborative recovery procedures, in adverse conditions. In this context, this feature addresses the enhancement of runway throughput, integrated surface management, airport safety nets and total airport management.

Enabling aviation infrastructure

The enhancement of the first three Features will be underpinned by an advanced, integrated and rationalised aviation infrastructure. It will rely on enhanced integration and interfacing between aircraft and ground systems. Communications, navigation and surveillance (CNS) systems, SWIM, trajectory management, Common Support Services and the evolving role of the human will be considered in a coordinated way for application across a globally interoperable ATM system. The continued integration of general aviation and rotorcraft and the introduction of remotely-piloted aircraft systems (RPAS) into the ATM environment is a major activity in this feature.

Major ATM changes within the ATM Master Plan

Note that the graphs below and the Strategic Views presented in the following chapters are based on the mapping of Operational Changes and SESAR Key Features as presented in MP Level 1 Edition 2015 (Figure 9 of the document). The changes to this mapping introduced during the update campaign of the MP Level 1 for 2018 will be taken into account in due time when these changes are stable.

Optimised ATM Network Services

Major ATM Change	Pre-SESAR	PCP	New Essential Operational Changes / *Operational Changes*
ATFCM	**ATFM slot exchange** **Basic network operations planning** • FCM03-Collaborative flight planning **STAM** • FCM04.1-STAM Phase 1	**Automated support for traffic complexity assessment** • FCM06-Traffic complexity assessment **CTOT to TTA for ATFCM purposes** • FCM07-CTOT to TTA for ATFCM purposes **Enhanced STAM** • FCM04.2-STAM Phase 2	**UDPP** • FCM09-Enhanced ATFM Slot Swapping
NOP	**Basic network operations planning** • FCM03-Collaborative flight planning • FCM05-Interactive Rolling NOP	**Collaborative NOP** • FCM05-Interactive Rolling NOP	
Free Route & Advanced FUA	**Civil/military airspace and aeronautical data coordination** • AOM13.1-Harmonise OAT and GAT handling • AOM19.1-ASM support tools	**ASM and A-FUA** • AOM19.1-ASM support tools • AOM19.2-ASM Management of real time airspace data • AOM19.3-Full rolling ASM/ATFCM process • AOM19.4-Management of Pre-defined Airspace Configurations (NEW) **Free route (*)** • AOM21.1-Direct Routing [Achieved] • AOM21.2-Free Route Airspace	

(*) This operational change is described in the section addressing Advanced Air Traffic Services

Advanced Air Traffic Services

Major ATM Changes	Pre-SESAR	PCP	New Essential Operational Changes / *Operational Changes*
Enhanced arrival sequencing	**Basic AMAN** • ATC07.1-AMAN • ATC15.1-Initial extension of AMAN to En-Route	**AMAN extended to en-route airspace** • ATC15.2-Extension of AMAN to En-route	**AMAN/DMAN integration including multiple airports** ***Airborne Separation Assistance System (ASAS) spacing*** ***Controlled Time of Arrival (CTA)*** ***Enhanced Safety Nets*** • ATC02.9-Enhanced STCA for TMAs
PBN	**Introduction of PRNAV** • ENV01-Continuous Descent Operations • ENV03-Continous Climb Operations • NAV03.1-RNAV-1 in TMAs • NAV10-APV Procedures • ATC02.8-Ground based safety nets (MSAW and APM)	**Enhanced TMA using RNP-based operations** • NAV03.2-RNP1 in TMAs	**Advanced RNP** **Trajectory-based tools** ***Enhanced Safety Nets*** **Additional objective:** • NAV12 - Optimised low-level IFR routes in TMA
Free Route	• ATC02.8-Ground based safety nets (APW) • ATC17-Electronic Dialog supporting COTR	**Free route** • AOM21.1-Direct Routing [Achieved] (*) • AOM21.2-Free Route Airspace • ATC12.1-MONA, TCT and MTCD	**Sector team operation** • ATC18-Multi Sector Planning **Trajectory-based tools** ***Enhanced Safety Nets***

(*) AOM21.1 was achieved during 2017 and therefore removed from the Implementation Plan. It is kept in this graph for traceability purposes.

High Performing Airport Operations

Major ATM Changes	Pre-SESAR	PCP	New Essential Operational Changes / *Operational Changes*
Collaborative Airport	**Initial airport CDM** • AOP05-Airport CDM **Additional Objectives:** • ENV02-Collaborative Environmental Management	**Airport operations plan** • AOP11-Initial Airport Operations Plan • FCM05-Interactive Rolling NOP	**Collaborative airport**
Surface management	**A-SMGCS L1 and L2** • AOP04.1-A-SMGCS Surveillance • AOP04.2-A-SMGCS Runway Monitoring and Conflict Alerting (RMCA) **Additional Objectives:** • SAF11-Prevent Runway Excursions	**Automated assistance to controller for surface movement planning and routing** • AOP13-Automated Assistance to Controller for Surface Movement Planning and Routing **Airport safety nets** • AOP12-Improve RWY safety with ATC clearance monitoring **DMAN synchronised with pre-departure sequencing** • AOP13-Automated Assistance to Controller for Surface Movement Planning and Routing **DMAN integrating surface management constraints**	**Integrated surface management** **Integrated surface management datalink** ***Ground Situational Awareness*** ***Enhanced Airport Safety Nets*** ***Airport Safety Nets Vehicles***
Enhanced / Optimised operations in the vicinity of the runway	**Crosswind reduced separations for arrivals** **Operations in LVC**	**TBS for final approach** • AOP10-Time based separation	**LVPs using GBAS** ***Approach & Departure Separations***

Enabling Aviation Infrastructure

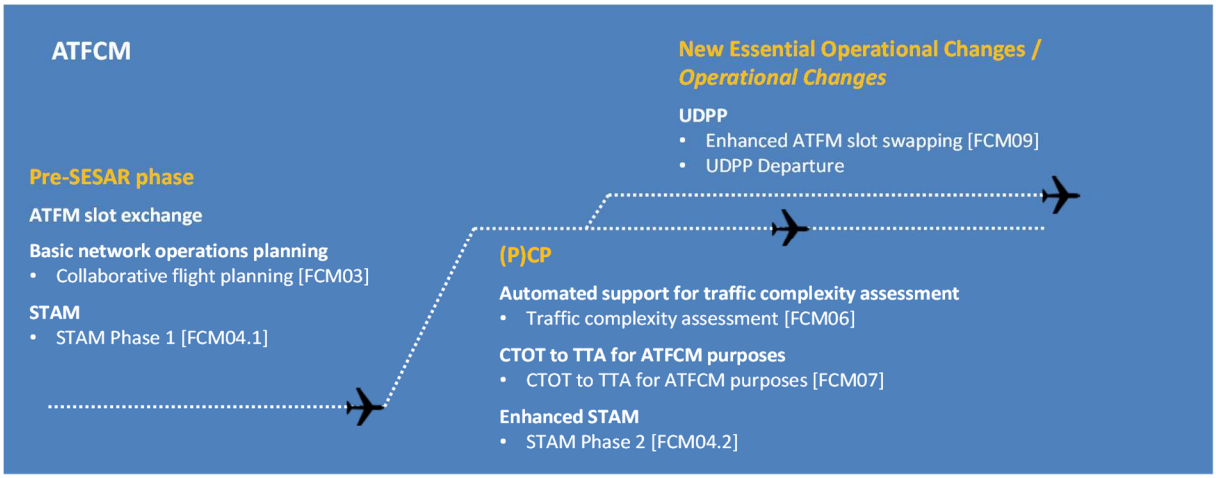
Major ATM Changes	Pre-SESAR	(P)CP	New Essential Operational Changes / *Operational Changes*
Pre-SWIM & SWIM	**IP network** • ITY-FMTP-FMTP over IPv6 **B2B services** **Information reference and exchange models** • INF07-eTOD • ITY-ADQ-Aeronautical Data Quality	**Common Infrastructure Components: SWIM registry, PKI** • INF08.1-iSWIM Yellow TI Profile **SWIM technical infrastructure and profiles** • INF08.1-iSWIM Yellow TI Profile **Aeronautical information exchange** • INF08.1-iSWIM Yellow TI Profile **Meteorological information exchange** • INF08.1-iSWIM Yellow TI Profile **Cooperative network information exchange** • INF08.1-iSWIM Yellow TI Profile **Flight information exchange** • INF08.1-iSWIM Yellow TI Profile • INF08.2-iSWIM Blue TI Profile • FCM08-Extended Flight Plan ***Communications infrastructure*** • COM12-NewPENS	***Digital Integrated Briefing***
Data Link	**A/G datalink** • ITY-AGDL-A/G Data-link	**Initial trajectory information sharing (i4D)**	**Information sharing and business trajectory** **Mission trajectory**
CNS Rationalisation	**ADS-B, WAM** • ITY-ACID-Aircraft Identification • ITY-SPI-Surveillance performance and interoperability **GNSS, GBAS, SBAS** ***Communications infrastructure*** • COM10-Basic and enhanced AMHS • ITY-AGVCS2-8,33KHz below FL195	***Communications infrastructure*** • COM11-Voice over IP (*) • COM12-NewPENS	**CNS rationalisation**

(*) Not mandated by the PCP Regulation but enabling some SESAR 1 operational changes

Air Traffic Flow and Capacity Management (ATFCM)

Air traffic flow and capacity management (ATFCM) endeavours to optimise traffic flows according to air traffic control capacity, while enabling airlines to operate safe and efficient flights. The implementation of the ATFCM major ATM change will see a deeper integration of all the operational stakeholders with regard to information sharing. The NM will play a central role, as information integrator in the creation of a more agile still more predictable Network.

The aim of this major ATM change is to pave the way from local-centric operations, planning and decision making to the SESAR target concept of flight and flow-centric operations where airspace users fly their preferred trajectories in a context where all actors share and access information, enabling a full collaborative decision-making process.



The **pre-SESAR** phase focused on the set-up of the network followed by the deeper integration of stakeholder through exchanges of information for better consistency and predictability. The latter elements of this phase are expected to be implemented by end 2019.

The **PCP** Regulation will add the next set of building blocks for this major ATM change by bringing flow management into a cooperative traffic management environment, and optimising the delivery of traffic into sectors and airports and the use for ATFCM measures.

PCP-RELATED FUNCTIONALITY

AF4 Network collaborative management

- s-AF4.1 Enhanced short term ATFCM measures
- *s-AF4.2 Collaborative NOP*
- s-AF4.3 Calculated take-off time to target times for ATFCM purposes
- s-AF4.4 Automated support for traffic complexity assessment

Furthermore, the **SESAR 1** programme has validated two additional SESAR Solutions which support the last element of this major ATM change - User-driven prioritisation process (UDPP). UDPP gives all concerned airspace users, including business aviation operators, the opportunity to exchange the departure order of two flights in accordance with their commercial or operational priorities. Of the two solutions, one [Solution #56] has already been translated into an implementation objective and the other one [Solution #57] will be considered for the medium term:

- Enhanced ATFM slot swapping, [Solution #56 - FCM09];
- UDPP-Departure [Solution #57], for which an Implementation Objective has not been created, yet.

Medium Term View

By addressing UDPP-Departure ATFCM would evolve to cover the full UDPP Operational Change, which facilitates ATFCM planning and departure sequencing through advanced airport operations (advanced collaborative decision making and demand capacity balancing).

Stakeholder Perspective

The major ATM change will make use of increased digitalisation for all operational stakeholders along the following lines:

Network Manager (NM)

- Integration of automatically transmitted real-time flight information for a better traffic situation awareness and higher sector load calculation accuracy.
- STAM measures to smooth sector workloads by reducing traffic peaks, moving from a procedural approach to a more network-centric, system supported application.
- Enhanced flight planning and flight data exchanges to support trajectory based operations. This includes the introduction of planning processes in which the AUs can access flight constraint assessments and obtain approval prior to filing, 4D trajectory exchange, downlinked trajectory information and OAT fight plans to get a complete picture of traffic demand.
- A more proactive approach to maximise the use of available capacity, will be introduced. This approach will combine the Network capacity modelling processes of the NOP with techniques enabling the optimisation of all necessary Network resources. It includes a.o. the design of optimum airspace structure with a specific focus on cross-border sectorisation, and the establishment of optimum sector opening schemes.
- Enhanced monitoring techniques, including the detection of local overloads, along with a continuous monitoring of impact at network level.
- Improved slot swapping offered to airspace users with a.o. multiple-swaps.

Air Navigation Service Providers (ANSPs)

- ANSPs play a primary role in the information sharing processes with the NM, both as information sources and users.
- An improved traffic situation picture allows a better accuracy for traffic complexity assessments and for smoothing traffic peaks with minimum restrictions for the airspace users.

Airport Operators

- Airport operators implementing the gate-to-gate concept are increasingly integrated into the network. This is achieved through the provision of airport related data (e.g. demand data) and their participation in the collaborative ATFCM processes in particular, for the allocation of target times.

Airspace Users (AUs)

- Airspace users benefit from the increased accuracy of traffic prediction, which improves the use of available capacity reducing the delays.
- The role of the users spans from the provision of demand data to the NM to the use of the slot swapping facility provided by the NM.

Performance Benefits

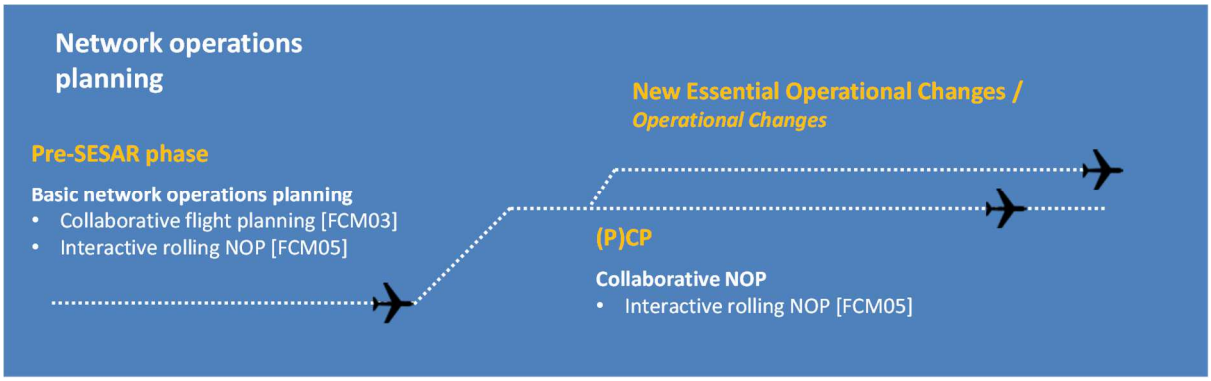
Optimised use of the available capacity by using real-time information about the network situation to identify and avoid ‘hotspots’ and reduce traffic complexity.

Reduced flight time and holdings, owing to improved network predictability. Cost savings and reduced fuel burn due to airspace users being able to fly their preferred trajectories, according to their priorities and operational objectives.

Improved ATCO workload predictability and prevention of overload.

Network Operations Planning

The Network Operations Plan (NOP) is an overview of consolidated network flow and capacity, enabling operational partners to anticipate or respond to events and to increase their mutual understanding of the situation from the strategic phase to the real-time operation phase, followed by post operational analysis. The operations planning process consolidates forecasts and plans from all partners involved in ATM operations (ANSPs, airports, AOs, MIL) and from the NM's units in charge of flow, capacity, and airspace management. Starting with the strategic planning of capacity, the process progresses to an operational level with the development of derived seasonal, weekly and daily plans (the so-called 'NOP Coordination'). The seasonal segment of the NOP is extracted and electronically hosted on the network operations portal of the NM. A seasonal segment of the NOP is developed each year to address the 'Transition Plan for Major Projects in Europe'.



The aim of this major ATM change is to pave the way from local-centric operations planning and decision making to the SESAR Target Concept of flight and flow-centric operations, where all actors share and access information, enabling a full collaborative planning and decision-making process with the NM in the core of the European ATM Network.

The **pre-SESAR** phase focused on the foundation of the network followed by the deeper integration of stakeholders through exchanges of information and set-up of the NOP.

The **PCP** Regulation will add the ensuing building blocks by improving the NOP with enhanced functionalities and with integration with Airport Operations Plans (AOP). NM will continue to develop the 'Rolling/Dynamic Network Plan' aimed at displaying network situational information updated in real time. It will address hotspots, network events, ATFCM measures and ATFM Information Messages made available via B2B services and via the n-CONNECT platform, in 2017. NOP will evolve towards "one stop shop" with "look ahead" capabilities, for NM to further develop 'Common Network Awareness' and 'Collaborative Network Planning'.

PCP-RELATED FUNCTIONALITY

AF4 Network collaborative management

- *s-AF4.1 Enhanced short term ATFCM measures*
- **s-AF4.2 Collaborative NOP**
- *s-AF4.3 Calculated take-off time to target times for ATFCM purposes*
- *s-AF4.4 Automated support for traffic complexity assessment*

Medium Term View

The cooperative processes required at both local and network level will be further enhanced. The NM will offer direct, open and consolidated support through an efficient partnership approach, from planning into operations. A direct link will be ensured between network capacity planning, airspace improvements, updated airport planning, integrated data and tool availability for all planning phases, enhanced ATFCM, as well as for the planning and coordination of significant events.

Stakeholder Perspective

The major ATM change will see a significant integration of all the operational stakeholders with regard the information sharing, with the NM playing a central role as information integrator.

Network Manager (NM)

The NOP will become the main transversal tool supporting collaborative planning. It will evolve towards “one stop shop” with “look ahead” capabilities, to allow NM to communicate and exchange information with all relevant stakeholders and further develop “Common Network Awareness” and “Collaborative Network planning”.

A more proactive, NOP-supported approach will be introduced to maximise the use of available capacity. This approach will combine Network capacity modelling processes of the NOP with techniques enabling the optimisation of all necessary Network resources. It will also encompass the design of optimum airspace structure with a specific focus on cross border sectorisation and the setting up of optimum sector opening schemes.

Air Navigation Service Providers (ANSPs)

The Network will not operate without the full involvement and commitment of ANSPs as the implementers of local activities related to capacity and flight efficiency enhancement measures.

Airport Operators

Increasingly, Airports will be integrated into the Network, improving the gate-to-gate perspective. This will be done through the provision of airport related data (e.g. demand data) to the NOP, followed by the full integration of the Airport Operations Plan data into the NOP.

Airspace Users

To fully realise the benefits of improved integration of airspace design, airspace management, flexible use of airspace and air traffic flow and capacity management, through the NOP, a more dynamic and flexible approach to flight planning from the airspace users will be required. This would enable capacity to be used as soon as airspace becomes available, even at short notice.

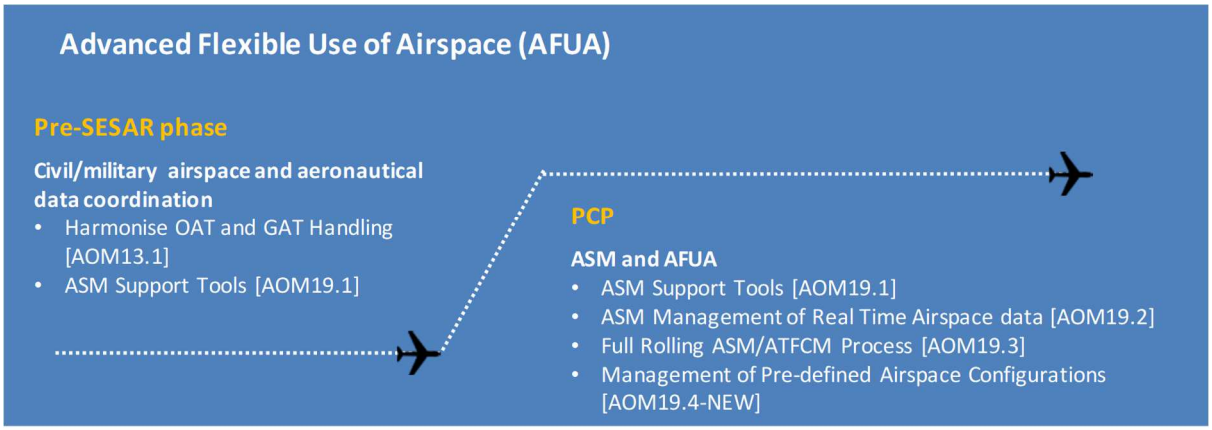
Performance Benefits

	Small benefits through improved use of the airport and airspace capacity resulting from a better knowledge of the airspace availability and of the traffic demand.
	Enhanced through use of cost efficient tools to access network information.
	Reduced flight time and flight holding due to improved network predictability. Cost savings and reduced fuel burn enabling airspace users to fly their preferred trajectories according to their priorities and operational requirements.
	Improved ATCO workload predictability and prevention of overloads.

Advanced Flexible Use of Airspace (AFUA)

The basic principle of flexible use of airspace (FUA) is that airspace is no longer designated as military or civil but is considered as a single continuum, used flexibly on a day-to-day basis. All users have access, and based on their specific needs, their requirements are managed to ensure the most efficient use of airspace. Wherever possible, permanent airspace segregation should be avoided.

Through a closer civil-military partnership and exchange of real-time airspace management (ASM) information, advanced FUA (AFUA) will enhance the efficiency of airspace use providing the ability to manage airspace reservations more flexibly in response to airspace user requirements. In an increasingly complex environment, AFUA will enable the implementation of other SES and SESAR concepts, in particular free route airspace.



One of the pillars of the **SES** Regulations was the implementation of FUA as required by Regulation (EC) No 2150/2005, which is now fully implemented in Europe. The FUA concept was developed at the three levels of ASM that correspond to civil/military co-ordination tasks: Strategic Level 1 – definition of the national airspace policy and establishment of pre-determined airspace structures; Pre-tactical Level 2 – day-to-day allocation of airspace according to user requirements; Tactical Level 3 – real-time use of airspace.

A further initiative includes the implementation of harmonised handling of operational air traffic (OAT) and general air traffic (GAT) across Europe, as defined in the "EUROCONTROL Specifications for harmonized Rules for OAT under IFR rules inside controlled Airspace (EUROAT)". Its full implementation is expected for 2019.

In support of FUA implementation, the use of ASM to support the management of airspace reservations is increasingly widespread.

As we move forward, these tools will evolve in order to handle the **PCP** requirements in terms of ASM and advanced FUA. ASM will require real-time sharing of airspace status between different ASM tools and with the NM through the Network Operations Plan (NOP).

PCP-RELATED FUNCTIONALITY

AF3 - Flexible Airspace Management and Free Route

- s-AF3.1 Airspace Management and Advanced Flexible Use of Airspace
- *s-AF3.2 Free Route*

This will enable a full rolling ASM/ATFCM process ensuring a continuous, seamless and reiterative airspace planning and allocation based on airspace requests, for any time period including, support for the deployment of airspace configurations.

Medium Term View

Transition towards trajectory-based operations will be enabled by the adoption of modular airspace reservations (ARES) using the variable profile area (VPA) design principles, validated in SESAR 1. VPA facilitates a better response to military requirements and constraints and enhances civil-military coordination including real time airspace status update for defining different airspace scenarios with acceptable network impact.

In parallel, SESAR 2020 R&D activities will further elaborate on dynamic airspace configurations (DAC) and dynamic mobile areas (DMA) concepts. Compared to today's airspace scenarios, which by their nature are static, DAC/DMA enable flexible solutions that can be dynamically adapted to traffic demand to respond to different regional/local performance objectives, which may vary in time and place.

Stakeholder Perspective

Due to the very nature of the major ATM change, addressing the national airspace, the implementation will require the coordinated actions of military and civil stakeholders, with the facilitation by the Network Manager.

Network Manager (NM)

The NM will provide the appropriate tools (e.g. via the NOP Portal or eAMI message for those using B2B service) allowing the dissemination of airspace information to aircraft operators. It will support real-time airspace status updates allowing ATC, airspace users and NM to take early advantage of possible opportunities and/or to increase awareness of real-time airspace situation. This will permit the NM systems that use updated environment airspace and route data and revised capacity figures to adjust traffic flow and maximise traffic flow throughput.

Air Navigation Service Providers (ANSPs)

The ANSPs will play their role in the civil-military partnership with their contribution to a full rolling ASM/ATFCM process. This process aims to optimise airspace availability and utilisation through a continuous real-time CDM process using, as input, rolling updates of military and civil demand needs, potential hotspots and network performance requirements. This will be accompanied by full real-time airspace status updates allowing ATC, airspace users, and NM to take early advantage of possible opportunities and/or to increase awareness of real-time airspace situation.

Airspace Users (AUs)

To realise the full benefits of improved integration of airspace design, ASM/FUA and ATFCM, a more dynamic and flexible approach to flight planning from the airspace users is required. This would enable capacity to be used as soon as airspace becomes available, even at short notice.

Military Authorities

AFUA is based on extended civil-military cooperation that is proactive and performance oriented to achieve mission effectiveness and flight efficiency. The military stakeholders will therefore have to contribute to the successful implementation of AFUA in tandem with airspace management levels, from strategic to tactical.

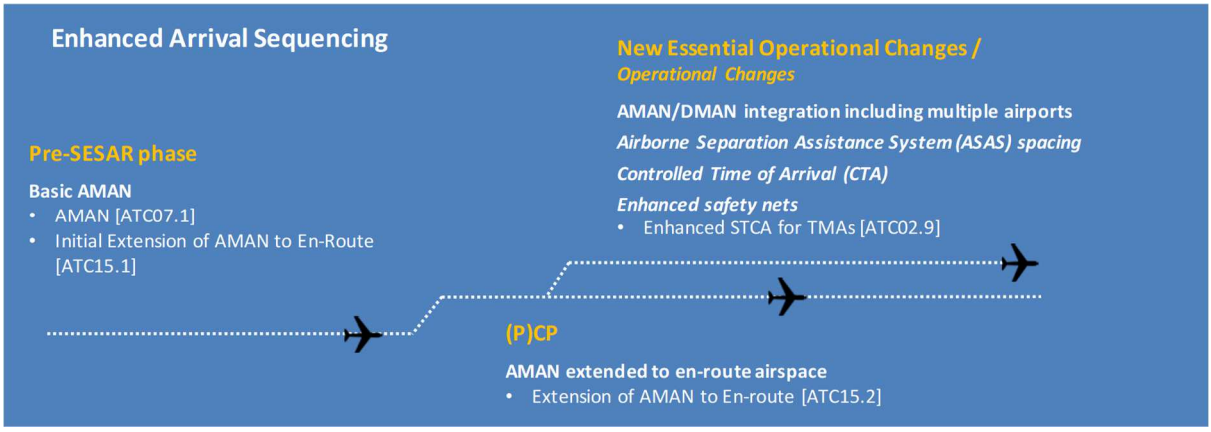
Performance Benefits

	Increased through better utilisation of airspace resources within and across airspace boundaries leading to reduction of flight delays. Reduction in airspace segregation.
	Increased through the availability of progressively optimum routes/trajectories aiding lower fuel burn. More efficient ways to separate operational and general air traffic. Definition and use of temporary airspace reservation, more closely in line with military operational requirements.
	Better knowledge of traffic environment, common situational awareness, and specific enhancements through reduction in controller workload.

Enhanced Arrival Sequencing

Arrival management (AMAN) tools enhance sequencing and metering of arrivals by integrating with the ATC systems and providing controllers with advisories to create an optimal arrival sequence, reducing holding and low-level vectoring.

Through this major ATM change, arrival sequencing is expected to progress from local AMAN tools utilising local constraints to a full integration of the AMAN with the en-route environment including multiple airports and taking into account network considerations by evaluating the impact on overall traffic flow.



During the **pre-SESAR** phase, ANSPs and airport operators are expected to implement basic AMAN tools to improve sequencing and metering of arrival aircraft in TMAs and airports. AMAN is already implemented in 20 airports in Europe (18 of them PCP) and is expected to be fully deployed by 2019.

Further to local implementation, the arrival management (AMAN) information is expected to be shared with upstream en-route sectors, using the arrival management information exchange message (AMA) or other generic arrival message/s. This will provide an enhanced arrival sequence allowing for a smoother accommodation of AMAN constraints.

Furthermore, an AMAN horizon of up to 180-200 nautical miles from the arrival airport, as required by the **PCP** Regulation, is expected to be implemented by the end of 2023. A high level of coordination will be required to ensure synchronised implementation across the different ANSPs managing the en-route sectors impacted by the traffic flows to/from the 25 PCP airports.

PCP-RELATED FUNCTIONALITY

AF1 Extended Arrival Management and Performance Based Navigation in high density Terminal Manoeuvring Area

- **s-AF1.1 AMAN extended to En-Route Airspace**
- *s-AF1.2 Enhanced Terminal Airspace using RNP-Based Operations*

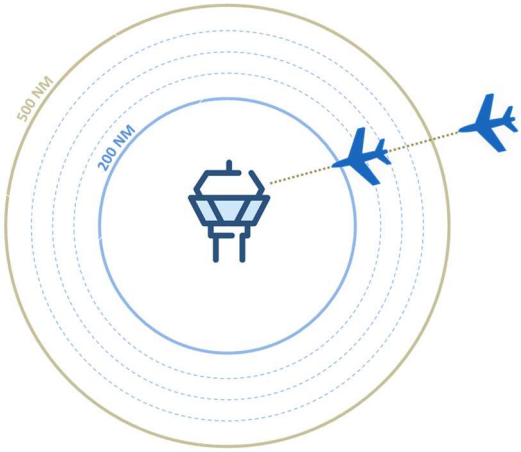
For the supporting safety tools, **SESAR 1** has addressed the optimisation of safety nets for specific TMA operations [Solution #60], as well as the performance of the short-term conflict alert (STCA) through the use of aircraft-derived data (ADD) [Solution #69]. The next step in this major ATM change will be the integration of AMAN and DMAN including multiple airports [Solution #08] improving delivery to the runways and en-route phase of flight respectively and the integration of arrival and departure flows to the same runway (or for dependent runways), for defined periods of time [Solution #54].

Stakeholder Perspective

While the implementation of basic AMAN tools is a local undertaking, the extension to en-route requires the involvement of multiple stakeholders (e.g. ANSPs of neighbouring countries) introducing a network dimension.

Air Navigation Service Providers (ANSPs)

ANSPs are the primary stakeholders implementing this change, either through the deployment of AMAN within their area of responsibility and further extension to en-route for up to 200 nautical miles, or through the extension of AMAN tools installed in neighbouring countries or even further away from their area of responsibility. Subsequently, the extended AMAN functionality will be integrated with the Departure Manager constraints and will consider new concepts of operations (e.g. related to the use of target times), taking into account network considerations through additional data exchanges with the NM.



Network Manager (NM)

The NM will support the network dimension of the extended AMAN as well as its evolution to a more network centric tool. The NM systems will support the extended AMAN functionality through data exchange (e.g. Flight Data messages), and additional procedures and tools (e.g. Network Impact Assessment Tool), implementing new concepts of operations.

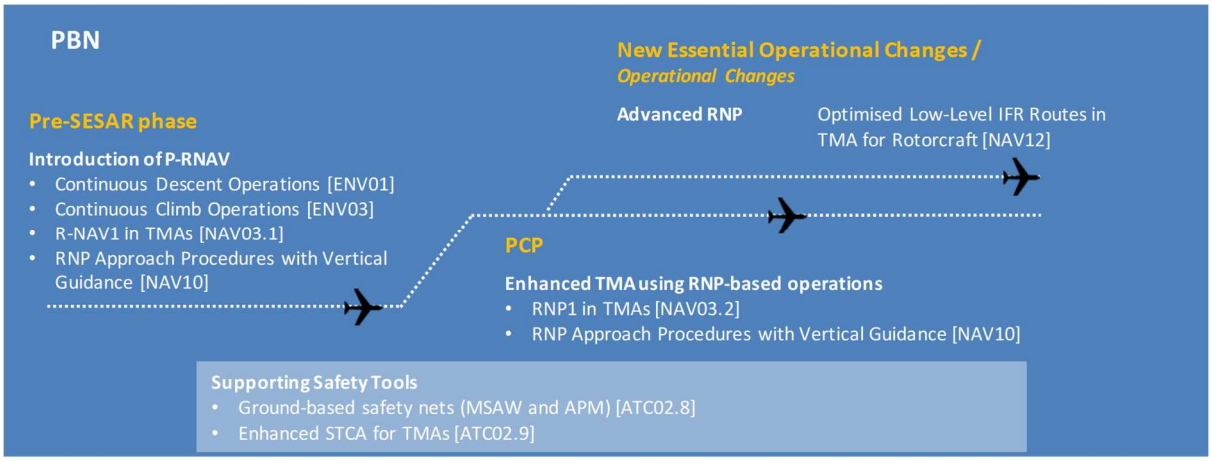
Performance Benefits

- Reduction in holding and in low-level vectoring, by applying delay management during an earlier stage of the flight, with a positive impact on fuel burn.
- Increased flight efficiency due to increased use of the Flight Management System (FMS) and improved environmental sustainability. Less noise and lower fuel consumption due to reduction in holding and low-level vectoring.
- Increased safety owing to a more structured airspace, with a positive impact on controller and pilot situational awareness.
- Reduced TMA controller workload due to reduction in frequency usage, permitting increase in capacity.

Performance Based Navigation (PBN)

ICAO's PBN concept has extended area navigation (RNAV) techniques, originally centred upon lateral navigation accuracy only, to a more extensive statement of required navigation performance (RNP) relating to accuracy, integrity and continuity and how this performance will to be achieved in terms of aircraft and crew requirements. RNP relies primarily on the use of satellite technologies.

The major ATM change for PBN will rely on advanced navigational capabilities of aircraft facilitating the implementation of more flexible and environmentally friendly procedures. This will enable better access to airspace and airports and will lead to a reduction in greenhouse gas emissions, providing a direct contribution towards the decarbonisation of aviation.



During the **pre-SESAR** phase, precision (P)-RNAV approaches combined, where possible, with continuous descent/climb operation techniques, have been deployed in a number of airports/TMAs mostly executing local initiatives. In the absence of a European-wide mandate, implementation has progressed slowly due to the difficulty of handling mixed-mode operations, especially in complex and busy TMAs.

The PBN concept suggests that RNAV specifications are effectively legacy specifications and is firmly set on RNP. The **PCP** Regulation mandates a number of high complexity TMAs to move to an RNP1 environment however, PCP pertains to a limited geographical scope.

SESAR 1 Solution #10 'Optimised Route Network using Advanced RNP' provides a PBN solution to link Free Route airspace (FRA) above FL310, to the final approach via a set of defined and de-conflicted routes, from fixed entry points at the base of the FRA to the final approach segment.

PCP-RELATED FUNCTIONALITY

AF1 Extended Arrival Management and Performance Based Navigation in high density Terminal Manoeuvring Area

- *s-AF1.1 AMAN extended to En-Route Airspace*
- s-AF1.2 Enhanced Terminal Airspace using RNP-Based Operations

PBN, in particular RNP1/0.3 applications, can also support a further integration of rotorcraft into the ATM system. SESAR 1 has validated a Solution [#113] proposing optimised low-level IFR routes in TMA, which enable an optimised use of the airspace and improve connectivity between the airports in the TMA. The Solution has been translated into an Implementation Objective.

Medium Term View

The PBN Regulation currently under consultation will set the wider scenario for the implementation of PBN in Europe. The Regulation has incurred some delays and this has created some uncertainty in the stakeholders' implementation commitments. Overall, Europe's airspace concept is evolving to include the use of advanced RNP in en-route and terminal operations, and RNP APCH on the approach to all runways.

Stakeholder Perspective

The implementation of PBN requires a strong partnership between many actors, primarily ANSPs, airspace users and regulatory authorities as follows:

Airspace Users (AUs)

The airspace users will retain a substantial role in the implementation of the change through:

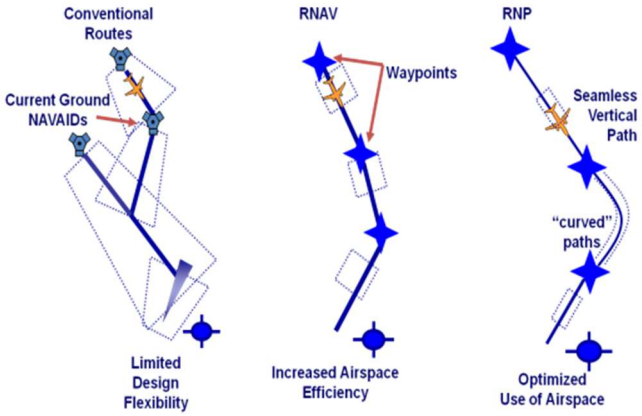
- The appropriate equipage of the airframes (e.g. RNAV 1 followed by RNP 1 capabilities) and,
- The training and the certification of aircrews.

These will allow the users to maximise benefits offered by the transition to a PBN environment.

Air Navigation Service Providers (ANSPs)

ANSPs will support this change by:

- Implementing new PBN procedures and airspace design, capitalising on improved navigation capabilities of aircraft.
- Adapting the ground navigation infrastructure in order to provide appropriate support to the airspace users.
- Deploying or updating of controller support tools (e.g. enhanced STCA), in order to take into account new patterns of traffic distribution.



Overall, this will allow a smoother evolution of the traffic (e.g. CDOs/CCOs, optimised route structure).

Regulatory Authorities

State authorities will play a key role in the implementation of PBN, not only to ensure its safe introduction through supervisory responsibilities, but also to actively participate in the development of an airspace concept that responds to the airspace users' requirements while preserving public interest.

Military Authorities

The military stakeholders will be involved in the implementation of PBN within their role as service providers as well as airspace users (flying IFR/GAT). The relevant capabilities of military aircraft with equivalent performance to that of civil airspace user aircraft will allow seamless integration of traffic flows and enable benefits from optimised airspace organisation and procedures.

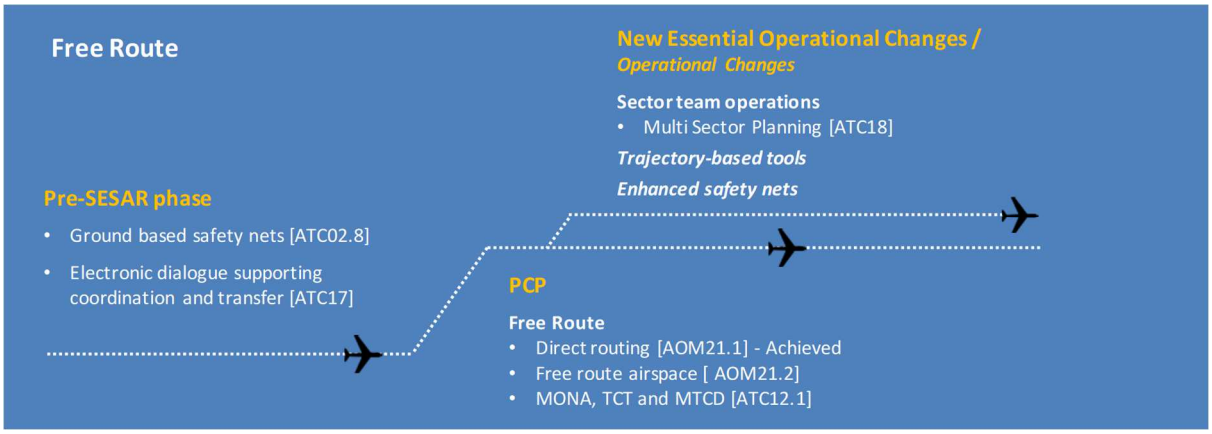
Performance Benefits

	Reduction in fuel burn through optimised routes and procedures.
	Emission of greenhouse gases and noise nuisance reduced by use of optimal flight procedures and routings.
	Improved through increased situational awareness, indirectly for both ATC and pilot through reduction of workload during RNAV/RNP/APV operations.
	Marginal improvement, in particular due to the implementation of APV procedures. This will allow improved access to airport in all weather conditions as well as lower minima, than what can be achieved with non-precision approaches.

Free Route

Free route airspace (FRA) is specified airspace within which users can freely plan a route between a defined entry point and a defined exit point, with the possibility of routeing via intermediate (published or unpublished) waypoints, without reference to the air traffic services (ATS) route network, subject to availability. Within FRA airspace, flights remain subject to air traffic control.

FRA is a response to the efficiency, capacity and environmental problems facing aviation. It represents a key milestone in achieving free routing across the entire European airspace on the road to SESAR business trajectories and 4D profiles.



During the **pre-SESAR phase**, the free route foundations have been laid by the deployment of several ground system support tools, facilitating the tasks of the controller in a free route environment as well as by initial, local deployments of direct routes or free route airspaces.

SUCCESS STORY: DIRECT ROUTING IMPLEMENTATION

During 2017, the implementation of Direct Routes (AOM21.1) has now been virtually completed within the "regulated" area (EU+, above FL310), with only one State (ES) having only partly implemented the functionality. In a very limited number of States, outside the regulated applicability area, the implementation will continue, with implementation plans extended until end-2019.

The wider scenario for the implementation of free route in Europe has been set up by the **PCP** Regulation, mandating the implementation of free route above flight level 310 in the entire European region (as an interim step, the implementation of direct routes is also envisaged by the Regulation). The implementation of the concept of operations will be accompanied by the deployment or upgrade of several controller support tools (e.g. medium-term conflict detection, conflict resolution assistant, area proximity warning, etc.) which are critical for the successful implementation of free route.

PCP-RELATED FUNCTIONALITY

AF3 Flexible Airspace Management and Free Route

- *s-AF3.1 ASM and Advanced Flexible Use of Airspace*
- s-AF3.2 Free Route

Furthermore, the **SESAR 1** programme has validated an additional technological solution potentially supporting the major ATM change: Enhanced STCA with downlinked parameters [Solution #69].

Medium Term View

Further implementation of free route will continue with more cross-border initiatives. This, together with more advanced controller tools and new ways of working, will bring additional flexibility and resilience in the network, and lead to the inherent harmonisation of airspace design, rules and operating practices in the European network, paving the way for trajectory based flights and flow-centric operations.

Stakeholder Perspective

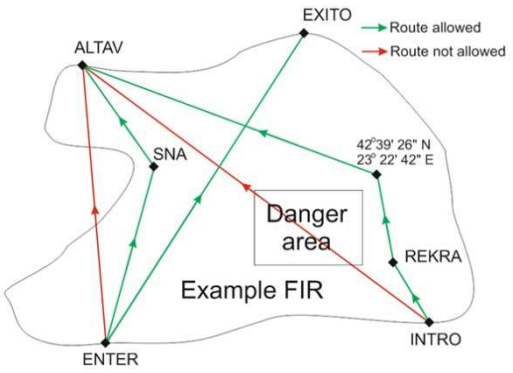
The implementation of free Route will require a concerted approach from airspace users, air navigation service providers and the Network Manager, with particular consideration to the assessment of impact on capacity.

Airspace Users (AUs)

The move from route-based airspace to free route airspace offers significant opportunities to airspace users. With the FRA concept compatible with current navigation capabilities, airspace users will need to adapt their flight planning systems to fully exploit the potential of free route airspace and reap the benefits.

Air Navigation Service Providers (ANSPs)

Operating a free route environment offers improved predictability due to more stable trajectories and the use of conflict detection tools. This concept can lead to a better spread of conflicts compared to the clustering of conflicts generated by the fixed route network. This new flexibility will require the deployment or upgrade of controller support tools.



Network Manager (NM)

The Network Manager has a crucial role to play in the deployment of free route. It will provide support to ANSPs with respect to airspace design, concepts of operation, advice on aeronautical publication and the pre-validation of each new free route environment to ensure that airspace users are able to plan flights in line with the concept. The NM will also provide applicable solutions to further enhance operational performance and resolve any potential problems, which may arise due to implementation of free route. This includes provision of proactive coordination, and technical and operational support for local or sub-regional free route airspace initiatives, ensuring that the requisite network improvements are in place to support the initiatives.

Performance Benefits

- Savings in route distances and fuel efficiency through increased use of preferred flight profiles.
- Reduction in emissions through use of optimal routes.
- Although the main benefits are expected in the area of environment, the FRA implementation has an ambition to at least maintain the current level of safety.
- Increased capacity through better airspace utilisation and reduced controller workload.

Collaborative Airport

Through this major ATM change, the airport will fully interface the landside with the ATM Network. Within this framework, airport operations planning, monitoring, management and post-operations analysis tools and processes are built into the airport operations plan (AOP) and the airport collaborative decision making (A-CDM), for normal, adverse and/or exceptional operating conditions. Target times of arrival will be derived from the AOP, and used by NM to balance arrival demand and capacity, to facilitate arrival management processes from the en-route phase.

The **pre-SESAR** phase establishes the foundation for this major ATM change focusing on concepts like:

- Local collaboration: Making the airport an interactive environment at local level, where information is shared and decisions are taken in a collaborative manner in terms of operations (A-CDM) but also in terms of safety (Local runway safety teams) and environmental aspects (Collaborative environmental management).
- Initial link to the network: Connecting the airport to the Network through the exchange of information with the Network Manager, and collaboratively manage flight updates (A-CDM).

Current plans show that deployment of this phase will be achieved within the 2018-2019 period.

The **PCP** Regulation builds on these concepts by transforming the A-CDM into an integrated airport operations plan, which dynamically connects the airport operator, ANSP and airline operations centre and, further integrating the airport with the network by connecting the AOP with NOP. The AOP will provide the NOP with airport constraints, target times for arrival, airport configurations, etc. in order to facilitate collaborative ATFCM processes. A further step will be to integrate airports into the ATM Network planning function, taking into consideration the operations influencing the airside processes. The 'AOP and AOP-NOP Seamless Integration' [Solution #21] supports this concept.

PCP-RELATED FUNCTIONALITY

AF4 Network Collaborative Management

- *s-AF4.1 Enhanced STAM measures*
- **s-AF4.2 Collaborative NOP**
- *s-AF4.3 Calculated Take- off Times (CTOTs) to Target Times of Arrival (TTA) for ATFM*
- *s-AF4.4 Automatic support for traffic complexity*

In order to support the integration in the ATM network of small/regional airports not implementing A-CDM or AOP, **SESAR 1** has validated a low cost solution to facilitate sharing of departure planning information with NM. This Solution [#61] supports the concept of 'Advanced ATC Tower'.

Medium Term View

The next step in this major ATM change will be the implementation of collaborative airport environment fully integrating the landside with the ATM Network. This is supported by the SESAR concept of airport operations centre (APOC). The APOC will allow stakeholders to communicate and coordinate, to develop and dynamically maintain joint plans and to execute those plans in their respective areas of responsibility. The APOC can be perceived as a 'Total Airport' management approach, with the airport operations plan at its core as the main source of information.

Stakeholder Perspective

This major ATM change is based on information sharing and collaborative decision-making, where cooperation and synchronisation between all involved stakeholders is paramount.

Airport Operators

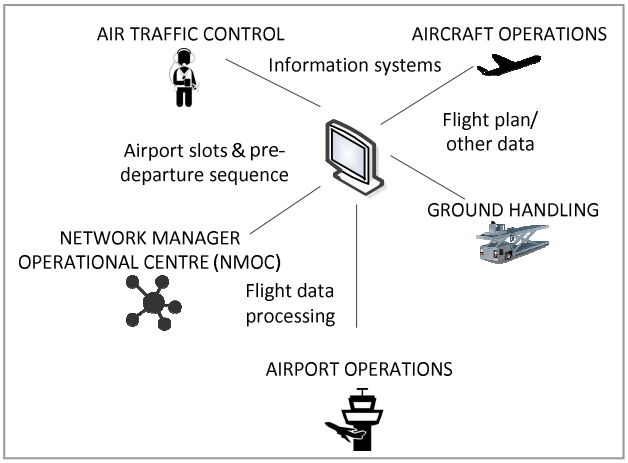
The airport operator will lead the implementation of this major ATM change by:

- Driving the local implementation of A-CDM, including connection to the network, by providing the NM with flight update messages (FUM) and departure planning information (DPI).
- In the second phase, setting up and operating the AOP that lies at the core of the collaborative airport concept. It will also be one of its main contributors by providing, e.g. airport configurations, operational capacity of airport resources, etc.
- Accomplishing the full integration of the landside, including ground handling, with the ATM Network as part of a 'Total Airport' management approach.

Air Navigation Service Providers (ANSPs)

The ANSP is a key partner of the airport operator for the implementation of this major ATM change:

- Participate in the A-CDM processes and,
- Provide and maintain the elements of the AOP within its responsibility, for example available airspace capacity, constraint factors (e.g. adjacent airports, military training areas, etc.).



Airspace Users (AUs)

Airspace users are another key partner in the A-CDM process and are one of its main beneficiaries. An important step forward will be the connection of airline operations centres' to the AOP, making airspace users both providers and users of its information.

Real-time availability of information will empower airspace users to make better strategic decisions according to their business needs.

Network Manager

NM will be responsible for achieving full integration of the NOP and the different European AOPs into a 'collaborative' NOP. It will enable the availability of shared operational planning and real-time data for all concerned stakeholders, making it the key enabler for CDM, both at network and airport level.

Performance Benefits

Better predictability of airport operations and significant resilience benefits through better management of forecast or unexpected capacity shortfalls. More flexibility, enabling airlines to consider their business requirements for a better decision-making.

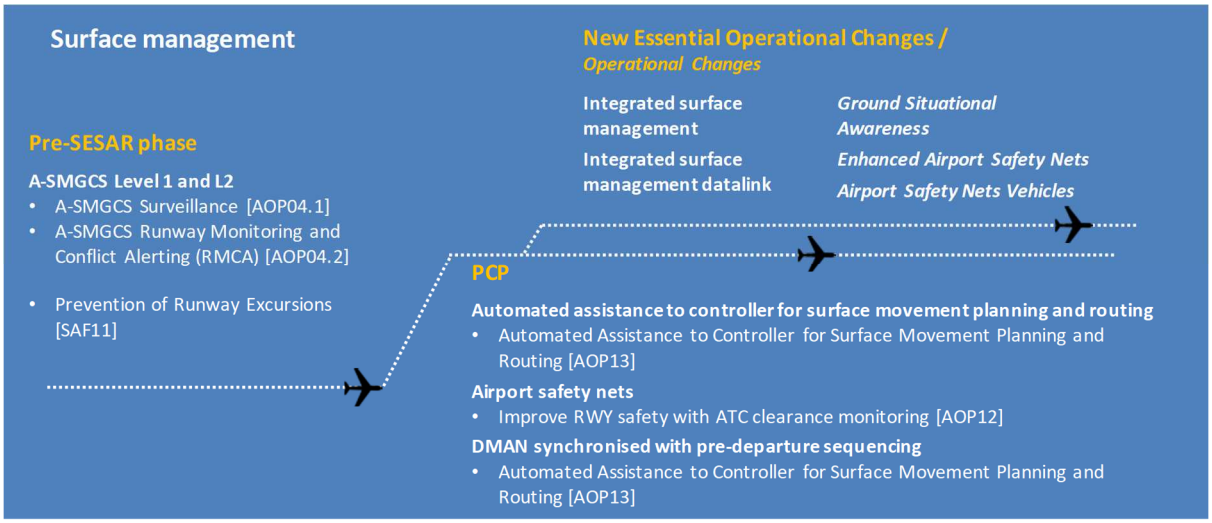
Improved through optimal use of facilities and services, better use of airport and ATFM slots. Reduction of structural delay - buffer time that the companies add to the planned flight time in order to statistically accommodate foreseeable delays.

Reduced noise and emissions thanks to better-timed operations enabling the reduction of engine ground running time.

Increased airport revenue through additional flights and passengers.

Surface Management

At busy airports, the management of arrivals and departures coupled with efficient and safe movement on the airport surface is a crucial part of managing an "on-time" airport. Improving airport surface operations is one of the key SESAR initiatives. Surface management provides critical situational awareness, visibility, alerts, and decision support to the airport and its stakeholders.



The **pre-SESAR** phase sets-up the foundation for this major ATM change through the widespread implementation of advanced surface movement guidance and control systems (A-SMGCS), in particular the 'Surveillance' service (former Level 1) which is a pre-requisite and the 'Runway Monitoring and Conflict Alerting (RMCA)' service (former Level 2); being the first element of the 'Airport Safety Support' service.

Additionally two ECAC-wide Action Plans, addressing runway incursions and excursions, are close to implementation.

The **PCP** Regulation mandates the implementation of automated assistance to controller for surface movement planning and routing, supplemented by departure management tools integrating surface management constraints and synchronised with pre-departure sequencing. To achieve this, the information on the use of taxi routes becomes crucial and it needs to be centralised, managed and distributed.

In terms of safety, the PCP Regulation mandates the full implementation of the Airport Safety Support service, including conflicting ATC clearances (CATC) and conformance monitoring alerts for controllers (CMAC).

PCP-RELATED FUNCTIONALITY

AF4 Airport integration and throughput

- s-AF2.1 DMAN synchronised with pre-departure sequencing
- s-AF2.2 DMAN integrating surface management constraints
- *s-AF2.3 Time-based separation for final approach*
- s-AF2.4 Automated assistance to controller for surface movement planning and routing
- s-AF2.5 Airport safety nets

The **SESAR 1** programme has validated additional SESAR Solutions further contributing to an integrated surface management, namely, Runway status lights [Solution #01] and Enhanced traffic situational awareness and airport safety nets for vehicle drivers [Solution #04]. Other SESAR 1 Solutions addressing guidance assistance through airfield ground lighting, the use of datalink between tower and crews, airport moving maps for flight crews or virtual block control in low visibility conditions are also in the pipeline for deployment.

Medium Term View

The next stage for this major ATM change, implied by the outcome of SESAR 1, is the use of airfield ground lighting for ATC purposes, the provision of enhanced displays, the integration of safety nets on-board vehicles and aircraft and the potential use of datalink for delivery of airport clearances.

Stakeholder Perspective

Stakeholder contribution to this major ATM change will include:

Air Navigation Service Providers (ANSPs)

In partnership with the airport operator, the ANSP will mainly be responsible for the implementation of:

- digital systems such as electronic flight strips (EFS),
- A-SMGCS 'Surveillance' and 'Airport Safety Support', which includes: runway monitoring and conflict alerting (RMCA), conflicting ATC clearances (CATC) and conformance monitoring alerts for controllers (CMAC),
- automated assistance to controller for surface movement planning and routing.

Based on local requirements and complexity, additional technical solutions may be implemented, e.g. assistance to vehicles and to flight crews through taxiway lighting, datalink between tower and crews and safety nets for vehicle drivers.

Airport Operators

The airport operator will be responsible for the integration of vehicles and vehicle drivers into the surface management system. All ground vehicles operating on the manoeuvring area need to be equipped to provide their position and identity to the surveillance system.

Optionally, depending on local needs and complexity, ground vehicles could be further equipped with systems providing safety net alerts to drivers, taxi information and clearances and/or in-vehicle access to ground clearances and information.

Airport operators will also be a key partner of the ANSP for the implementation of solutions based on airfield ground lighting (e.g. RWSL).

Airspace Users (AUs)

This major ATM change does not require additional equipment for airspace users, but AUs will need to update the training manuals for pilots.

Regulatory Authorities

Regulatory authorities will ensure, through appropriate mandates, that aircraft and vehicles are suitably equipped to enable their location and identification on the airport surface, where required.

Performance Benefits

Improved situational awareness of all actors and support to controller in detecting potentially hazardous conflicts on or near the runway or infringement of the runway.

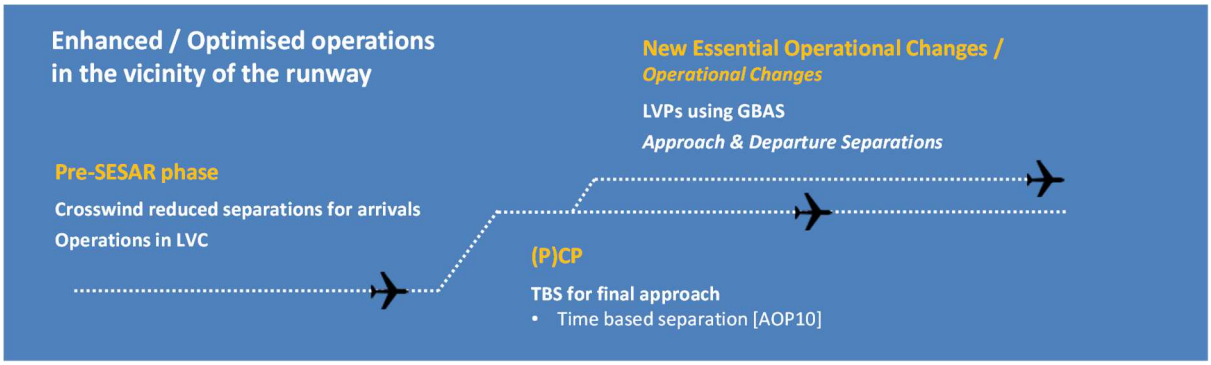
Increased availability of taxiway resources and reduced total taxi time by ground movements. Improved traffic flow on the manoeuvring area by providing more accurate taxi times to A-CDM platform for runway sequencing.

Reduced fuel consumption due to reduced taxi time.

Reduced noise and emissions thanks to better-timed operations enabling the reduction of engine ground running time.

Enhanced Operations in the Vicinity of the Runway

Flight operations in the vicinity of the runway, namely those pertaining to the final approach phase, can be optimised by a series of improvements related to separation management. Whilst maintaining safety levels, these improvements offer capacity and flight efficiency benefits and contribute to reducing cost and environmental impact, thereby providing benefits to airlines, ANSPs and airports.



During the **pre-SESAR** phase initial steps were taken to progress this major ATM change with the local implementation of reduced separations between aircraft for arrivals , taking into consideration wake turbulence categories ('RECAT') or under specific wind conditions (initial TBS / CREDOS project), and operations in low visibility conditions (LVC) that make use of enhanced ATC procedures and/or navigation systems.

The RECAT-EU solution (the new European separation standard for wake turbulence on approach and departure, and based on 6-categories), has initially been implemented at Heathrow airport. Its deployment is not mandatory, but is available for implementation where there is a positive benefits case. The operational use of the RECAT-EU scheme requires limited changes to the ATM system and no need for new technologies.

The **PCP** phase focuses on time-based Separation (TBS) for final approach. For TBS, separation between two successive aircraft in an arrival sequence is based on a time interval instead of distance. The equivalent distance information is calculated by the TBS support tool (taking account of prevailing wind and integration of relevant separation constraints and parameters), and displayed to the controller along with the time interval separations.

PCP-RELATED FUNCTIONALITY

AF4 Airport integration and throughput

- *s-AF2.1 DMAN synchronised with pre-departure sequencing*
- *s-AF2.2 DMAN integrating surface management constraints*
- **s-AF2.3 Time-based separation for final approach**
- *s-AF2.4 Automated assistance to controller for surface movement planning and routing*
- *s-AF2.5 Airport safety nets*

The PCP Regulation mandates the implementation of TBS in 16 major European airports. However currently, there are ongoing feasibility studies and local CBAs evaluations to determine the suitability of this functionality for their specific local environments.

The **SESAR 1** programme has validated a Solution [#55] for precision approaches, using ground-based augmentation of satellite navigation systems (GBAS) for CAT II/III operations. Since GBAS has limited or no protection areas compared to ILS, this solution has the potential to unlock capacity benefits, as well as enable a future rationalisation of airport infrastructure/s.

Medium Term View

The runway throughput enhancement solutions will be extended and integrated with the TBS tool, encompassing: weather-dependent separation (WDS), RECAT pairwise separation (PWS) – also for departures, reduced minimum surveillance separation (MSS) and enhanced arrival navigation procedures.

Stakeholder Perspective

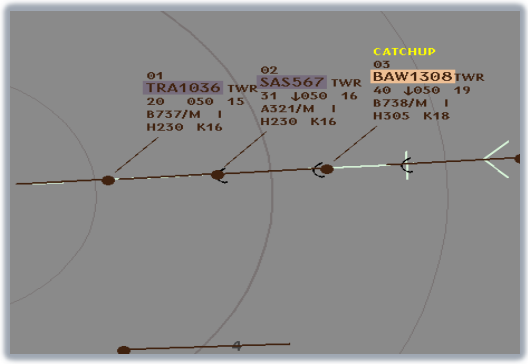
Stakeholders will contribute to this major ATM change as follows:

Air Navigation Service Providers (ANSPs)

ANSPs will be at the core of this major ATM change for the pre-SESAR and PCP phases since the majority of the elements related to operational changes fall under their responsibility. In particular, for the implementation of TBS, the ANSPs will have to ensure the integration of several elements:

- compatibility between AMAN and TBS systems;
- integration of the TBS tool, with safety nets, into the controller working position;
- integration of local MET info with actual glide-slope wind conditions into the TBS tool.

The TBS tool will also provide automatic monitoring and alerting of non-conformant behaviours, separation infringement and incorrect aircraft being turned on to a separation indicator. Controllers will therefore need adequate training for TBS procedures to ensure its safe introduction.



If a decision is made to implement GBAS CAT II/III procedures, whether locally or from a European perspective, the ANSPs will collaborate with the airport operators for the installation of the necessary ground equipment and development of procedures.

Airport Operators

Airport operators maintain a key role in this major ATM change for supporting and liaising with the ANSP in the local implementation of TBS. They will be the main stakeholder for the decision to implement GBAS CAT II/III operations, or for potential rationalisation of airport infrastructure.

Airspace Users (AUs)

Airspace users will need to brief aircraft crews on new separation modes (TBS / RECAT). For GBAS CAT II/III, it will be necessary to ensure aircraft are suitably equipped and airworthiness certification and operational approval has been secured.

Regulatory Authorities

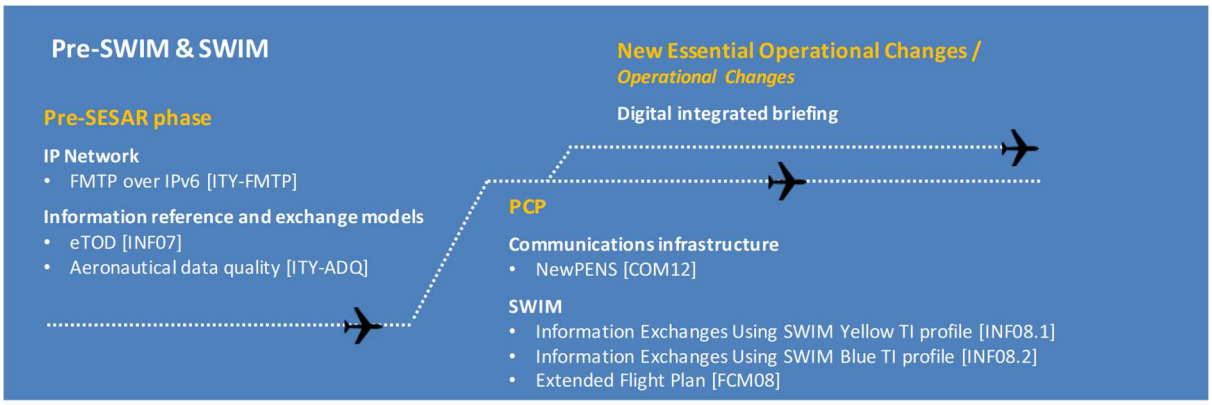
Regulatory authorities will ensure the safe introduction of local TBS procedures and systems but will also have an important role to play in the decision-making process for a potential widespread implementation of GBAS CAT II/III operations.

Performance Benefits

	More consistent separation delivery on final approach.
	Improved aircraft landing rates leading to increased airport throughput and resilience across wind conditions. Reduction in holding times and in stack entry to touchdown times leading to reduced delays.
	With the introduction of operations using GBAS CatII/III technology, cost efficiency is expected to improve.
	Reduced fuel consumption due to reduced holding times.
	Reduced emissions due to reduced holding times and stack entry to touchdown times.

Pre-SWIM and SWIM

System wide information management (SWIM) represents a paradigm change in information management throughout its lifecycle, within the European ATM system. The aim of SWIM is to provide users with relevant and commonly comprehensible information. This means making the right ATM information available at the right time to the right stakeholder. SWIM brings the industry-based information technology approach of service-orientated architecture (SOA), to the European ATM system where all stakeholders are able to access, share and process ATM information through SWIM-enabled applications and services, fully aligned with the ICAO Manual on SWIM Concept. Through this major ATM change, information exchange will move from a peer-to-peer (legacy) infrastructure to an agile, high quality and secure information sharing environment, flight object related, enabling seamless operations and full digitalisation.



The **pre-SESAR** phase is expected to set up a firm foundation for SWIM implementation. This includes migration to an internet protocol-based network (IPv6) for the peer-to-peer communications of flight information and the deployment of a rigorous baseline of aeronautical data with appropriate level of quality, integrity and format. This requires the involvement of a broad range of stakeholders, from the State authorities up to the originators and users of aeronautical data. Whilst noting the risks of delay associated with the implementation of aeronautical data quality, it is anticipated that the baseline will be in place by 2019.

PCP-RELATED FUNCTIONALITY

AF5 Initial SWIM

- s-AF5.1 Common infrastructure components
- s-AF5.2 SWIM Technical infrastructure and profiles
- s-AF5.3 Aeronautical information exchange
- s-AF5.4 Meteorological information exchange
- s-AF5.5 Cooperative network information exchange
- s-AF5.6 Flight information exchange

The pre-SESAR baseline will be used for the extensive implementation of initial SWIM (Yellow profile used for exchange of ATM data (e.g. aeronautical, meteorological (MET), airport, etc.), and Blue profile used for exchange of flight information in relation to the flight object), required by the **PCP** Regulation and supported by the Pan-European Network Service (PENS) to provide a common IP-based network service across the entire European region. Initial SWIM will encompass governance, security, technical infrastructure and profiles, SWIM foundation, ATM Information Reference Model (AIRM) and Information Service Reference Model (ISRM). The exchange of MET information via SWIM is, addressed by Solution #35.

Furthermore, the **SESAR 1** programme has validated one additional solution addressing a Digital Integrated Briefing [Solution #34].

Medium Term View

The next step will be to build on the SWIM infrastructure and continue the ATM digitalisation process with the overall aim to deploy a state of the art information-sharing infrastructure, integrating aircraft and ground systems in a globally interoperable and harmonised manner.

Stakeholder Perspective

The implementation of the major ATM change will require the contribution of all stakeholders, in full concert and across the whole ATM data chain, with a particular involvement of the ANSPs.

Air Navigation Service Providers (ANSPs)

The ANSPs will play a significant role in the implementation of the major ATM change. Adaptation of the data communication infrastructure to IPv6 has begun and it will continue with the implementation of appropriate infrastructure components and data exchanges, in the quest for full ATM digitalisation.

Network Manager (NM)

NM will support the deployment of NewPENS through the migration of the own systems, supplemented with the implementation of the appropriate infrastructure components and data exchanges.

Airport Operators

Airport operators will facilitate a data originator role, with responsibility for the collection, management and provision of (electronic) terrain and obstacle data (eTOD) and assurance of the quality of aeronautical data and information under their responsibility. With the introduction of SWIM, appropriate infrastructure components and data exchanges will also require deployment.

Airspace Users (AUs)

The Airspace Users will provide the Network with the appropriate information being also at the receiving end of the information flow with the NM. The major ATM change will oversee the implementation of these information exchanges.

Regulatory Authorities

While not directly involved in the technical implementation, the regulatory authorities will play a crucial role in deployment by setting up and overseeing the appropriate policies and regulatory frameworks related to aeronautical data and aeronautical information.

Military Authorities

Depending on their tasks, military authorities will participate in specific roles: regulatory authorities, data originators, airport operators, air navigation providers and airspace users. These roles, taking into account the specifics of the military and their primary role will be similar to the role of the stakeholders identified above.

Industry

The implementation of the major ATM change will need suitable systems and constituents that will be developed and made available by the ATM manufacturing industry.

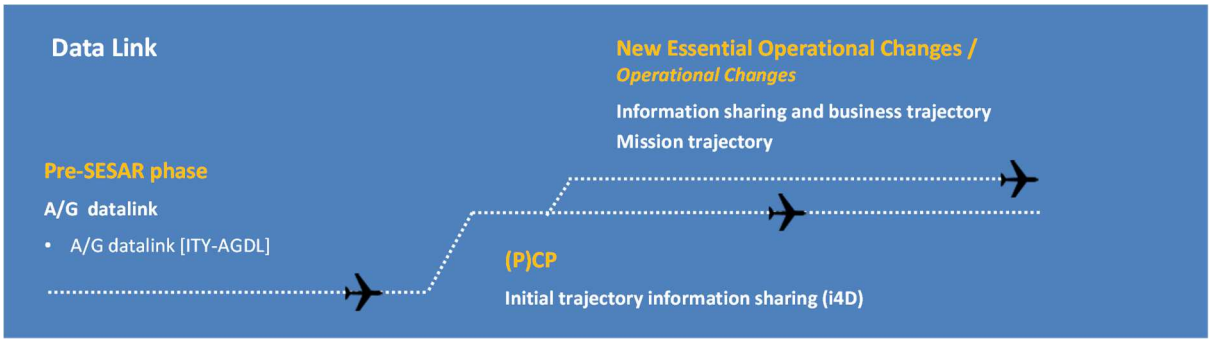
Performance Benefits

The implementation of SWIM is an enabler for unlocking multiple potential applications. Therefore, benefits will be dependent upon applications that will operate over the SWIM infrastructure and cannot be generically quantified or qualified. However, some benefits triggered by the improvement of quality of aeronautical data and of aeronautical information, in terms of safety and security can be highlighted:

- Improved consistency, reliability and integrity of aeronautical data and aeronautical information as well as the availability of quality-assured electronic terrain and obstacle data from authoritative sources.
- Enhanced security due to the implementation of security requirements as required by the ADQ Regulation.

Data Link

Data link (DL) is an essential enabler for the implementation of trajectory-based operations (TBO) which will see the sharing of the same information between airborne and ground systems through the business-mission trajectory lifecycle. Owing to data link-based TBO, flight and flow centric operations will be possible in a network context enabling the implementation of new concepts of operation. It can therefore be said, that there can be no Single European Sky without data link!



In the **pre-SESAR phase**, the first step in DL was to connect pilots and controllers (controller–pilot datalink communications - CPDLC) to support routine non-time critical communications; to increase safety and efficiency in the short term and to lead to new ways of working in the future, paving the way for more advanced DL applications. CPDLC is a method by which air traffic controllers can communicate with pilots over a DL system, replacing voice communication with data messages. Technical issues during implementation have led to delays in the deployment of DL. This has triggered an action by the European Commission in mandating the SESAR Deployment Manager to act as Data Link Services (DLS) Implementation Project Manager and to set up a DLS Recovery Plan, with the objective to put the implementation of DL back on track. The Recovery Plan issued in October 2016, was aimed at identifying relevant actors, milestones and listing activities needed to be undertaken in order to achieve the full DLS implementation in Europe whilst circumventing inappropriate investments.

This activity will continue through the initial **PCP** timeframe, be supplemented in due course with other initiatives, leading to initial trajectory information sharing to be succeeded by full information sharing in support of the performance of business/mission trajectory.

PCP-RELATED FUNCTIONALITY

AF6 Initial Trajectory Information Sharing

· s-AF6.1 Initial trajectory information sharing (i4D)

Additionally, the **SESAR 1** programme has validated an additional technological solution supporting the major ATM change:

- Air traffic services (ATS) datalink using Iris precursor [Solution #109]

Medium Term View

Following on from the implementation of the DL first step, the focus will move to further integration between airborne and ground systems with a view to accomplish full 4D information sharing. This will be done with full coordination with ATM modernisation programs outside Europe and in particular, with NextGen.

Stakeholder Perspective

The full implementation of the major ATM change will enable a paradigm change in the provision of air navigation services, requiring contribution, dedication and synchronisation of all stakeholders in Europe and beyond.

Air Navigation Service Providers (ANSPs)

The ANSPs (this may include communication service providers, not providing other types of air navigation services) together with the airspace users, will play the main role in the implementation of DL. The implementation of CPDLC will continue with further integration of the ground systems with the airborne systems, and the deployment of automatic dependent surveillance-Contract (ADS-C) allowing more flight centric operations and new methods of service provision.

Airspace Users (AUs)

The Airspace Users will play a critical role by collaborating with ANSPs in the transition to DL. AUs will be required to deploy airborne components and associated procedures supporting DL throughout its evolution, from CPDLC to 4D trajectory sharing via ADS-C for flight management system (FMS) trajectory prediction downlink.

Network Manager (NM)

NM will support implementation through multiple initiatives, from flight plan filtering to the migration of systems and procedures, in support of operations based on full sharing of trajectory between all relevant stakeholders.

Military Authorities

The main role of the military authorities will be as airspace users. They will benefit from the move to mission trajectory based operations, but in order to do so, they will be required to participate in trajectory information sharing and update their systems accordingly. However, it is acknowledged that the specific situation of military fleets and the nature of their operations (even when flying IFR/GAT) may raise specific issues, which will be managed during the implementation process and for the operations, thereafter.

Regulatory Authorities

Ultimately, the implementation of the major ATM change may lead to a paradigm shift in the provision of services. The change process will be governed by the regulatory authorities, who will create an appropriate framework and oversee the new operating environment.

Performance Benefits

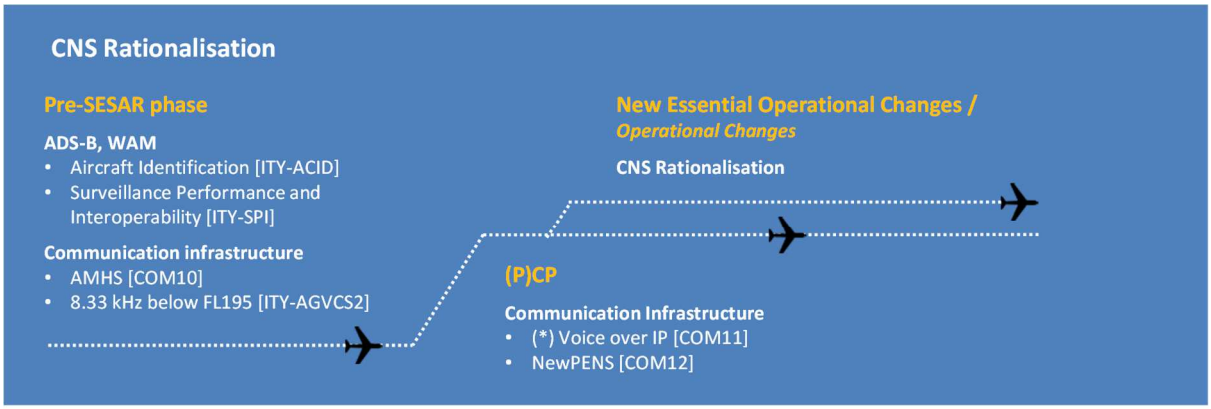
The performance benefits will be evident with the introduction of CPDLC but will increase substantially with the progress towards trajectory-based operations. The following enumeration is limited to the benefits realised by CPDLC.

Enhanced through the delivery of standard and unambiguous message and reduction of miscommunications.

Additional capacity obtained through increased controller productivity, because of a reduction in voice communications.

CNS Rationalisation

Development of the CNS rationalisation, an aspect of the infrastructure key feature, is one of the main priorities for the ATM Master Plan update 2018, with multiple preparatory activities taking place or due to start under the SESAR 2020 banner. It is anticipated that the current independent activities supporting CNS rationalisation will be consolidated in an overarching strategic approach. Pending the availability of the above-mentioned strategy, the current strategic view is focussed on developments already being performed in the pre-SESAR phase, and consolidated by the PCP regulation.



(*) Not mandated by the PCP Regulation but enabling some related operational changes.

In the **pre-SESAR** phase, the main driver for change was the SES interoperability Regulation and implementing rules. In this phase, the implementation initiatives addressed specific shortcomings faced by the European Air Traffic Management Network (e.g. shortage of VHF frequency assignments, shortage of SSR transponder codes, surveillance spectrum protection, etc.) and support for the deployment of new technologies (e.g. ADS-B, AMHS, etc.). These initiatives, implemented mostly in the timeframe 2018-2020 will set a firm foundation for new concepts of operations in the field of communication and surveillance, unlocking the potential for CNS rationalisation.

In the **PCP** timeframe, the baseline will include new features, particularly in the field of communication infrastructure (e.g. Voice over IP and New PENS). These new features are potential enablers for PCP implementation (e.g. VoIP) or essential prerequisites for the successful implementation of the PCP (e.g. New PENS).

The **SESAR 1** programme has validated an additional technological solution supporting the major ATM change for, among which the most promising for implementation in the incoming future:

- ADS-B surveillance of aircraft in flight and on the surface [Solution #110]

Medium Term View

The next step for this major ATM change will be to consolidate the current and proposed evolutions into a robust Strategy, viewing C, N and S from a holistic perspective and in line with the vision for future ATM systems, enabling a lean and efficient use of the CNS infrastructure.

Stakeholder Perspective

The implementation of this major ATM change will require contributions from all operational stakeholders, with a particular emphasis on the synchronisation between airborne and ground deployment.

Air Navigation Service Providers (ANSPs)

The ANSPs will need to deploy the new CNS ground infrastructure, which may impose changes to their ATM systems/procedures extending beyond the CNS systems (e.g. flight/surveillance data processing systems and HMI) alone. These changes will require implementation with minimal disruption to service provision and an awareness for the need to safely accommodate traffic with differing capabilities.

Network Manager (NM)

The major ATM change will be impact the NM to a lesser extent as it does not operate surveillance or a navigation infrastructure of its own. However, the NM will support the changes by adapting its systems (e.g. ground-ground communications with its stakeholders) as well as its services and applications to take into account the new infrastructure (e.g. flight plan flagging/filtering).

Airspace Users (AUs)

The Airspace Users will play a critical role in the implementation for CNS infrastructure rationalisation, which will be dependent on new CNS capabilities of aircraft. The change will take into account the time required for aircraft equipage and the fact that some old airframes may never be equipped.

Airport Operators

Airport operators will contribute to the implementation of the major ATM change through rationalisation of their CNS infrastructure. This refers only to the communication infrastructure used in relation to their stakeholders, but depending on the local conditions and organisations, it may also address the surveillance and the navigation infrastructure as well.

Military Authorities

The military authorities will specific roles to play, depending on their tasks: regulatory authorities, airport operators, air navigation providers and airspace users. The most significant contribution will come from its airspace user role. The equipage requirements will need to take into account specific constraints for military fleets (e.g. lengthy procurements, technical constraints, large fleets, certification mismatch).

Regulatory Authorities

While not directly involved in the technical implementation, the regulatory authorities will play a crucial role in setting up and overseeing appropriate policies and regulatory frameworks.

Industry

The implementation of the major ATM change will require suitable systems and constituents which will be made available by the ATM manufacturing industry.

Performance Benefits

Enhanced safety through reduction of harmful interference currently caused by the use of systems in a less rationalised way.

More cost efficient systems replacing legacy systems based on outdated technologies or allowing the decommissioning of legacy systems/constituents.

Additional capacity through the deployment of new cost-efficient CNS solutions in areas where they are not currently deployed (e.g. ADS-B in non-radar areas).

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3. SESAR SOLUTIONS IN THE IMPLEMENTATION PLAN

One of the main drivers of the Implementation Plan is to gradually incorporate the results of the SESAR Programme, in particular, the validated and performing SESAR Solutions stemming out of SESAR 1.

The Implementation Plan naturally incorporates those SESAR Solutions that are subject to regulated implementation through the EU legal framework. Other Solutions should find their way into the Level 3 through the development of deployment scenarios that, in turn, need to fulfil a number of conditions so the Solution is subject to a coordinated / harmonised deployment. The need for an agreed process and set of criteria to define which Solutions are incorporated in the Implementation Plan is identified in the Risk Management chapter and should be addressed.

The following tables show the current coverage of SESAR 1 Solutions in this edition of the Implementation Plan, per SESAR Key Feature.

Optimised ATM Network Services

PCP Related Solutions

	SESAR Solution	MP Level 3 Implementation Objective
Sol #17	Advanced short-term ATFCM measures (STAMs)	FCM04.2
Sol #18	Calculated take-off time (CTOT) and target time of arrival (TTA)	FCM07
Sol #19	Automated support for traffic complexity detection and resolution	FCM06
Sol #20	Initial collaborative network operations plan (NOP)	FCM05
Sol #31	Variable profile military reserved areas and enhanced civil-military collaboration	AOM19.1, AOM19.2, AOM19.3, AOM19.4

Non-PCP Related Solutions

	SESAR Solution	MP Level 3 Implementation Objective
Sol #56	Enhanced air traffic flow management (ATFM) slot swapping	FCM09
Sol #57	User-driven prioritisation process (UDPP) – departure	-

Advanced Air Traffic Services

PCP Related Solutions

	SESAR Solution	MP Level 3 Implementation Objective
Sol #05	Extended arrival management (AMAN) horizon	ATC15.2
Sol #09 & #51	RNP 1 operations	NAV03.2
Sol #32 & #65	Direct Routing	AOM21.1*
Sol #33	Free Route through the use of Free Routing for flights both in cruise and vertically evolving in cross ACC/FIR borders and within permanently low to medium complexity environments	AOM21.2
Sol #66	Automated support for dynamic sectorisation	AOM21.2-ASP03
Sol #103	Approach Procedures with vertical guidance	NAV10

**After 2017, this objective/solution has been considered 'Achieved' and therefore has been removed from the Implementation Plan 2018*

Non-PCP Related Solutions

	SESAR Solution	MP Level 3 Implementation Objective
Sol #06	Controlled time of arrival (CTA) in medium-density/medium-complexity environments	-
Sol #08	Arrival management into multiple airports	-
Sol #10	Optimised route network using advanced RNP	-
Sol #11	Continuous descent operations (CDO) using point merge	
Sol #27	Enhanced tactical conflict detection & resolution (CD&R) services and conformance monitoring tools for en-route	ATC12.1
Sol #60	Enhanced STCA for TMA specific operations	ATC02.9
Sol #62	Precision area navigation (P-RNAV) in a complex terminal airspace	NAV03.1
Sol #63	Multi-Sector Planning	ATC18
Sol #69	Enhanced STCA with down-linked parameters	-
Sol #104	Sector Team Operations - En-route Air Traffic Organiser	ATC12.1
Sol #105	Enhanced airborne collision avoidance system (ACAS) operations using the autoflight system	-
Sol #107	Point merge in complex terminal airspace	-
Sol #108	Arrival Management (AMAN) and Point Merge	-
Sol #113	Optimised Low Level IFR routes for rotorcraft	NAV12

High-Performing Airport Operations

PCP Related Solutions

	SESAR Solution	MP Level 3 Implementation Objective
Sol #02	Airport safety nets for controllers: conformance monitoring alerts and detection of conflicting ATC clearances	AOP12
Sol #21	Airport operations plan (AOP) and its seamless integration with the network operations plan (NOP)	AOP11, FM05
Sol #22	Automated assistance to controllers for surface movement planning and routing	AOP13
Sol #53	Pre-departure sequencing supported by route planning	AOP13-ASP02
Sol #64	Time-based separation	AOP10

Non-PCP Related Solutions

	SESAR Solution	MP Level 3 Implementation Objective
Sol #01	Runway status lights	-
Sol #04	Enhanced traffic situational awareness and airport safety nets for vehicle drivers	-
Sol #12, 13, 52 & #71	Remote tower	AOP14
Sol #23	D-TAXI service for controller-pilot datalink communications (CPDLC) application	-
Sol #47	Guidance assistance through airfield ground lighting	-
Sol #48	Virtual block control in low visibility procedures (LVPs)	-
Sol #54	Flow based integration of arrival and departure management	-
Sol #55	Precision approaches using GBAS Category II/III	-
Sol #61	A low-cost and simple departure data entry panel for the airport controller working position	-
Sol #70	Enhanced ground controller situational awareness in all weather conditions	(**)
Sol #106	DMAN Baseline for integrated AMAN DMAN	AOP05
Sol #116	De-icing management tool	(***)

(**) Linked to the Level 3 via AOP04.1, however this objective is technology-agnostic (not necessarily via ADS-B)

(***) DIMT is implemented via AOP05 as part of A-CDM, but not necessarily as an internet-based tool

Enabling Aviation Infrastructure

PCP Related Solutions

	SESAR Solution	MP Level 3 Implementation Objective
Sol #35	Meteorological information exchange	INF08.1
Sol #37	Extended flight plan	FCM08
Sol #46	Initial system-wide information management (SWIM) technology solution	INF08.1
Sol #115	Extended Projected Profile (EPP) availability on ground	Awaiting clarification on PCP AF6 functionality

Non-PCP Related Solutions

	SESAR Solution	MP Level 3 Implementation Objective
Sol #34	Digital integrated briefing	-
Sol #67	AOC data increasing trajectory prediction accuracy	-
Sol #100	ACAS Ground Monitoring and Presentation System	-
Sol #101	Extended hybrid surveillance	-
Sol #102	Aeronautical mobile airport communication system (AeroMACS)	-
Sol #109	Air traffic services (ATS) datalink using Iris Precursor	-
Sol #110	ADS-B surveillance of aircraft in flight and on the surface	-
Sol #114	Composite Surveillance ADS-B / WAM	-

4. DEPLOYMENT VIEW

The Deployment View is organised per SESAR Key Feature and, for each one provides an overview of the associated implementation objectives and their planned deployment in the form of a Gantt chart. Each implementation objective is then described in a more detailed deployment view answering:

- **What**: providing a brief description of the improvement to be implemented;
- **Why**: detailing the performance benefits brought by the objective;
- **Who**: listing the ATM stakeholders involved in its implementation;
- **When**: presenting agreed timelines;
- **Where**: setting the geographical scope for implementation;
- **How**: breaking down the actions to be taken by each stakeholder.

In addition, for each objective a preview is given of the reported implementation progress, and some additional information like links to SESAR Level 1 and 2 elements, ICAO Aviation Systems Block Upgrades (ASBUs), Families of the DP and applicable legislation and standards.

The progress status for each objective comes from the Master Plan Level 3 2017 Implementation Report and described in the following terms:

On time	implementation progress is on time and no delays are expected;
Risk of delay	the estimated achievement date is in line with the FOC date, but there are risks which could jeopardise timely implementation of the objective;
Planned delay	the estimated achievement date is beyond the FOC date. Stakeholders already envisage delays the implementation. FOC date is still in the future, some corrective measures can still be taken to achieve the objective in line with its FOC date;
Late	the estimated achievement date is beyond the FOC date and the FOC date is already past;
Not available	objectives in their first year of monitoring; the data collected does not allow yet determining a reliable estimated achievement date or a progress status.
Completion rate – end 2017:	refers to the percentage of States/airports that have reported the objective as 'completed' (cf. LSSIP[3] 2017).
Estimated achievement	the date of estimated achievement is calculated as the year when the objective's implementation is at least 80% completed in the applicability area.

Additionally, those objectives that have not been monitored in 2017 and therefore no progress status can be determined are identified as:

- **New:** new objective introduced in this edition of the Implementation Plan;
- **New 'Active':** objective that was 'Initial' in the edition 2017 (and therefore not monitored) and has been changed to 'Active' in this edition of the Implementation Plan;
- **Initial:** objective introduced in the Implementation Plan for which some elements still require validation and therefore area not yet monitored.

Detailed explanation of the terminology used throughout this chapter is provided in Annex 1 - Definitions and Terminology.

[3] Local Single Sky ImPlementation (LSSIP) – ECAC-wide EUROCONTROL reporting process on Single European Sky ATM changes

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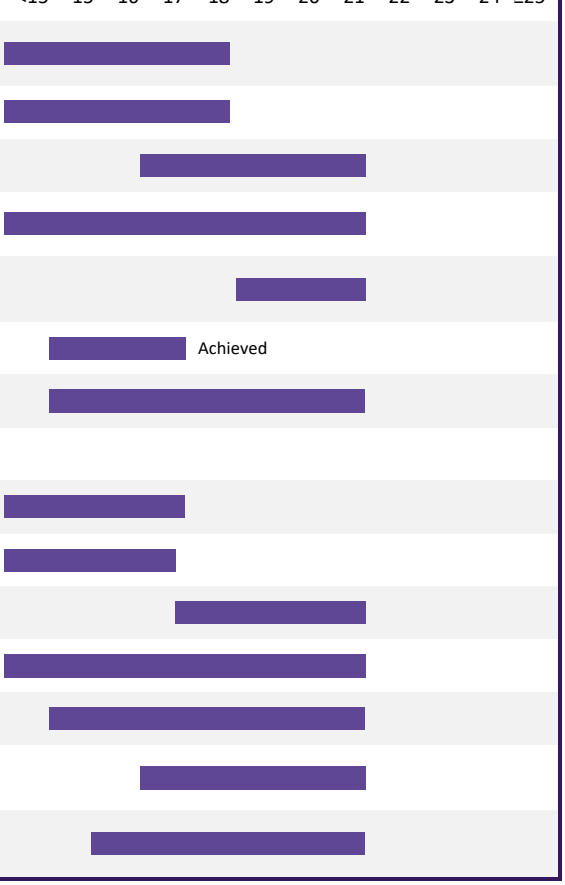
Implementation Objectives – Deployment Views Index

Table 1 - Implementation Objectives – Deployment Views Index

Optimised ATM network services

		<15	15	16	17	18	19	20	21	22	23	24	≥25
AOM13.1	Harmonise Operational Air Traffic (OAT) and General Air Traffic (GAT) handling												
AOM19.1	ASM Support Tools to Support AFUA												
AOM19.2	ASM Management of Real-Time Airspace Data												
AOM19.3	Full Rolling ASM/ATFCM Process and ASM Information Sharing												
AOM19.4	Management of Pre-defined Airspace Configurations												
AOM21.1	Direct Routing (*)												
AOM21.2	Free Route Airspace (**)												
FCM03	Collaborative Flight Planning												
FCM04.1	STAM Phase 1												
FCM04.2	STAM Phase 2												
FCM05	Interactive Rolling NOP												
FCM06	Traffic Complexity Assessment												
FCM07	Calculated Take-Off Time (CTOT) to Target Times for ATFCM Purposes												
FCM09	Enhanced ATFM Slot Swapping												



(**) AOM21.1 was achieved during 2017 and therefore removed from the Implementation Plan. It is kept in this graph for traceability purposes but no deployment view is presented in the next chapters

(**) This objective is described in the section addressing Advanced Air Traffic Services

The objective codes in the MP Level 3 appearing in this section refer to:

- AOM – Airspace Organisation and Management
- FCM – Flow and Capacity Management

A full definition of all acronyms can be found in Annex 1-Definitions and Terminology.

AOM13.1 - Harmonise OAT and GAT Handling

This objective aims at ensuring that the principles, rules and procedures for handling operational air traffic (OAT) and general air traffic (GAT) are commonly applied to the maximum possible extent within ECAC airspace. Harmonised rules are set in the 'EUROCONTROL Specifications for harmonized Rules for OAT under Instrument Flight Rules (IFR) inside controlled Airspace (EUROAT)'.

OAT means 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.

GAT means all movements of aircraft carried out in conformity with ICAO procedures.

SESAR Key Feature:	Optimised ATM Network Services
OI Steps & *Enablers*:	AOM-0301, *AAMS-10a, AIMS-19b*
Dependencies:	No dependencies
Network Strategy Plan:	SO6/2
Operating Environment:	En-Route, Mixed, Network
EATMN Systems:	ASM, AIS

When

FOC: **31/12/2018**

Who

Stakeholders:
- Regulators
- ANSPs
- Military

Where

Applicability Area
All ECAC States except Albania, Latvia, Luxembourg, Maastricht UAC, Malta and Moldova.

Status

On time

Completion rate - end 2017: **33%**

Estimated achievement: **12/2018**

Applicable regulations & standards

- Regulation (EC) No 2150/2005 on common rules for the flexible use of airspace
- Regulation (EU) 2015/340 on technical requirements and administrative procedures relating to air traffic controllers' licences and certificates pursuant to Regulation (EC) No 216/2008

Benefits

Operational Efficiency

Increased efficiency of civil-military operations through the use of harmonised procedures at pan-European level.

Safety

Less risk of error through the use of common rules and procedures for OAT handling and for OAT/GAT interface.

Security

Increased through robust pan-European OAT provisions and structures to effectively support national and multinational military operations.

Regulatory Lines of Action:

REG01	**Revise national legislation as required** - Perform conformance analysis between existing rules and the EUROAT specification and determine, changes of regulatory material, where necessary. - Develop and enact national regulations and rules pertinent to this specification.	31/12/2018

ANSPs Lines of Action:

ASP01	**Apply common principles, rules and procedures for OAT handling and OAT/GAT interface**	31/12/2018
ASP02	**Train staff as necessary** - Train ATCOs in the provision of ATS to OAT-IFR flights including the new procedures introduced by the implementation of this objective.	31/12/2018

Military Lines of Action:

MIL01	**Apply common principles, rules and procedures for OAT handling and OAT/GAT interface**	31/12/2018
MIL02	**Provide feedback on result of conformance analysis between national rules to EUROAT** - Provide EUROCONTROL with a national point of contact (POC) and a distribution list for the dissemination of EUROAT specification.	31/12/2012
MIL04	**Migrate military aeronautical information to EAD**	31/12/2015

Changes to the Objective since previous edition:

- Added operating environment.

AOM19.1 – ASM Tools to Support AFUA

Deploy airspace management (ASM) support tools and their interoperability with the Network Management's systems to support advanced FUA (AFUA) by managing airspace reservations resulting from civil-military co-ordination, more flexibly according to airspace users' needs. These tools enable improved ASM processes at strategic, pre-tactical and tactical levels, they support dynamic and flexible sector configurations and are capable of sharing real-time airspace status and possibly provide data for impact assessment of airspace configurations. This objective is an enabler for AOM19.2 and AOM19.3.

SESAR Solutions:	Solution #31 Variable profile military reserved areas and enhanced civil-military collaboration
SESAR Key Feature:	Optimised ATM Network Services
Essential Operational Change / PCP:	S-AF3.1 Airspace Management and Advanced FUA
DP Families:	3.1.1 ASM Tool to support AFUA
OI Steps & *Enablers*:	AOM-0202, AOM-0202-A
Dependencies:	No dependencies
ICAO ASBUs:	B1-FRTO, B1-NOPS
Network Strategy Plan:	SO3/2, SO3/3
Operating Environment:	Terminal, Mixed, En-Route, Network
EATMN Systems:	ASM

When

FOC: **31/12/2018**

Who

Stakeholders:
- ANSPs
- Network Manager

Where

Applicability Area
All ECAC States except Armenia, Georgia, FYROM, Malta, Luxembourg, and Moldova

Status

On time

Completion rate - end 2017: **19%**

Estimated achievement: **12/2018**

Applicable regulations & standards

- Regulation (EC) 2150/2005 - Implementation and Application FUA
- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Capacity
Increased through better utilisation of airspace resources within and across airspace boundaries leading to reduction of flight delays.

Operational Efficiency
Increased through the availability of more optimum routes/trajectories allowing lower fuel burn.

Safety
Improved through a shared real-time airspace status display and enhanced, common situational awareness of all players.

ANSPs Lines of Action:

ASP01	**Deploy automated ASM support systems** - Deploy ASM support systems (LARA or locally developed ones) to support the local or sub-regional airspace planning and allocation (without interface with NM - covered by ASP02).	31/12/2018
ASP02	**Implement interoperability of local ASM support system with NM system** - Adapt local ASM support systems to make them interoperable with NM system. - Conclude the Operational Access Acceptance Activities required to validate the ASM tool interfacing NM system via B2B service. - Update the existing agreement with NM in order to cover B2B services.	31/12/2018
ASP03	**Improve planning and allocation of airspace booking** - Improve planning and allocation of reserved/segregated airspace at pre-tactical ASM level 2 by: - Planning reserved/segregated airspace utilization in accordance with actual need; - Releasing reserved/segregated non used airspace as soon as activity stops; - Utilising reserved/segregated airspace that has not been planned in airspace use plan (AUP). - This should be enabled by the measurement of FUA Indicators.	31/12/2018

Network Manager Lines of Action:

NM01	**Integrate local ASM support systems with NM systems** - Integrate the local automated ASM support systems with NM systems. - Update existing agreement NM-ANSP in order to cover B2B services.	31/12/2018

Changes to the Objective since previous edition:

- Improved definitions of ASP02 and NM01.
- Added operating environment.
- Georgia removed from the applicability area.
- Removed link to ICAO GANP ASBU B0-FRTO.

AOM19.2 – ASM Management of Real-Time Airspace Data

Implement enhanced airspace management (ASM) by automated, real-time, continuous exchange services of ASM data during the tactical phase. ASM information (airspace reservation (ARES) status) is shared between ASM systems, civil and military ATS units/systems and communicated to NM. These data are collected, saved and processed in order to be exchanged between ASM stakeholders and be made available to ATM actors; while some airspace users are not directly involved in ASM process, they will be notified by the NM.

SESAR Solutions:	Solution #31 Variable profile military reserved areas and enhanced civil-military collaboration
SESAR Key Feature:	Optimised ATM Network Services
Essential Operational Change / PCP:	S-AF3.1 Airspace Management and Advanced FUA
DP Families:	3.1.2 ASM management of real time airspace data
OI Steps & *Enablers*:	AOM-0202-A, AOM-0206-A
Dependencies:	AOM19.1, AOM19.3
ICAO ASBUs:	B1-FRTO, B1-NOPS
Network Strategy Plan:	SO3/2, SO3/3
Operating Environment:	Terminal, Mixed, En-Route, Network
EATMN Systems:	ASM, FDPS/SDPS & HMI

When

FOC: **31/12/2021**

Who

Stakeholders:
- ANSPs
- Airspace users
- Network Manager

Where

Applicability Area
All ECAC States except Armenia, Luxembourg, Georgia, FYROM, Malta, and Moldova

Status

Not available

Completion rate - end 2017: **3%**

Estimated achievement: **Not available**

Applicable regulations & standards

- Regulation (EC) 2150/2005 - Implementation and Application FUA
- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Capacity
Increased through better utilisation of airspace resources within and across airspace boundaries leading to reduction of flight delays.

Operational Efficiency
Increased through the availability of more optimum routes/trajectories allowing lower fuel burn.

Safety
Better knowledge of traffic environment, common situational awareness, and some enhancement through reduction in controller workload.

ANSPs Lines of Action:

ASP01	**Adapt ATM systems for real-time ASM data exchanges**	31/12/2021
ASP02	**Adapt local ASM support system for real-time ASM data exchanges with NM systems**	31/12/2021
ASP03	**Implement procedures related to real-time (tactical) ASM level III information exchange** - Develop and implement the ASM/ATFCM and ATC procedures for ASM real time data exchanges with different actors and systems (NM, military authorities, AMC, ATC).	31/12/2021

Airspace Users Lines of Action:

USE01	**Adapt airspace users systems for real-time ASM data exchanges with NM** - Adapt systems (computer flight plan software providers (CFSP)) for real-time ASM data exchanges.	31/12/2021

Network Manager Lines of Action:

NM01	**Adapt ATM systems for real-time ASM data exchanges** - Enhance systems to receive and process real-time airspace activation, de-activation and modification of airspace reservation (ARES) and include this information in the Network Operations Plan (NOP).	31/12/2021
NM02	**Implement procedures related to real-time (tactical) ASM level III information exchange** - Develop and deploy procedures for ASM real time data exchanges with different actors and systems (NM, military authorities, CFSPs, ATC, AMC), including a Network impact assessment of the airspace changes resulting of the real-time airspace data exchanges.	31/12/2021

Changes to the Objective since previous edition:

- Added link to OI step AOM-0206-A.
- Added operating environment.
- Georgia, FYROM and Malta removed from the applicability area.

AOM19.3 – Full Rolling ASM/ATFCM Process and ASM Information Sharing

The full rolling ASM/ATFCM process shall ensure a continuous, seamless and reiterative airspace planning and allocation based on airspace requests at any time period within strategic (level 1), pre-tactical (level 2) and tactical (level 3) ASM levels; the process will also support the deployment of Airspace Configurations. It will result in the enhancement of the daily Network Operations Plan (NOP) allowing airspace users to better benefit from changes in airspace structures in closer to the event.

SESAR Solutions:	Solution #31 Variable profile military reserved areas and enhanced civil-military collaboration
SESAR Key Feature:	Optimised ATM Network Services
Essential Operational Change / PCP:	S-AF3.1 Airspace Management and Advanced FUA
DP Families:	3.1.3 Full rolling ASM/ATFCM process and ASM information sharing
OI Steps & *Enablers*:	AOM-0202, AOM-0202-A
Dependencies:	AOM19.1, AOM19.2
ICAO ASBUs:	B1-FRTO, B1-NOPS, B2-NOPS
Network Strategy Plan:	SO3/2, SO3/3
Operating Environment:	Terminal, Mixed, En-Route, Network
EATMN Systems:	ASM, ATFCM

When

FOC: **31/12/2021**

Who

Stakeholders:
- ANSPs
- Airspace users
- Network Manager

Where

Applicability Area
All ECAC States except Armenia, Luxembourg, Georgia, FYROM, Malta, and Moldova

Status

Not available

Completion rate - end 2017: **5%**

Estimated achievement: **Not available**

Applicable regulations & standards

- Regulation (EC) 2150/2005 - Implementation and Application FUA
- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Capacity
Increased through better utilisation of airspace resources within and across airspace boundaries leading to reduction of flight delays.

Operational Efficiency
Increased through the availability of more optimum routes/trajectories allowing lower fuel burn.

Safety
Better knowledge of traffic environment, common situational awareness, and some enhancement through reduction in controller workload.

ANSPs Lines of Action:

ASP01	**Adapt ASM systems to support a full rolling ASM/ATFCM process** - System improvements supporting a full management of airspace structures via AUP/UUP and initial CDM.	31/12/2021
ASP02	**Implement procedures and processes for a full rolling ASM/ATFCM process** - Develop processes supporting a full rolling and dynamic ASM/ATFCM process – process for a full management of airspace structure via AUP/UUP and process for initial CDM.	31/12/2021

Airspace Users Lines of Action:

USE01	**Adapt airspace users systems to improve ASM notification process** System improvements at airspace users' operations centers for full management of AUP/UUP airspace structure via B2B service.	31/12/2021
USE02	**Implement procedures in support of an improved ASM notification process**	31/12/2021

Network Manager Lines of Action:

NM01	**Adapt NM systems to support a full rolling ASM/ATFCM process**	31/12/2021
NM02	**Implement procedures and processes for a full rolling ASM/ATFCM process**	31/12/2021
NM03	**Improve ASM notification process** - Improve ASM notification process by improving the European AUP/UUP and updates (EAUP/EUUP) including harmonisation of areas notifications and cross border CDRs (Conditional Routes) notifications. - Graphical display of AUP/UUP on NOP Portal.	31/12/2021

Changes to the Objective since previous edition:

- Added operating environment.
- Revised description of objective and SLoAs to avoid overlaps with AOM19.4.
- Georgia, FYROM and Malta removed from the applicability area.
- Added link to ICAO GANP ASBU B2-NOPS.

AOM19.4 – Management of Pre-defined Airspace Configurations [New]

Implement an improved ASM solutions process, the management of pre-defined airspace configurations and the process and supporting tools for an improved ASM performance analysis.

The ASM solutions process aims at delivering ASM options (e.g. predefined airspace scenarios) that can help alleviate capacity issues in the European airspace as well as improve flight efficiency assessing impact on capacity and ensuring synchronised availability of optimised airspace structures based on traffic demand.

Pre-defined airspace configurations are based on coordinated and validated combinations of airspace structures and ATC dynamic sectorisation, to meet airspace needs in terms of capacity and/or flight efficiency.

SESAR Key Feature:	Optimised ATM Network Services
Essential Operational Change / PCP:	S-AF3.1 Airspace Management and Advanced FUA
DP Families:	3.1.4 Management of dynamic airspace configurations
OI Steps & *Enablers*:	Under definition
Dependencies:	AOM19.1, AOM19.2
ICAO ASBUs:	B1-FRTO, B1-NOPS
Network Strategy Plan:	SO3/2, SO3/3
Operating Environment:	Terminal, Mixed, En-Route, Network
EATMN Systems:	ASM, ATFCM

When

FOC: **31/12/2021**

Who

Stakeholders:
- ANSPs
- Network Manager

Where

Applicability Area
All ECAC States except Armenia, Luxembourg, Georgia, FYROM, Malta, and Moldova

Status

New objective

Completion rate - end 2017: **n/a**

Estimated achievement: **n/a**

Applicable regulations & standards

- Regulation (EC) 2150/2005 - Implementation and Application FUA
- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Capacity

Increased through better utilisation of airspace resources within and across airspace boundaries leading to reduction of flight delays.

Operational Efficiency

Increased through the availability of more optimum routes/trajectories allowing lower fuel burn.

ANSPs Lines of Action:

ASP01	**Adapt ATM systems to support the management of ASM solutions and pre-defined airspace configurations** Adapt ATM systems including: - system changes for ASM solutions; - system changes for predefined airspace configurations; - sharing of the ASM solutions, pre-defined airspace configuration inputs and outputs via B2B services.	31/12/2021
ASP02	**Implement procedures in support of an improved ASM solution process and the management of pre-defined airspace configurations** - Implement procedures including an ASM solution process and process changes for predefined airspace configurations.	31/12/2021

Network Manager Lines of Action:

NM01	**Adapt NM systems to support the management of pre-defined airspace configurations**	Finalised
NM02	**Implement procedures in support of an improved ASM solution process and the management of pre-defined airspace configurations**	Finalised
NM03	**Implement tools in support of ASM performance analysis** Implement tools and processes in support of ASM performance analysis in order to assess the flight efficiency gains resulting from the rolling ASM/ATFCM process implementation.	31/12/2021

Changes to the Objective since previous edition:

- New objective.

FCM03 – Collaborative Flight Planning

Improve collaboration between the NM, ANSPs, airports and airspace users in flight plan (FP) filing, in particular to assist airspace users in filing their FPs and in re-routings according to the airspace availability and ATFM situation.

The ATC flight plan (AFP) messages sent to the NM serve purpose of:
- Enabling NM to provide ATC Units with more accurate FP information, improving their traffic situation awareness and reducing the workload caused by last minute updates or missing FPs.
- Updating the ETFMS with FP information in order to reflect as accurately as possible the current and future flight trajectories, providing accurate sector load calculations.

SESAR Key Feature:	Optimised ATM Network Services
Essential Operational Change / PCP:	- Basic Network Operations Planning - Pre-requisite for PCP/AF4 Network Collaborative Management
DP Families:	4.2.3 Interface ATM systems to NM systems
OI Steps & *Enablers*:	IS-0102
Dependencies:	No dependencies
ICAO ASBUs:	B0-NOPS
Network Strategy Plan:	SO4/2, SO5/1, SO5/6
Operating Environment:	Airport, Terminal, Mixed, En-Route, Network
EATMN Systems:	ATFCM, FDPS/SDPS & HMI

When

FOC: **31/12/2017**

Who

Stakeholders:
- ANSPs
- Network Manager

Where

Applicability Area
All ECAC States

Status

Late

Completion rate - end 2017: **50%**

Estimated achievement: **12/2018**

Applicable regulations & standards

N/A

Benefits

Operational Efficiency

A better traffic prediction will enhance traffic smoothing allowing less “unnecessary” actions to be taken. Earlier awareness of the updated traffic situation will permit the Flow Management Positions to consider and implement remedial actions to reduce the impact of the measures taken to accommodate the traffic. From the perspective of the airspace users, better traffic prediction will provide improved ability to maintain accurate estimated off-block times (EOBTs) for the return and subsequent legs for a flight/aircraft.

Capacity

Better use of the available network capacity hence reducing delays.

Safety

Prevention of ATCO overload.

ANSPs Lines of Action:

ASP01	**Provide flight plan message processing in ICAO format**	Finalised
ASP02	**Automatically process FPLs derived from RPLs**	Finalised
ASP03	**Provide flight plan message processing in ADEXP format**	31/12/2012
ASP04	**Processing of APL and ACH messages**	Finalised
ASP05	**Automatically provide AFP for missing flight plans**	31/12/2017
ASP06	**Automatically provide AFP message for change of route**	31/12/2017
ASP07	**Automatically provide AFP message for a diversion**	31/12/2017
ASP08	**Automatically provide AFP message for a change of flight rules or flight type**	31/12/2017
ASP09	**Automatically provide AFP message for a change of requested cruising level**	31/12/2017
ASP13	**Automatically provide AFP message for change of aircraft type**	31/12/2017
ASP14	**Automatically provide AFP message for change of aircraft equipment**	31/12/2017

Network Manager Lines of Action:

NM01	**Integration of Automatic AFP in NM systems**	31/12/2017

Changes to the Objective since previous edition:

- Added operating environment.
- Status changed from ‘Planned Delay’ to ‘Late’.

FCM04.1 – STAM Phase 1

The aim is to improve the efficiency of the system using flow management techniques close to the real time operations with direct impact on tactical capacity management, occupancy counts and tactical action on traffic. The target of the short-term ATFCM measures (STAM) is to replace en-route CASA (Computer Assisted Slot Algorithm) regulations for situations where the capacity is nominal. This objective deals with the initial version of STAM, based mostly on procedures.

SESAR Key Feature:	Optimised ATM Network Services
Essential Operational Change / PCP:	Pre-requisite for PCP AF4 Network Collaborative Management
DP Families:	4.1.1 STAM phase 1
OI Steps & *Enablers*:	DCB-0205
Dependencies:	No dependencies
Network Strategy Plan:	SO4/3, SO5/4
Operating Environment:	En-Route, Mixed, Network
EATMN Systems:	ATFCM

When

FOC: **31/10/2017**

Who

Stakeholders:
- ANSPs
- Network Manager
- Airspace Users

Where

Applicability Area
Austria, Belgium, Bosnia & Herzegovina, Croatia, Czech Republic, France, Germany, Hungary, Italy, Maastricht UAC, Poland, Spain, Slovak Republic, Slovenia, Switzerland, UK

Status

Late

Completion rate - end 2017: **60%**

Estimated achievement: **10/2018**

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Capacity

Sector occupancy counts are used to identify “hotspots” where action can be taken to reduce traffic complexity. This results in a streamlined ATCO workload, thus improving capacity and safety.

Safety

Some enhancement through the prevention of ATCO overloads.

ANSPs Lines of Action:

ASP01	**Availability of demand-capacity balancing tools via CHMI**	31/10/2017
ASP02	**Provision of ANSPs sector and traffic occupancy parameters data to NM**	31/10/2017
ASP03	**Implement FCM Procedures to enable application of flow management techniques on traffic streams closer to real-time and including more accurate assessment of forecast sector loads and cooperative management of groups of sectors and ATCO resources**	31/10/2017
ASP04	**Develop, and deliver as necessary, a safety assessment of the changes imposed by the implementation of Short Term ATFCM Measures Phase 1**	31/10/2017

Airspace Users Lines of Action:

USE01	**Availability of demand-capacity balancing tools via CHMI**	31/10/2017

Network Manager Lines of Action:

NM01	**Develop and implement demand-capacity balancing tools via CHMI**	Finalised
NM02	**Integration of ANSPs sector and traffic occupancy parameters data into NM systems**	31/10/2017

Changes to the Objective since previous edition:

- Added operating environment.
- Status changed from ‘On time’ to ‘Late’.
- Removed link to ICAO GANP ASBU B0-NOPS.
- Bosnia & Herzegovina, Hungary, Maastricht UAC, Slovak Republic, Slovenia and UK added to the applicability area.

FCM04.2 – STAM Phase 2

Short-term ATFCM measures (STAM) consists of a system supported approach to smooth sector workloads by reducing traffic peaks through short-term application of minor ground delays, appropriate flight level capping, timing and modalities of ATC re-sectorisation, exiguous re-routings to a limited number of flights. These measures are capable of reducing the traffic complexity for ATC with minimum curtailing for the airspace users.

SESAR Solutions:	Solution #17 Advanced Short ATFCM Measures (STAM)
SESAR Key Feature:	Optimised ATM Network Services
Essential Operational Change / PCP:	S-AF4.1 Enhanced Short Term ATFCM Measures
DP Families:	4.1.2 STAM phase 2
OI Steps & *Enablers*:	DCB-0308, *ER APP ATC 17*
Dependencies:	No dependencies
Network Strategy Plan:	SO4/3, SO5/4
Operating Environment:	En-Route, Mixed, Network
EATMN Systems:	ATFCM

When

FOC: **31/12/2021**

(Only for EU States + Norway and Switzerland)

Who

Stakeholders:
- ANSPs
- Network Manager
- Airspace Users

Where

Applicability Area
All ECAC States except Armenia, Georgia and Moldova

Status

Not available

Completion rate - end 2017: **3%**

Estimated achievement: **Not available**

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Capacity
Effective capacity is globally optimised thanks to replacement of some ATFCM regulations with the STAM measures, hotspot reduction and its more efficient management.

Operational Efficiency
Improved through the proposition of the most appropriate measures according with the type of flight.

Safety
Small enhancement through the resolution of some conflicts through STAM measures.

ANSPs Lines of Action:

ASP01	**Develop STAM procedures and upgrade the local systems** - This SLoA is only applicable to those ANSPs for which, due to their local environments, the NM application is not sufficient, therefore the development/upgrade of local systems is needed.	31/12/2021
ASP02	**Use of STAM phase 2** - This SLoA is relevant for the ANSPs which are using the NM provided STAM P2 application, without deploying local tools.	31/12/2021
ASP03	**Train the personnel**	31/12/2021

Airspace Users Lines of Action:

USE01	**Airspace Users to deploy the appropriate tools and associated procedures** - This SLoA addresses in particular the flight planning services as well as the communication of the STAM measures to the crews.	31/12/2021

Network Manager Lines of Action:

NM01	**Update the NM systems and develop the associated procedures**	31/12/2021
NM02	**Train the personnel**	31/12/2021

Changes to the Objective since previous edition:

- Added operating environment.
- Applicability area fully reviewed.
- Objective scope changed from EU+ to ECAC.
- Removed link to ICAO GANP ASBU B0-NOPS (typo correction).

FCM05 – Interactive Rolling NOP

This objective consists in the implementation of a platform that uses the state-of-the art technologies for creation of a virtual operations room for the physically distributed European ATM Network Operations, in support of the collaborative Network Operations Plan (NOP). This platform will support the network collaborative rolling processes from strategic to real-time operations, including capabilities for online performance monitoring integrated and feeding back into the collaborative network planning. Also, the platform provides access to post-operational data for offline analysis and performance reporting.

SESAR Solutions:	Solution #20 Initial collaborative NOP
SESAR Key Feature:	Optimised ATM Network Services
Essential Operational Change / PCP:	S-AF4.2 Collaborative NOP
DP Families:	4.2.2 Interactive Rolling NOP 4.2.4 AOP/NOP Information Sharing
OI Steps & *Enablers*:	DCB-0102, DCB-0103-A
Dependencies:	AOM19.1
ICAO ASBUs:	B1-ACDM, B1-NOPS
Network Strategy Plan:	SO2/1, SO2/2, SO2/3, SO2/4
Operating Environment:	Airport, Terminal, Mixed, En-Route, Network
EATMN Systems:	ATFCM

When

FOC: **31/12/2021**

Who

Stakeholders:
- ANSPs
- Airspace Users
- Airport Operators
- Network Manager

Where

Applicability Area
All ECAC States except Armenia, FYROM, Luxembourg, Maastricht UAC and Moldova

Status

On time

Completion rate - end 2017: **8%**

Estimated achievement: **12/2021**

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Cost Efficiency
Enhanced through use of cost efficient tools to access network information instead of expensive local tools or procedures.

Capacity
Small benefits through improved use of the airport and airspace capacity resulting from a better knowledge of the airspace availability and of the traffic demand.

Safety
Enhanced by improved sharing of the network situation.

ANSPs Lines of Action:

ANSP SLoA listed in objective AOM19.1, identified as a dependency to this objective, are also relevant for FCM05. These SLoAs address the “Upgrade the automated ASM support system with the capability of AIXM 5.1 B2B data exchange with NM” and “The integration of the automated ASM support systems with the Network”.

ASP04	**Develop and implement ATFCM procedures for interaction with the NOP**	31/12/2021
ASP05	**Train the relevant personnel for interaction with the NOP**	31/12/2021

Airport Operators Lines of Action:

APO01	**Provide the required data to the Network Manager for Demand Data Repository (DDR)**	31/12/2017
APO02	**Perform the integration of the AOP with the NOP**	31/12/2021

Airspace Users Lines of Action:

USE01	**Provide the required data to the Network Manager for DDR**	31/12/2017

Network Manager Lines of Action:

NM01	**ADR to provide, common and consolidated view of European airspace data containing both static and dynamic digital data**	Finalised
NM02	**Upgrade NM system for external user access to the airspace data repository (making restrictions available in AIXM 5.1 format via B2B)**	Finalised
NM03	**Equip Airspace management system with tools for collection of airspace data (Interoperability with ASM tools in AIXM 5.1)**	Finalised
NM04	**Perform an integration of ASM support systems with the Network**	Finalised
NM05	**Upgrade NM systems to allow the access of interested users to the DDR**	Finalised
NM06	**Implement FCM Procedures for on-line access/update to the NOP and notification of updates**	Finalised
NM07	**Upgrade NM systems to allow FMP to remote access simulation via the NOP Portal (create of simulations and assessment of the results) and in a second step to edit scenario measures (regulation, config, capacities,...) prior to running simulations**	Finalised
NM08	**Flight Plan filing capability directly via the NOP portal**	Finalised
NM09	**Develop AOP/NOP interfaces**	31/12/2018
NM10	**Integrate the AOPs into the Network Operation Plan**	31/12/2021
NM12	**Enhance the NM technical platform and services**	31/12/2021
NM13	**Implement appropriate procedures**	31/12/2021

Changes to the Objective since previous edition:

- Added operating environment.
- Removed link to ICAO GANP ASBU B0-NOPS and added link to B1-ACDM.

FCM06 – Traffic Complexity Assessment

The rigid application of ATFCM regulations based on standard capacity thresholds needs to be replaced by a close working relationship between ANSPs and the NM, which would monitor both the real demand and the effective capacity of sectors having taken into account the complexity of expected traffic situation.

The traffic complexity tools continuously monitor sector demand and evaluate traffic complexity (by applying predefined complexity metrics) according to a predetermined qualitative scale. The predicted complexity coupled with traffic demand enables ATFCM actors to take timely action to adjust capacity, or request the traffic profile changes in coordination with ATC and airspace users.

SESAR Solutions:	Solution #19 Automated support for Traffic Complexity Detection and Resolution
SESAR Key Feature:	Optimised ATM Network Services
Essential Operational Change / PCP:	S-AF4.4 Automated Support for Traffic Complexity Assessment
DP Families:	4.4.2 Traffic Complexity tools
OI Steps & *Enablers*:	CM-0101, CM-0103-A, *NIMS-20*
Dependencies:	No dependencies
ICAO ASBUs:	B1-NOPS
Network Strategy Plan:	SO4/3, SO5/4
Operating Environment:	Terminal, Mixed, En-Route, Network
EATMN Systems:	ATFCM, FDPS/SDPS & HMI

When

FOC: **31/12/2021**

(Only for EU States + Norway and Switzerland)

Who

Stakeholders:
- ANSPs
- Network Manager

Where

Applicability Area
All ECAC States except Luxembourg

Status

Not available

Completion rate - end 2017: **11%**

Estimated achievement: **Not available**

Applicable regulations & standards

- Regulation (EU) 677/2011 - Implementation of ATM network functions amending Regulation (EU) No 691/2010
- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Operational Efficiency

Increased through use of more optimal routes leading to fuel saving and lower CO2 emissions.

Safety

The better ATCO workload predictability via deployment of the traffic complexity assessment tool will lead to safety gains. Enhancement also through reduction in controller workload.

ANSPs Lines of Action:

ASP01	**Implement Local Traffic Load Management tool** - The automated tools shall support the continuous monitoring of the traffic loads per network node (sector, waypoint, route, route-segment) according to declared capacities and provide support to the local resource management.	31/12/2021
ASP02	**Receive, process and integrate ETFMS Flight Data (EFD)** - The local FDPS to receive, process and integrate EFD provided by NM in the local traffic complexity assessment tool.	31/12/2021
ASP03	**Implement Local Traffic Complexity tools and procedures** - Local traffic complexity assessment tolls shall receive process and integrate EFD provided by NM.	31/12/2021

Network Manager Lines of Action:

NM01	**Provide ETFMS Flight Data (EFD) to the local traffic complexity tools**	31/12/2021
NM02	**Improved trajectory in NM systems** - Adapt NM systems to improve the quality of the planned trajectory, thus enhancing flight planning and complexity assessment. They adaptation addresses: operational deployment of EFPL, processing of ATC information, processing of OAT FPL information and support to mixed mode operations.	31/12/2021
NM03	**Network Traffic Complexity Assessment** - Implementation of scenario management tools in support of traffic complexity management in the pre-tactical phase. This tool is built on the planned trajectory information and allows simulating options optimising the use of available capacity. - It is intended to support NM operations by identifying the possible mitigation strategies to be applied at network or local level, in coordination with FMPs and airspace users. - In addition there is a need to develop a procedure related to implementation of traffic count methodologies that do not impact trajectory calculation.	31/12/2021

Changes to the Objective since previous edition:

- Added operating environment.
- Luxembourg removed from the applicability area.
- Objective scope changed from EU+ to ECAC.
- Removed link to ICAO GANP ASBU B0-NOPS.

FCM07 – Calculated Take-off Time (CTOT) to Target Times for ATFCM Purposes

Target times (TT) shall be applied to selected flights for ATFCM purposes to manage ATFCM at the point of congestion rather than only at departure. Where available, the target times of arrival (TTA) shall be derived from the airport operations plan (AOP).

TTAs shall be used to support airport arrival sequencing processes in the en-route phase. NM's systems shall be able to adjust CTOTs based on refined and agreed TTAs at the destination airport; TTAs shall be integrated into the AOP for subsequent refinement of the NOP. Flight data processing systems may need to be adapted in order to process downlinked trajectory data (ADS-C EPP).

In a first step, NM system will transmit calculated target times (TT) at the most penalising regulation reference point in addition to CTOT to all concerned users. Those users should manage this new feature so potential system upgrades should be foreseen.

SESAR Solutions:	Solution #18 CTOT and TTA
SESAR Key Feature:	Optimised ATM Network Services
Essential Operational Change / PCP:	S-AF 4.3 Calculated Take-Off Time (CTOT) to Target Times of Arrival (TTA) for ATFCM
DP Families:	4.3.1 - Target Time for ATFCM purposes 4.3.2 - Reconciled target times for ATFCM and arrival sequencing
OI Steps & *Enablers*:	DCB-0208
Dependencies:	No dependencies
ICAO ASBUs:	B1-NOPS
Network Strategy Plan:	SO4/3, SO6/4
Operating Environment:	Terminal, Mixed, En-Route, Network
EATMN Systems:	ATFCM, FDPS/SDPS & HMI

When

FOC: **31/12/2021**

Who

Stakeholders:
- ANSPs
- Airport Operators
- Airspace users
- Network Manager

Where

Applicability Area
All EU+ States

Status

'Initial' objective

Completion rate - end 2017: **n/a**

Estimated achievement: **n/a**

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Capacity

The involvement in TT generation of local actors has a positive impact on capacity and delay reduction.

Operational Efficiency

Reduced flight time in TMA leading to an optimised flight arrival management in the TMA. Reduction of holdings along with radar vectoring, with positive impact on fuel burn.

ANSPs Lines of Action:

ASP01	**Adapt ATM/ATFCM systems to enable the Target Times extraction and presentation to relevant operational personnel**	31/12/2021
ASP02	**Implement procedures and processes in support of Target Time sharing**	31/12/2021
ASP03	**Adapt systems to support Calculated Take-off Time to Target Times for ATFCM purposes**	31/12/2021
ASP04	**Implement procedures and processes in support of Calculated Take-off Time to Target Times for ATFCM purposes**	31/12/2021

Airport Operators Lines of Action:

APO01	**Adapt airport systems, as required, to support Calculated Take-off Time to Target Times for ATFCM purposes**	31/12/2021
APO02	**Implement procedures and processes in support of Calculated Take-off Time to Target Times for ATFCM purposes**	31/12/2021

Airspace Users Lines of Action:

USE01	**Adapt systems at airspace users' operations centers to enable Target Times extraction and distribution**	31/12/2021
USE02	**Implement procedures and processes to adhere to TTs, to the extent possible**	31/12/2021
USE03	**Adapt systems to support Calculated Take-off Time to Target Times for ATFCM purposes**	31/12/2021
USE04	**Implement procedures and processes in support of Calculated Take-off Time to Target Times for ATFCM purposes**	31/12/2021

Network Manager Lines of Action:

NM01	**Adapt NM systems to support Target Time sharing**	31/12/2021
NM02	**Adapt systems to support Calculated Take-off Time to Target Times for ATFCM purposes**	31/12/2021
NM03	**Implement procedures and processes in support of Calculated Take-off Time to Target Times for ATFCM purposes**	31/12/2021

NOTE: This objective provides advance notice to stakeholders. Some aspects of the objective require further validation.

Changes to the Objective since previous edition:

- Added operating environment.
- Added link to ICAO GANP ASBU B1-NOPS.

FCM09 – Enhanced ATFM Slot Swapping

The enhanced ATFM slot swapping improves the current slot swapping by allowing its extension to within the same group of airlines/operators (i.e. an alliance), by reprioritizing their flights during the pre-tactical part of operations.

The enhanced process increases flexibility for airspace users and provides a wider range of possibilities, by facilitating the identification of possible swaps for a regulated flight and also by reducing the rate of rejection of swap request.

The Network Manager will supervise the swapping or changing of flight priority requests.

SESAR Solutions:	Solution #56 Enhanced ATFM Slot Swapping
SESAR Key Feature:	Optimised ATM Network Services
Essential Operational Change:	Intermediate step towards UDPP - User Driven Prioritisation Process
OI Steps & *Enablers*:	AUO-0101-A
Dependencies:	No dependencies
ICAO ASBUs:	B1-NOPS
Network Strategy Plan:	SO6/1
Operating Environment:	Network
EATMN Systems:	ATFCM

When

FOC: **31/12/2021**

Who

Stakeholders:
- Network Manager
- Airspace Users

Where

Applicability Area
All ECAC States

Status

On time

Completion rate - end 2017: **n/a**

Estimated achievement: **12/2021**

Applicable regulations & standards

N/A

Benefits

Capacity

Maximisation of throughput during period of constrained capacity.

Operational Efficiency

Airspace users can choose which of their flights to prioritise for operational reasons. Airlines save costs with each slot swap that is executed.

Airspace Users Lines of Action:

USE01	**Upgrade the Flight Operations Centre (FOC) interface** - Update as necessary the flight operations centre (FOC) systems and interface with NM so as to allow the use of the ATFM Slot swapping functionality. - Operators who wish to receive NM's slot service via B2B might need to adapt their own FOC interface.	31/12/2021
USE02	**Train the personnel**	31/12/2021

Network Manager Lines of Action:

NM01	**Upgrade the NM systems and develop the associated procedures** - Update the NM systems, and develop associated procedures as necessary allowing an enhanced ATFM slot swapping process.	31/12/2017

Changes to the Objective since previous edition:

- Added operating environment.
- Removed link to ICAO GANP ASBU B1-ACDM.

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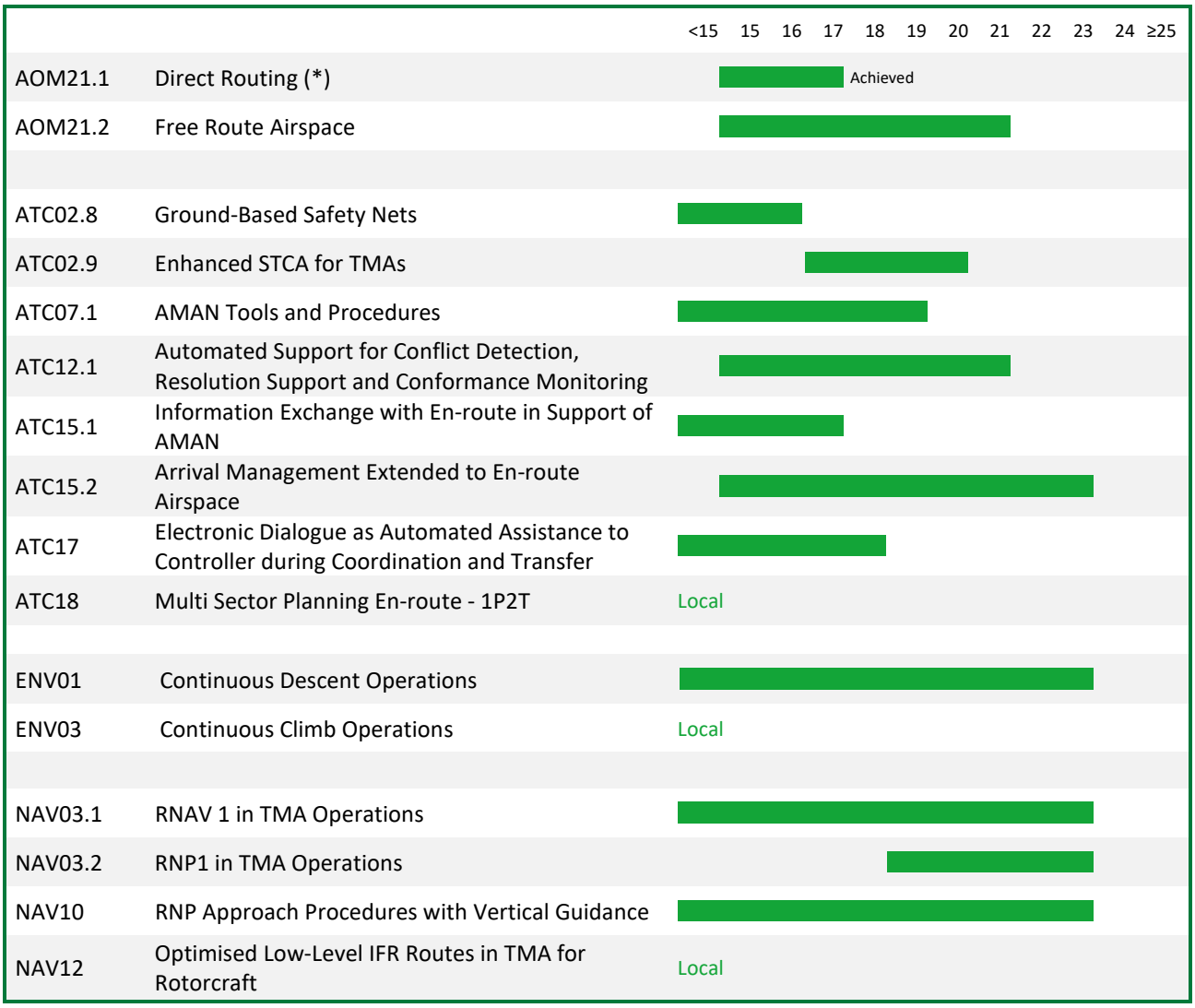
Advanced Air Traffic Services



(**) AOM21.1 was achieved during 2017 and therefore removed from the Implementation Plan. It is kept in this graph for traceability purposes but no deployment view is presented in the next chapters

◊ Means that the objective has an FOC prior to 2015 but has not yet been fully implemented.

The objective codes in the MP Level 3 appearing in this section refer to:

- AOM – Airspace Organisation and Management
- AOP – Airport Operations
- ATC – Air Traffic Control
- ENV – Environment
- NAV – Navigation

A full definition of all acronyms can be found in Annex 1-Definitions and Terminology.

A list containing all airports to which objectives ATC07.1 and ENV01 apply can be found in Annex 2-Applicability to Airports.

AOM21.2 – Free Route Airspace

Free route airspace (FRA) is a specified airspace within which users may freely plan a route between a defined entry point and a defined exit point, with the possibility to route via intermediate (published or unpublished) waypoints, without reference to the ATS route network, subject to airspace availability.

The PCP IR requires the deployment of free route airspace within of the ICAO EUR region at and above FL 310. Within the PCP the implementation of FRA is closely linked to the deployment of airspace management procedures and advanced flexible use of airspace.

SESAR Solutions:	Solutions #33 & #66
SESAR Key Feature:	Advanced Air Traffic Services Optimised ATM Network Services
Essential Operational Change / PCP:	S-AF3.2 Free Route
DP Families:	3.2.1 Upgrade of ATM systems to support Direct Routing and Free Routing 3.2.4 Implement Free Route Airspace
OI Steps & *Enablers*:	AOM-0401, AOM-0402, AOM-0501, AOM-0505, CM-0102-A
Dependencies:	ATC 12.1 (MTCD), ITY-COTR (OLDI) , ATC17 (SYSCO) and ATC02.8 (APW)
ICAO ASBUs:	B1-FRTO
Network Strategy Plan:	SO3/1, SO3/4
Operating Environment:	En-Route, Mixed, Network
EATMN Systems:	ASM, ATFCM, FDPS/SDPS & HMI

When

FOC: **31/12/2021**

Who

Stakeholders:
- Network Manager
- ANSPs
- Airspace Users

Where

Applicability Area
All ECAC States except Azerbaijan, Belgium, Luxembourg and the Netherlands

Status

On time

Completion rate - end 2017: **66%**

Estimated achievement: **11/2021**

Applicable regulations & standards

- Regulation (EU) 677/2011 - Implementation of ATM network functions amending Regulation (EU) No 691/2010
- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Operational Efficiency
Savings in route distances and fuel efficiency through increased use of preferred flight profiles.

Environment
Reductions in emissions through use of optimal routes.

Capacity
Increased through better airspace utilisation to and reduced controller workload.

Safety
Although the main benefits are expected in the area of environment the FRA implementation has the ambition to at least maintain the current level of safety.

ANSPs Lines of Action:

ASP01	**Implement procedures and processes in support of the network dimension** - Identify the local FRA airspace in coordination with the Network and FAB partners and the update Route Availability Document (RAD) accordingly. - Update the local ATFCM procedures in cooperation with the network to take on board the FRA impact.	31/12/2021
ASP02	**Implement system improvements** - Upgrade FDP and CWP to support FRA, if required.	31/12/2021
ASP03	**Implement dynamic sectorisation**	31/12/2021
ASP04	**Implement procedures and processes in support of the local dimension** - Describe and publish FRA airspace in the AIP and charts. - Update letters of agreement, if necessary. - Update ASM and ATC procedures to take on board the FRA impact.	31/12/2021
ASP05	**Implement transversal activities in support of the operational deployment of FRA (validation, safety case and training)**	31/12/2021

Airspace Users Lines of Action:

USE01	**Implement system improvements** - Adapt as necessary the flight Planning system to support free routing.	31/12/2021
USE02	**Implement procedures and processes**	31/12/2021
USE03	**Train aircrews and operational staff for FRA operations**	31/12/2021

Network Manager Lines of Action:

NM01	**Implement system improvements** - Adapt NM systems (IFPS and Airspace Management tools) to support FRA.	31/12/2019
NM02	**Implement procedures and processes** - Update European Airspace with the integration of the coordinated FRA definition. - Update Route Availability Document (RAD) accordingly.	31/12/2017

Changes to the Objective since previous edition:

- ASP02 split into two SLoAs (ASP02 and ASP03) in order to be able to track separately the implementation of dynamic sectorisation (SESAR Solution #66).
- As a consequence of the above, former SLoAs ASP03 and ASP04 become now ASP04 and ASP05.
- Added operating environment.

ATC02.8 - Ground-Based Safety Nets

This objective covers the implementation of the following ground-based safety nets:
- Area proximity warning (APW) warns the controller when an aircraft is, or is predicted to be, flying into a volume of notified airspace (e.g. controlled airspace; danger, prohibited or restricted areas). APW has been identified as a pre-requisite for the implementation of free route airspace (FRA) in the PCP Regulation No 716/2014.
- Minimum safe altitude warning (MSAW) warns the controller about the risk of controlled flight into terrain by generating an alert of proximity to terrain or obstacles.
- Approach path monitor (APM) warns the controller about the risk of controlled flight into terrain accidents by generating an alert of proximity to terrain or obstacles during final approach.

SESAR Key Feature:	Advanced Air Traffic Services
Essential Operational Change / PCP:	Only APW: Pre-requisite for S-AF3.2 Free Route (PCP)
DP Families:	3.2.1 Upgrade of ATM systems to support Direct Routing and Free Routing
OI Steps & *Enablers*:	CM-0801
Dependencies:	No dependencies
ICAO ASBUs:	B0-SNET, B1-SNET
Network Strategy Plan:	SO4/1
Operating Environment:	Terminal, Mixed, En-Route
EATMN Systems:	FDPS/SDPS & HMI

When

FOC: **31/12/2016**

Who

Stakeholders:
- ANSPs

Where

Applicability Area
All ECAC States except the Netherlands

Status

Late

Completion rate - end 2017: **54%**

Estimated achievement: **12/2019**

Applicable regulations & standards

- Only for APW: Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Safety

Major safety improvement through the systematic presentation of:
- imminent and actual unauthorized penetrations into airspace volumes to controllers ahead of their occurrence, as provided by APW;
- possible infringements of minimum safe altitude to controllers ahead of their occurrence, as provided by MSAW;
- deviations from the glide path to controllers, as provided by APM.

ANSPs Lines of Action:

ASP01	**Implement the APW function** - Upgrade ground systems to support the APW function. - Put into service APW function.	31/12/2016
ASP02	**Align ATCO training with the use of APW ground-based safety tools** - Train operational staff in the use of APW according to adapted procedures.	31/12/2016
ASP03	**Implement the MSAW function** - Upgrade ground systems to support the MSAW function. - Put into service MSAW function.	31/12/2016
ASP04	**Align ATCO training with the use of MSAW ground-based safety tools** - Train operational staff in the use of MSAW according to adapted procedures.	31/12/2016
ASP05	**Implement the APM function** - Upgrade ground systems to support the APM function. - Put into service APM function.	31/12/2016
ASP04	**Align ATCO training with the use of APM ground-based safety tools** - Train operational staff in the use of APM according to adapted procedures.	31/12/2016

Changes to the Objective since previous edition:

- Added operating environment.

ATC02.9 – Enhanced STCA for TMAs

STCA (Short Term Conflict Alert) is a ground system designed and deployed to act as safety net against the risk of having collisions between aircraft during airborne phases of flight. STCA can be used in both en-route and TMA surveillance environments.

The difficulty of STCA development lies in the need to avoid having a high nuisance alert rate, while still making sure that real conflicts always trigger an appropriate and timely warning. Specific tuning is necessary for STCA to be effective in the TMA, in order to account for lower separation minima, as well as increased frequency of turns, climbs and descents.

The aim of this Objective is the implementation of enhanced algorithms for STCA for its use in TMA ensuring earlier warning and lower nuisance alert rates related to steady and manoeuvring aircraft, in comparison to previous STCA technology.

SESAR Solutions:	Solution #60 Enhanced STCA for TMAs
SESAR Key Feature:	Advanced Air Traffic Services
Operational Change :	Enhanced safety nets
OI Steps & *Enablers*:	CM-0801, CM-0811
Dependencies:	No dependencies
ICAO ASBUs:	B0-SNET, B1-SNET
Network Strategy Plan:	SO4/1
Operating Environment:	Terminal, Mixed
EATMN Systems:	FDPS/SDPS & HMI

When

FOC: **31/12/2020**

Who

Stakeholders:
- ANSPs

Where

Applicability Area
TMAs, according to local business needs

Status

On time

Completion rate - end 2017: **62%**

Estimated achievement: **12/2020**

Applicable regulations & standards

N/A

Benefits

Safety
Identification of conflicts between flights in Terminal Manoeuvring Areas (TMAs).
A reduction in the false alert rate while maintaining or even slightly increasing the genuine alert rate and warning times.
Significant increases in the safety of flights especially during complex operations.

ANSPs Lines of Action:

ASP01	**Implement/adapt the STCA function in TMA** - Put into service or enhance STCA functionality adapted for the specific TMA operating modes, flight characteristics and separation.	31/12/2020
ASP02	**Develop and implement ATC procedures related to the use of STCA in TMA**	31/12/2020
ASP03	**Align ATCO training with the use of STCA in TMA**	31/12/2020
ASP04	**Develop a local safety assessment**	31/12/2020

Changes to the Objective since previous edition:

- Added status.
- Added operating environment.

ATC07.1 – AMAN Tools and Procedures

Implement basic arrival manager (AMAN) tools to improve sequencing and metering of arrival aircraft in selected TMAs and airports.

AMAN interacts with several systems resulting in a 'planned' time for any flight. When several aircraft are predicted around the same time on the runway it plans a sequence with new 'required' times that need to be applied to create/maintain the sequence.

AMAN also outputs the required time for the ATCO in the form of 'time to lose/time to gain', and the ATCO is then responsible for applying an appropriate method for the aircraft to comply with the sequence.

SESAR Key Feature:	Advanced Air Traffic Services
Essential Operational Change / PCP:	- Basic AMAN Facilitator for: - S-AF1.1 AMAN Extended to En-route Airspace (PCP) - AMAN/DMAN Integration Including Multiple Airports (OC)
DP Families:	1.1.1 Basic AMAN
OI Steps & *Enablers*:	TS-0102
Dependencies:	No dependencies
ICAO ASBUs:	B0-RSEQ
Network Strategy Plan:	SO4/1
Operating Environment:	Terminal, Mixed
EATMN Systems:	FDPS/SDPS & HMI

When

FOC: **31/12/2019**

Who

Stakeholders:
- ANSPs

Where

Applicability Area
23 PCP Airports
8 non-PCP airports

Status

On time

Completion rate - end 2017: **63%**

Estimated achievement: **12/2019**

Applicable regulations & standards

N/A

Benefits

Environment
Reduced holding and low level vectoring has a positive environmental effect in terms of noise and CO2 emissions.

Operational Efficiency
Optimised arrival sequencing produces a positive effect on fuel burn.

Capacity
Improved airport/TMA capacity and reduced delays.

ANSPs Lines of Action:

ASP01	**Implement initial basic arrival management tools**	31/12/2019
ASP02	**Implement initial basic AMAN procedures** - Define, validate and implement ATC procedures for operational use of basic AMAN tools.	31/12/2019
ASP03	**Adapt TMA organisation to accommodate use of basic AMAN**	31/12/2019
ASP04	**Adapt ground ATC systems to support basic AMAN functions**	31/12/2019

Changes to the Objective since previous edition:

- Added operating environment.

ATC12.1 - Automated Support for Conflict Detection, Resolution Support Information and Conformance Monitoring

The implementation of free route airspace (FRA) needs to be supported by conflict detection tools (CDT), resolution support information and conformance monitoring.

The term 'conflict detection tool' is used to generally indicate the trajectory based medium conflict detection tool (MTCD – an automated decision-support tool that detects conflicts between aircraft trajectories up to 20 minutes in advance) or/and tactical controller tool (TCT - an automated tool that allows the tactical controller (radar/executive) to detect and resolve conflicts up to 8 minutes in advance). TCT is not a replacement of MTCD. The decision to implement either one or both tools) is left to each ANSP depending on local conditions.

SESAR Solutions:	Solution #27 MTCD and conformance monitoring tools
SESAR Key Feature:	Advanced Air Traffic Services
Essential Operational Change / PCP:	Pre-requisite for S-AF3.2 Free Route (PCP)
DP Families:	3.2.1 Upgrade of ATM systems to support Direct Routing and Free Routing
OI Steps & *Enablers*:	CM-0202, CM-0203, CM-0205, CM-0207-A
Dependencies:	No dependencies
ICAO ASBUs:	B1-FRTO
Network Strategy Plan:	SO3/1, SO4/1
Operating Environment:	En-Route, Mixed
EATMN Systems:	FDPS/SDPS & HMI

When

FOC: **31/12/2021**

Who

Stakeholders:
- ANSPs

Where

Applicability Area
All ECAC States except Luxembourg

Status

On time

Completion rate - end 2017: **44%**

Estimated achievement: **12/2021**

Applicable regulations & standards

N/A

Benefits

Safety

Early and systematic conflict detection and conformance monitoring enabled by ground based automated tools will reduce the need for tactical interventions, conformance monitoring reduces the risk of the impact of controllers and pilots errors. Possibility to maintain high level of safety with an increase in capacity due to a reduction of controller workload per aircraft.

Capacity

Reduction of tactical controller workload, and better sector team productivity, compared to the conventional systems without automated support will open potential for capacity up to 15% in comparison to a baseline case without a detection tool (MTCD and/or TCT).

ANSPs Lines of Action:

ASP01	**Implement MTCD and associated procedures** - Deploy the MTCD related for detection conflicts and risks - between aircraft, between aircraft and reserved airspace or area (such as holding stack area) upon activation or de-activation, including posting detection to the sector responsible for acting on it. - Adapt the operational procedures and working methods to support the MTCD deployment.	31/12/2021
ASP02	**Implement resolution support function and associated procedures** - Deploy the resolution support information which includes conflict probe and passive conflict resolution assistant as appropriate and in accordance with the ANSP's concept of operation and identified needs. - Adapt the operational procedures and working methods for the resolution support function deployment.	31/12/2021
ASP03	**Implement TCT and associated procedures (optional)** - Deploy the tactical controller tool (TCT) to: • Detect conflicts between state vector trajectories(extended STCA); • Detect conflicts between state vector trajectories and tactical trajectories; • Detect conflicts between tactical trajectories; as appropriate and in accordance with the ANSP's Concept of Operation and identified needs. - Adapt the operational procedures and working methods to support the TCT deployment.	31/12/2021
ASP04	**Implement monitoring aids (MONA) functions** - Deploy MONA functions (lateral deviation, longitudinal deviation, vertical deviation CFL deviation, aircraft derived data (ADD) deviations) as appropriate and in accordance with the ANSP's concept of operation and identified needs. - Adapt the operational procedures and working methods to support the MONA deployment.	31/12/2021
ASP05	**Perform ATCO training for the use of CDT (MTCD and or TCT), resolution support and MONA related functions**	31/12/2021
ASP06	**Develop safety assessment for the changes**	31/12/2021
	- Develop safety assessment of the changes, notably ATC systems and procedures that will implement conflict detection tools, resolution support function and conformance monitoring.	

Changes to the Objective since previous edition:

- Previous ASP01 now split into two SLoAs (ASP01 and ASP02) to track separately the implementation of MTCD and the resolution support function.
- Added operating environment.

ATC15.1 - Information Exchange with En-route in Support of AMAN

Implement, in en-route operations in selected ACCs, information exchange mechanisms, tools and procedures in support of basic AMAN operations in adjacent ACCs and/or subjacent TMAs (including, where relevant, support for AMAN operations involving airports located in adjacent ATSUs). Arrival management requires the capability for an accepting unit to pass to the transferring unit information on the time that a flight is required to lose or gain to optimise the approach sequence. The system integrates information from arrival management systems operating to a limited distance around the TMA to provide a consistent arrival sequence.

SESAR Key Feature:	Advanced Air Traffic Services
Essential Operational Change / PCP:	Predecessor of S-AF1.1 AMAN extended to En-Route Airspace (PCP)
DP Families:	1.1.2 AMAN upgrade to include Extended Horizon function
OI Steps & *Enablers*:	TS-0305
Dependencies:	ATC07.1 - AMAN tools and procedures
ICAO ASBUs:	B1-RSEQ
Network Strategy Plan:	SO4/1
Operating Environment:	Terminal, En-route, Mixed
EATMN Systems:	FDPS/SDPS & HMI

Applicable regulations & standards

N/A

When

FOC: **31/12/2019**

Who

Stakeholders:
- ANSPs

Where

Applicability Area
EU States except Cyprus, Greece, Latvia, Lithuania, Luxembourg, Malta, Slovak Republic, Slovenia.
Plus: Bosnia and Herzegovina, Maastricht UAC, Norway, Switzerland, Turkey

Status

Planned delay

Completion rate - end 2017: **31%**

Estimated achievement: **12/2019**

Benefits

Capacity
Improved airport/TMA capacity.

Environment
Reduction in holding and in low-level vectoring, by applying delay management at an early stage of flight, has a positive environmental effect in terms of noise and CO2 emissions.

Operational Efficiency
Reduction in holding and in low-level vectoring, by applying delay management at an early stage of flight, reduces delay and has a positive effect on fuel burn.

ANSPs Lines of Action:

ASP01	**Develop safety assessment for the changes** - Develop safety assessment of the changes, notably ATC systems and procedures that will implement arrival management functionality in en-route sectors and associated procedures.	31/12/2019
ASP02	**Adapt the ATC systems that will implement arrival management functionality in en-route sectors in support of AMAN operations in adjacent/subjacent TMAs** - Implement, in selected ATC systems, the necessary functionality and information exchanges to support the use of AMAN information in en-route sectors requiring data exchange generated from AMAN systems and operations in adjacent/subjacent TMAs.	31/12/2019
ASP03	**Implement ATC procedures in en-route airspace/sectors that will implement AMAN information and functionality** - Define, validate and implement the necessary ATC procedures in selected en-route airspace/sectors, to support the use of AMAN information in en-route sectors that are interfacing with AMAN systems operating in adjacent/subjacent TMAs.	31/12/2019
ASP04	**Train operational and technical staff and update training plans** - Train operational staff in the use of ATC procedures in en-route airspace/sectors that will implement AMAN information and functionality in support of AMAN in adjacent/subjacent TMAs.	31/12/2019

Changes to the Objective since previous edition:

- FOC postponed to 31/12/2019.
- Added operating environment.
- Latvia removed from the applicability area.
- Removed link to ICAO GANP ASBU B0-RSEQ and added link to B1-RSEQ.

ATC15.2 - Arrival Management Extended to En-route Airspace

Arrival management (AMAN) extended to en-route airspace extends the AMAN horizon from the 100-120 nautical miles to at least 180-200 nautical miles from the arrival airport.

Arrival sequencing may be anticipated during en-route and early descent phases.

The objective supplements the existing ATC15.1, which consider the AMAN extension to a limited distance around the TMA.

SESAR Solutions:	Solution #05 Extended AMAN horizon
SESAR Key Feature:	Advanced Air Traffic Services
Essential Operational Change / PCP:	S-AF1.1 AMAN extended to En-Route Airspace (PCP)
DP Families:	1.1.2 AMAN upgrade to include Extended Horizon function
OI Steps & *Enablers*:	TS-0305-A
Dependencies:	ATC07.1 - Implement AMAN tools and procedures
ICAO ASBUs:	B1-RSEQ
Network Strategy Plan:	SO4/1
Operating Environment:	Terminal, En-route, Mixed
EATMN Systems:	FDPS/SDPS & HMI

When

FOC : **31/12/2023**

Only for ACCs within the extended AMAN horizon, including those adjacent to TMAs serving/associated to PCP airports

Who

Stakeholders:
- ANSPs
- Network Manager

Where

Applicability Area
All ECAC States except Armenia, Cyprus, Finland, FYROM, Latvia, Lithuania, Luxembourg , Montenegro and Serbia

Status

Not available

Completion rate - end 2017: **7%**

Estimated achievement: **Not available**

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Capacity
Optimal use of TMA capacity.

Environment
Delays are resorbed by reducing speed in early phases of arrivals leading to reduction of holding and vectoring which has a positive environmental impact in terms of fuel savings.

Operational Efficiency
Improved arrival flow.

ANSPs Lines of Action:

ASP01	**Upgrade ATC systems to support extended AMAN** - The upgrade should consider data exchange, data processing and information display at the ATCO working positions in support the handling of AMAN constrains as appropriate. Systems must be able to generate, communicate, receive and display AMA OLDI messages or other extended AMAN data exchanges via B2B services.	31/12/2023
ASP02	**Implement ATC procedures to support extended AMAN** - Define and implement the needed ATC procedures to support the extended AMAN functionality.	31/12/2023
ASP03	**Develop, and deliver as necessary, a safety assessment** - Develop safety assessment of the changes related to implementation of extended arrival management functionality.	31/12/2023
ASP04	**Establish bilateral agreements** - Establish Bilateral agreements between the ATS units involved for extended operational procedures and data exchanges, as well as between the concerned ATS unit and NM.	31/12/2023
ASP05	**Ensure that all operational personnel concerned is adequately trained** - Train operational staff in the use of ATC procedures.	31/12/2023

Network Manager Lines of Action:

NM01	**Upgrade NM systems to support extended AMAN** - Adapt NM systems including reception, processing and presentation of extended AMAN data, provision of network information (EFD) as well as development of network impact assessment tools to include extended AMAN.	31/12/2023
NM02	**Establish bilateral agreements** - Define the data exchanges and operational procedures between NM and concerned ATS units.	31/12/2023
NM03	**Implement ATFCM procedures for management of extended AMAN info** - Define and implement the required ATFCM procedures to support the extended AMAN functionality.	31/12/2023

Changes to the Objective since previous edition:

- Added operating environment.
- Objective scope changed from EU+ to ECAC.
- Applicability area fully reviewed.

ATC17 - Electronic Dialogue as Automated Assistance to Controller during Coordination and Transfer

Implement automated assistance to controller during coordination and transfer between ATC components serving ATC units for the purpose of achieving:
1. Electronic dialogue in coordination prior to the transfer of flights from one ATC unit to the next.
2. Transfer of communication from one ATC unit to the next ATC unit of such flights.
3. Coordination processes that support the exchange of OLDI messages related to the basic procedure.

SESAR Key Feature:	Advanced Air Traffic Services
Essential Operational Change / PCP:	Enabler for S-AF3.2 Free Route
DP Families:	3.2.1 Upgrade of ATM systems to support Direct Routing and Free Routing
OI Steps & *Enablers*:	CM-0201
Dependencies:	ITY-COTR – Ground/ground automated co-ordination processes
Network Strategy Plan:	SO3/1, SO4/1
Operating Environment:	Terminal, Mixed, En-Route, Network
EATMN Systems:	FDPS/SDPS & HMI

When

FOC: **31/12/2018**

Who

Stakeholders:
- ANSPs

Where

Applicability Area
All ECAC States except Ireland, Slovak Republic and Ukraine

Applicable regulations & standards

- EUROCONTROL - SPEC 106 - Specification for On-Line Data Interchange (OLDI) - Edition 4.2 - recognised as Community specification; OJ 2011/C 146/11 / 12/2010

Status

Planned delay

Completion rate - end 2017: **23%**

Estimated achievement: **12/2019**

Benefits

Capacity
Reduction of controller workload compared to conventional processes without automated support.

Safety
Reduction of human error due to automation of controller tasks during coordination and transfer.

Operational Efficiency
More efficient planning and operational decision making.

ANSPs Lines of Action:

ASP01	**Develop safety assessment for the changes** - Develop safety assessment of the changes, notably upgrades of the system to support electronic dialogue during coordination and transfer.	31/12/2018
ASP02	**Upgrade and put into service ATC system to support the Basic procedure (specifically PAC and COD)** - When bilaterally agreed between ANSPs, upgrade and put into service ATC system to support the basic procedure, specifically Preliminary Activation Message (PAC) and, if applicable, SSR Code Assignment Message (COD).	31/12/2018
ASP03	**Upgrade and put into service ATC system to support electronic dialogue procedure in Transfer of communication process** - Upgrade ground systems with the functions to support electronic dialogue procedure in transfer of communication process using OLDI messages, as identified by the individual administration from the following list: - ROF, COF, TIM, HOP, MAS and SDM.	31/12/2018
ASP04	**Upgrade and put into service ATC system to support electronic dialogue procedure in Coordination process** - Upgrade ground systems with the functions to support electronic dialogue procedure in coordination process using OLDI messages, as identified by the individual administration from the following list: - RAP, RRV, CDN, ACP, RJC and SBY.	31/12/2018
ASP05	**Train ATC staff for applying electronic dialogue procedure**	31/12/2018

Changes to the Objective since previous edition:

- Added operating environment.
- Removed link to ICAO GANP ASBU B0-FICE.

ATC18 - Multi Sector Planning En-route - 1P2T [Local]

The multi-sector planner (MSP) defines a new organisation of controller team(s) and new operating procedures to enable the planning controller to provide support to several tactical controllers operating in different adjacent en-route or TMA sectors.

This Implementation Objective proposes a structure whereby, in en-route sectors, a single planner controller (P) is planning and organising the traffic flows for two tactical controllers (T), each of whom is controlling a different sector (1P-2T configuration). There is no need for exit/entry coordination with the airspace volume of multi-sector planner. However, the coordination capability with adjacent planner/multi-planner should remain.

This concept is intended for operation with suitably configured flight data processing components, flexible allocation of ATC roles and volumes and multi-sector planning.

SESAR Solutions:	Solution #63 Multi-Sector Planning
SESAR Key Feature:	Advanced Air Traffic Services
Essential Operational Change :	Sector Team Operation
DP Families:	No direct link, although implementation is recommended in Family 3.2.1
OI Steps & *Enablers*:	CM-0301
Dependencies:	No dependencies
Network Strategy Plan:	SO4/1
Operating Environment:	En-Route, Mixed
EATMN Systems:	FDPS/SDPS & HMI

When

FOC: **n/a**

Who

Stakeholders:
- ANSPs

Where

Applicability Area
Subject to local needs and complexity

Status

Completion rate - end 2017:

Implemented by 5 ANSPs

Planned / ongoing by 7 ANSPs

Applicable regulations & standards

N/A

Benefits

Cost Efficiency

Improved through improved ATCO Productivity. The improvement comes from handling traffic levels with fewer ATCO hours than in current operations and through workload reduction from new ATCO support tools.

Capacity

The workload reduction might be translated in marginal capacity gains.

ANSPs Lines of Action:

ASP01	**ATM system support to permit a single planner role associated to two adjacent tactical roles** - The en-route ATM system functions are enhanced to allow a planner role to be associated to two adjacent sector tactical roles. The planner role shall be given the data access and eligibility to modify relevant traffic attributes for the airspace volume allocated to him so that the planner can identify the s potential conflicts or risk of conflicts and de-conflict/ smooth the traffic flows in order to avoid the tactical interventions. The actually necessary capabilities depend on the individual level of complexity. In many cases a stripless HMI, trajectory prediction and medium-term conflict detection might be required.	n/a
ASP02	**Develop multi-sector planning procedures and working methods for en-route sectors** - Develop procedures and working methods to cater for enhanced planner tools and adapted workplace layout requirements triggered by the change of coordination and communication among ATCOs.	n/a
ASP03	**Train air traffic controllers to multi-sector planning**	n/a
ASP04	**Develop, and deliver as necessary, a safety assessment**	n/a

Changes to the Objective since previous edition:

- Added operating environment.

ENV01 - Continuous Descent Operations

A continuous descent operation (CDO) is an aircraft operating technique, enabled by airspace design, procedure design and ATC clearances in which arriving aircraft descend without interruption, to the greatest possible extent, by employing minimum thrust to optimise fuel burn.

Many major airports now employ PBN procedures which can enable both CDO and continuous climb operations (CCO). CDO does not adversely affect safety and capacity and will produce environmental and operational benefits including reductions to fuel burn, gaseous emissions and noise impact.

It is important that, to avoid misleading interpretations, monitoring and measuring of CDO execution is done using harmonised definitions, methodology and parameters. The proposed methodology(*) identified by the European TF on CCO/CDO is detailed at http://www.eurocontrol.int/articles/continuous-climb-and-descent-operations.

(*) Note that at the time of publication of this document, the methodology released in 2016 by the CCO/CDO TF1 is currently being reviewed by the CCO/CDO TF2.

SESAR Key Feature:	Advanced Air Traffic Services
OI Steps & *Enablers*:	AOM-0701, AOM-0702-A
Dependencies:	No dependencies
ICAO ASBUs:	B0-CDO, B1-CDO
Network Strategy Plan:	SO6/5
Operating Environment:	Airport, Terminal, Mixed
EATMN Systems:	No impact on EATMN systems

When

FOC: **31/12/2023**

Who

Stakeholders:
- ANSPs
- Airport Operators
- Airspace Users

Where

Applicability Area
66 Airports

Status

N/A - Objective fully reviewed

Completion rate - end 2017: **80%**

Estimated achievement: **12/2017**

Applicable regulations & standards

- Regulation (EU) 598/2014 on rules and procedures on noise-related operating restrictions at Union airports within a Balanced Approach and repealing Directive 2002/30/EC (as from 16/06/2016)
- EC Directive 2002/49/EC, on the assessment and management of environmental noise
- EC Directive 2008/50/EC, on ambient air quality and cleaner air for Europe

Benefits

Environment

Reduction of fuel burn (and consequently, atmospheric emissions) has been estimated to be 51kg per flight for those flying CDO over those flying non-CDO. In addition, studies have indicated that due to lower drag and thrust facilitated by CDO, over certain portions of the arrival profile, noise can be reduced by up to 5dB.

Operational Efficiency

Reduction in fuel consumption by the flying of optimised profiles (no vertical containment required). If the CDO is flown as part of a PBN procedure, the predictability of the vertical profile will be enhanced for ATC. CDOs are also a proxy for Vertical Flight Efficiency (VFE) and should be monitored according to harmonised definitions and parameters in order to measure efficiency.

ANSPs Lines of Action:

ASP01	**Implement rules and procedures for the application of CDO techniques** Implement rules and ATC procedures for the application of CDO techniques in the TMA, whenever practicable. Coordination should be, in all circumstances, undertaken with adjacent ATS units, NM, aircraft operators and airport operators. Provide situational awareness support to allow aircrew to apply CDO.	31/12/2023
ASP02	**Design and implement CDO procedures enabled by PBN** Deploy PBN airspace and arrival procedures that allow the aircraft to fly a continuous descent approach taking into account airspace and traffic complexity. This enhances vertical flight path precision and enables aircraft to fly an arrival procedure not reliant on ground-based equipment for vertical guidance.	31/12/2023
ASP03	**Train controllers in the application of CDO techniques**	31/12/2023
ASP04	**Monitor and measure the execution of CDO** - In cooperation with airport, monitor and measure CDO execution, where possible based upon a harmonised methodology (*) and metrics. The methodology should be used also to identify the cause of any restrictions to CDO (such as inefficient LoAs (reflecting older more inefficient aircraft types and their corresponding vertical profiles)). Route changes should then be proposed to facilitate CDOs, in order to enhance vertical flight efficiency. - Provide any feedback to all concerned stakeholders on the level of CDO execution together with any other trends observed by the CDO performance monitoring.	31/12/2023

Airport Operators Lines of Action:

APO01	**Monitor and measure the execution of CDO** - In cooperation with the ANSP, monitor and measure CDO execution, where possible based upon a harmonised methodology (*) and metrics. The methodology should be used also to identify the cause of any restrictions to CDO (such as inefficient LoAs (reflecting older more inefficient aircraft types and their corresponding vertical profiles)). Route changes should then be proposed by the ANSP to facilitate CDOs, in order to enhance vertical flight efficiency. - Provide any feedback to all concerned stakeholders on the level of CDO execution together with any other trends observed by the CDO performance monitoring.	31/12/2023

Airspace Users Lines of Action:

USE01	**Include CDO techniques in the aircrew training manual and support its implementation wherever possible**	31/12/2013

(*) Note that at the time of publication of this document, the methodology released in 2016 by the CCO/CDO TF1 is currently being reviewed by the CCO/CDO TF2.

Changes to the Objective since previous edition:

- All fields of the objective reviewed in order to bring the objective up to date with the latest developments and the results of the European Task Force on CCO/CDO.
- Antwerp, Baku, Bratislava, Luxembourg, Milano-Linate, Riga and Toulouse added to the applicability area.
- Added operating environment.
- Added link to ICAO GANP ASBU B1-CDO.

ENV03 - Continuous Climb Operations [Local]

A continuous climb operation (CCO) is an aircraft operating technique, enabled by airspace design, procedure design and ATC clearances in which departing aircraft climb without interruption, to the greatest possible extent, by employing optimum climb engine thrust at climb speeds until reaching the cruise flight level.

Many major airports now employ PBN procedures which can enable both CDO and continuous climb operations (CCO). CCO does not adversely affect safety and capacity and will produce environmental and operational benefits including reductions to fuel burn, gaseous emissions and noise impact.

It is important that monitoring and measuring of CDO execution is done using harmonised definitions, methodology and parameters to avoid misleading interpretations. The proposed methodology (*) identified by the European TF on CCO/CDO is detailed at http://www.eurocontrol.int/articles/continuous-climb-and-descent-operations.

(*) Note that at the time of publication of this document, the methodology released in 2016 by the CCO/CDO TF1 is currently being reviewed by the CCO/CDO TF2.

SESAR Key Feature:	Advanced Air Traffic Services
OI Steps & *Enablers*:	AOM-0703
Dependencies:	No dependencies
ICAO ASBUs:	B0-CCO
Network Strategy Plan:	SO6/5
Operating Environment:	Airport, Terminal, Mixed
EATMN Systems:	No impact on EATMN systems

When

FOC: **n/a**

Who

Stakeholders:
- ANSPs
- Airport Operators
- Airspace users

Where

Applicability Area
Aerodromes subject to local needs and complexity

Status

Completion rate - end 2017: **Implemented in 42 locations**

Planned / ongoing in 42 locations

Applicable regulations & standards

- Regulation (EU) 598/2014 on rules and procedures on noise-related operating restrictions at Union airports within a Balanced Approach and repealing Directive 2002/30/EC (as from 16/06/2016)
- EC Directive 2002/49/EC, on the assessment and management of environmental noise
- EC Directive 2008/50/EC, on ambient air quality and cleaner air for Europe

Benefits

Environment

Reduction of fuel burn (and consequently, atmospheric emissions) has been estimated to be 17kg per flight for those flying CCO over those flying non-CCO. In addition, studies have indicated that due to lower drag and thrust facilitated by CCO, over certain portions of the arrival profile, noise may be reduced. Studies are currently ongoing to gauge such noise reductions.

Operational Efficiency

CCOs contribute to reducing airlines operating costs including a reduction in fuel consumption by the flying of optimised profiles (no vertical containment required). If the CCO is flown as part of a PBN procedure, the predictability of the vertical profile will be enhanced for ATC. CCOs are also a proxy for Vertical Flight Efficiency (VFE) and should be monitored according to harmonised definitions and parameters in order to measure efficiency.

ANSPs Lines of Action:

ASP01	**Implement rules and procedures for the application of CCO techniques** Implement rules and ATC procedures for the application of CCO techniques in the TMA, whenever practicable. Coordination should be, in all circumstances, undertaken with adjacent ATS units, the NM, aircraft operators and airport operators. Provide the tactical and operational situational awareness support to allow aircrew to apply CCO.	n/a
ASP02	**Train controllers in the application of CCO techniques**	n/a
ASP03	**Monitor and measure the execution of CCO** - In cooperation with airports, monitor and measure CCO execution, where possible based upon a harmonised methodology (*) and metrics. The methodology should be used also to identify the cause of any restrictions to CCO (such as inefficient LoAs (reflecting older more inefficient aircraft types and their corresponding vertical profiles)). Route changes should then be proposed to facilitate CCOs, in order to enhance vertical flight efficiency. - Provide any feedback to airports, aircraft operators and the NM on the level of CCO execution together with any other trends observed by the CCO performance monitoring.	n/a

Airport Operators Lines of Action:

APO01	**Monitor and measure the execution of CCO** - In cooperation with the ANSP, monitor and measure CCO execution, where possible based upon a harmonised methodology (*) and metrics. The methodology should be used also to identify the cause of any restrictions to CCO (such as inefficient LoAs (reflecting older more inefficient aircraft types and their corresponding vertical profiles)). Route changes should then be proposed, by the ANSP, to facilitate CCOs, in order to enhance vertical flight efficiency. - Provide any feedback to the ANSP, aircraft operators and the NM on the level of CCO execution together with any other trends observed by the CCO performance monitoring.	n/a

Airspace Users Lines of Action:

USE01	**Include CCO techniques in the aircrew training manual**	n/a

(*) Note that at the time of publication of this document, the methodology released in 2016 by the CCO/CDO TF1 is currently being reviewed by the CCO/CDO TF2.

Changes to the Objective since previous edition:

- All fields of the objective reviewed in order to bring the objective up to date with the latest developments and the results of the European Task Force on CCO/CDO.
- Added operating environment.

NAV03.1 - RNAV 1 in TMA Operations

Performance-based navigation distinguishes between RNAV and RNP Specifications, both of which rely on area navigation techniques which allow aircraft to operate on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these. An RNAV 1 specification includes several requirements, one being a requirement for the lateral and longitudinal total system error (TSE) to be within +/- 1NM at least 95% of the flight time.

This is an interim objective aimed towards establishing a global performance-based navigation (PBN) environment. Individual States, ANSPs, airports and aircraft operators will need to evaluate the business need for RNAV 1 procedures according to local circumstances.

SESAR Solutions:	Solution #62 Precision area navigation (P-RNAV) in a complex terminal airspace
SESAR Key Feature:	Advanced Air Traffic Services
Essential Operational Change / PCP:	- Introduction of P-RNAV - Predecessor of S-AF1.2 Enhanced TMA using RNP-based operations
OI Steps & *Enablers*:	AOM-0601, *CTE-N08*
Dependencies:	No dependencies
ICAO ASBUs:	B0-CDO, B0-CCO, B1-RSEQ
Network Strategy Plan:	SO6/5
Operating Environment:	Terminal, Mixed
EATMN Systems:	FDPS/SDPS & HMI, NAV

When

FOC: **31/12/2023**

Who

Stakeholders:
- ANSPs
- Airspace users

Where

Applicability Area
All ECAC States except Luxembourg and Maastricht UAC

Status

On time

Completion rate - end 2017: **56%**

Estimated achievement: **12/2023**

Applicable regulations & standards

N/A

Benefits

Operational Efficiency
Reduction in fuel burn through optimised routes and TMA procedures.

Environment
Emissions and noise nuisance reduced by use of optimal flight procedures and routings.

Safety
Increased situational awareness and indirect benefit to both ATC and pilot through reduction of workload during RNAV operations.

ANSPs Lines of Action:

ASP01	**Develop an airspace concept based on RNAV 1 arrival and departure procedures** - Develop an airspace concept based on RNAV 1 arrival and departure procedures with a view to providing performance benefits.	31/12/2023
ASP02	**Provide appropriate terrestrial navigation infrastructure to support RNAV 1 operations** - Implement appropriate DME/DME Navaid Infrastructure to support nominal or non-nominal mode, dependent on the airspace concept. Where RNAV 1 procedures are dependent upon sufficient DME transponders being distributed geographically to allow for DME/DME navigation either in nominal or in non-nominal mode (in the absence of onboard GNSS equipment or GNSS failure), this may result in a requirement to install new DME stations and/or the relocation of existing units.	31/12/2023
ASP03	**Train air traffic controllers in RNAV 1 procedures**	31/12/2023
ASP04	**Train procedure designers in RNAV 1 capabilities**	Finalised
ASP05	**Implement RNAV 1 arrival and departure procedures based on the airspace concept**	31/12/2023
ASP06	**Publish in AIPs all co-ordinate data in WGS-84 meeting the quality requirements set out in ICAO Annex 15**	Finalised
ASP08	**Adapt ATS automated systems to ensure the availability of information regarding aircraft RNAV equipage for systematic display to relevant control positions**	Finalised
ASP11	**Develop a local RNAV 1 safety assessment**	31/12/2023

Airspace Users Lines of Action:

USE01	**Install appropriate RNAV 1 equipment**	31/12/2023
USE02	**Train flight crews in RNAV 1 TMA procedures**	31/12/2023

Changes to the Objective since previous edition:

- Added operating environment.
- Added Slovak Republic to the applicability area.
- Removed link to ICAO GANP ASBU B0-APTA and added link to B1-RSEQ.

NAV03.2 – RNP 1 in TMA Operations

An RNP 1 specification allows an aircraft to fly a specific path between two 3D-defined points in space; to this end, it requires several specific functions as well as a lateral performance accuracy of +/- 1NM 95% of the flight time. RNP 1 operations require on-board performance monitoring and alerting capability. RNP 1 capability requires inputs from global navigation satellite systems (GNSS).

This objective refers to the implementation, where benefits are clearly evident, of flexible and environmentally friendly procedures for departure, arrival and initial approach using PBN in TMAs, as specified as specified in the PBN manual, together with the use of the radius to fix (RF) path terminator for SIDs, STARs and transitions to final approach.

SESAR Solutions:	Solutions #09 & #51
SESAR Key Feature:	Advanced Air Traffic Services
Essential Operational Change / PCP:	S-AF1.2 Enhanced TMA using RNP-based operations
DP Families:	1.2.3 RNP 1 Operations in high density TMAs (ground capabilities) 1.2.4 RNP 1 Operations (aircraft capabilities)
OI Steps & *Enablers*:	AOM-0603, AOM-0605
Dependencies:	Improvements for controller support tools might be required e.g. ATC12.1 (MTCD, conflict resolution support and MONA), ATC02.9 (STCA) and ATC02.8 (APW)
ICAO ASBUs:	B1-RSEQ
Network Strategy Plan:	SO6/5
Operating Environment:	Terminal, Mixed
EATMN Systems:	FDPS/SDPS & HMI, NAV

When

FOC: **31/12/2023**

Who

Stakeholders:
- ANSPs
- Airspace users

Where

Applicability Area
Mandatory for TMAs listed in section 1.2.1 of the Annex of the PCP Regulation. For all other ECAC TMAs, according to local business needs.

Status

Not available

Completion rate - end 2017: **2%**

Estimated achievement: **Not available**

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Operational Efficiency
Reduction in fuel burn through optimised TMA procedures.

Environment
Emissions and noise nuisance reduced by use of optimal flight procedures and routings.

Safety
Increased situational awareness and indirect benefit to both ATC and pilot through reduction of workload during RNP operations.

ANSPs Lines of Action:

ASP01	**Develop an airspace concept based on designated RNP 1 arrival and departure procedures with Radius to Fix (RF)** - Develop an airspace concept, including designated RNP 1 arrival and departure procedures with Radius to Fix (RF) with a view to providing performance benefits. The airspace concept is to include non-nominal operations to accommodate reversion from RNP 1 operations.	31/12/2023
ASP02	**Where necessary, provide appropriate navigation infrastructure to support RNP 1 operations including the infrastructure required for GNSS reversion** - The RNP 1 specification requires the mandatory use of GNSS, specifically GPS. This means that the ANSPs would need to determine whether and to what extent a DME infrastructure is needed to accommodate non-nominal operations in the event of a GNSS outage requiring reversion from RNP 1 operations. Such a determination is made on the basis of several criteria, including fleet equipage with DME/DME, traffic density and complexity. This may result in a requirement to install new DME stations and/or the relocation of existing units. NOTE: According to ICAO standards the only appropriate basis for RNP1 procedures is GNSS. For reversion a fallback to RNAV1 operations based on DME/DME is a feasible option (see NAV03.1-ASP02). The actual fallback solution has to be chosen under local considerations.	31/12/2023
ASP03	**Train air traffic controllers in RNP 1 procedures with Radius to Fix (RF)**	31/12/2023
ASP04	**Implement RNP 1 arrival and departure procedures with Radius to Fix (RF)** - Implement validated airspace concept with the RNP 1 arrival and departure procedures with Radius to Fix (RF).	31/12/2023
ASP05	**Develop a local RNP 1 safety assessment**	31/12/2023

Airspace Users Lines of Action:

USE01	**Install appropriate RNP 1 with Radius to Fix (RF) equipment**	31/12/2023
USE02	**Train flight crews in RNP 1 TMA procedures**	31/12/2023

Changes to the Objective since previous edition:

- Added operating environment.
- Removed link to ICAO GANP ASBU B1-APTA and added link to B1-RSEQ.

NAV10 - RNP Approach Procedures with Vertical Guidance

Implement RNP Approach procedures with vertical guidance . The intention is to transition from conventional Non Precision Approach (NPA) procedures to RNP approach procedures with vertical guidance.

RNP approach operations with vertical guidance using SBAS are flown to LPV minima, while the operations using Baro are flown to LNAV/VNAV minima. In addition, RNP approach operations using SBAS can be flown to LNAV/VNAV minima.

The main incentive is to enhance safety but there are potential benefits in terms of reduced minima and better access to airports that do not have precision approach and landing capabilities.

SESAR Solutions:	Solution #103 Approach Procedure with vertical guidance (LPV)
SESAR Key Feature:	Advanced Air Traffic Services
Essential Operational Change / PCP:	Pre-requisite for s-AF1.2 Enhanced TMA using RNP-based operations
DP Families:	1.2.1 RNP APCH with vertical guidance 1.2.2 Geographic Database for procedure design
OI Steps & *Enablers*:	AOM-0602, AOM-0604
Dependencies:	No dependencies
ICAO ASBUs:	B0-APTA
Network Strategy Plan:	SO6/5
Operating Environment:	Terminal, Mixed
EATMN Systems:	AIS, NAV

When

FOC: **31/12/2023**

Who

Stakeholders:
- Regulators
- ANSPs
- Airspace Users

Where

Applicability Area
All ECAC States except Maastricht UAC

Status

N/A - Objective fully reviewed

Completion rate - end 2017: **29%**

Estimated achievement: **12/2019**

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Safety
Reduction in Controlled Flight Into Terrain (CFIT) occurrences. Improved pilot situation awareness and reduced crew workload.

Capacity
Potential to enhance capacity due to lower minima than be achieved through conventional NPA.

Operational Efficiency
Improved through shortened approaches, increased flexibility in the use of runways, reduced landing minima with only conventional NPAs, fallback during precision approach system outages.

Environment
Emissions and noise nuisance reduced by use of optimal flight procedures and routings and the elimination of step-down approach procedures.

Regulators Lines of Action:

REG01	**Apply EASA material to local national regulatory activities** - Publish national regulatory material for RNP approach procedures based on Airworthiness Approval and Operational Criteria for RNP APPROACH (RNP APCH) operations including LNAV/VNAV minima (EASA AMC 20-27) and Airworthiness approval and Operational criteria RNP APPROACH (RNP APCH) Operations including LPV minima (EASA AMC 20-28).	30/04/2023

ANSPs Lines of Action:

ASP01	**Design and Publish RNP approach procedures to LNAV/VNAV and/or LPV minima**	31/12/2023
ASP02	**Provide an approved SBAS Service to support APV/SBAS and declare the Service area**	Finalised
ASP03	**Develop National safety case for RNP approach down to LNAV/VNAV and/or LPV minima**	30-04/2023
ASP04	**Publish in AIPs all coordinates data in WGS-84 in accordance with ICAO Annex 15 requirements and Article 14 of Regulation (EU) No 73/2010** - It is an essential requirement for RNAV procedures that all coordinates data published in AIPs are surveyed with reference to the WGS84 standard.	31/12/2023

Airspace Users Lines of Action:

USE01	**Equip aircraft with systems approved for RNP approach down to LNAV/VNAV and/or LPV minima operations** Fit the aircraft with suitably approved equipment (Stand alone or integrated with existing FMS) as follows: - APV/Baro equipment compliant to AMC 20-27; - APV/SBAS SBAS compliant to AMC 20-28. For new or modified aircraft, the Aircraft Flight Manual (AFM) or the Pilot's Operating Handbook (POH), whichever is applicable, should be updated according to AMC 20-27 and AMC 20-28.	31/12/2023
USE02	**Get airworthiness certification and operational approval** - Apply for and get approval against EASA AMC 20-27 and 20-28.	31/12/2023

Changes to the Objective since previous edition:

- Objective title changed from ‘APV Procedures’ to ‘RNP Approach Procedures with Vertical Guidance’.
- Consequently, the term APV is replaced by “RNP approach with vertical guidance” accordingly through the text in the objective, as applicable.
- New full operational capability (FOC) date of the objective and its SLoAs is set to 31/12/2023.
- Terminology in SLoAs title and finalisation criteria “APV procedures based on /Baro and/or APV/SBAS” is changed to “RNP approach procedures down to LNAV/VNAV and/or LPV minima” as applicable.
- Added operating environment.

NAV12 – Optimised Low-Level IFR Routes in TMA for Rotorcraft [Local]

The implementation objective consists in the implementation of low level IFR routes (LLR) based on GNSS technology, using required navigation performance (RNP 1.0 / 0.3) to enable an optimised use of the airspace within medium dense/complex TMAs.

This objective supports connectivity between the airports included into the TMA airspace and also better approach procedures thanks to the implementation of "Standard PinS - Point In Space" procedures concept. The PinS procedures consist in flying under instrument flight rules (IFR) to/from a Point-In-Space in the proximity of the landing/departure site using very high accuracy (RNP0.3 or better). The segment joining the "PinS" and the landing/departure site (FATO - Final Approach & Take-Off areas) is flown visually.

SESAR Solutions:	Solution #113 Optimised low-level IFR routes for rotorcraft
SESAR Key Feature:	Advanced Air Traffic Services
OI Steps & *Enablers*:	AOM-0810
Dependencies:	NAV03.1, NAV03.2
ICAO ASBUs:	B1-APTA
Network Strategy Plan:	SO6/5
Operating Environment:	Terminal, Mixed
EATMN Systems:	FDPS/SDPS & HMI, NAV

When

FOC: **n/a**

Who

Stakeholders:
- ANSPs
- Airspace users

Where

Applicability Area
TMAs subject to local needs and complexity

Status

Completion rate - end 2017:

Implemented by 2 ANSPs

Planned / ongoing by 3 ANSPs

Applicable regulations & standards

N/A

Benefits

Safety
Improved through airspace de-confliction of low altitude airways. It can provide more visibility into planning of those sectors (up-stream sectors) where the ATCO is arranging the arrivals sequence.

Operational Efficiency
Improved through reduced track mileage, resulting in less fuel consumption and associated CO2 emissions, enhanced transition from the en-route phase to the approach phase to the Final Approach and Takeoff Area-FATO (and vice versa) and more direct routing in dense terminal airspace (obstacle-rich or noise-sensitive terminal environment).

Environment
Reduced track mileage, resulting in less fuel consumption and associated CO2 emissions.

Capacity
Potential to enable an increasing of passenger throughput at medium and large airports, removing IFR rotorcraft from active runways.

ANSPs Lines of Action:

ASP01	**Implement low-level IFR routes (LLR) in TMA for rotorcraft**	n/a
ASP02	**Train air traffic controllers procedures supporting low-level IFR routes (LLR) in TMA for rotorcraft**	n/a
ASP03	**Develop a local safety assessment for the implementation of low-level IFR routes (LLR) in TMA for rotorcraft**	n/a

Airspace Users Lines of Action:

USE01	**Install appropriate RNP 0.3 equipment**	n/a
USE02	**Train flight crews in RNP 0.3 ATS routes**	n/a

Changes to the Objective since previous edition:

- Added operating environment.

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High Performing Airport Operations

		<15	15	16	17	18	19	20	21	22	23	24	≥25
AOP04.1	A-SMGCS Surveillance (former Level 1)	◊											
AOP04.2	A-SMGCS Runway Monitoring and Conflict Alerting (RMCA) (former Level 2)												
AOP05	Airport CDM												
AOP10	Time-Based Separation												
AOP11	Initial Airport Operations Plan												
AOP12	Improve Runway and Airfield Safety with ATC Clearances Monitoring												
AOP13	Automated Assistance to Controller for Surface Movement Planning and Routing												
AOP14	Remote Tower Services	Local											
ENV01	Continuous Descent Operations (*)												
ENV02	Collaborative Environmental Management	Local											
ENV03	Continuous Climb Operations (*)	Local											
SAF11	Improve Runway Safety by Preventing Runway Excursions												

◊ Means that the objective has an FOC prior to 2015 but has not yet been fully implemented.

The objective codes in the MP Level 3 appearing in this section refer to:

- AOP – Airport Operations
- ENV – Environment
- SAF – Safety Management

A full definition of all acronyms can be found in Annex 1-Definitions and Terminology.

A list containing all airports to which objectives ATC07.1 and ENV01 apply can be found in Annex 2-Applicability to Airports.

AOP04.1 – A-SMGCS Surveillance (former Level 1)

Advanced surface movement guidance and control system (A-SMGCS) Surveillance' service (former Level 1) is a surface consists in a surveillance system that provides ATC the controller with the position and automatic identity of all suitably equipped relevant aircraft on the movement area and all suitably equipped relevant vehicles on the manoeuvring area.

A-SMGCS Surveillance service may be used to replace visual observation and as the basis of controller decision making. Traffic is controlled through appropriate procedures allowing the issuance of information and clearances. to traffic on the basis of A-SMGCS Surveillance data.

SESAR Key Feature:	High Performing Airport Operations
Essential Operational Change / PCP:	Pre-requisite for: - S-AF2.4 Automated Assistance to Controller for Surface Movement Planning and Routing (PCP) - S-AF2.5 Airport Safety Nets (PCP) - Integrated Surface Management (EOC)
DP Families:	2.2.1 A-SMGCS level 1 and 2
OI Steps & *Enablers*:	AO-0201, *CTE-S02b, CTE-S03b, CTE-S04b*
Dependencies:	No dependencies
ICAO ASBUs:	B0-SURF
Network Strategy Plan:	SO6/6
Operating Environment:	Airport
EATMN Systems:	FDPS/SDPS & HMI, SUR

When

FOC: **31/12/2011**

Who

Stakeholders:
- Regulators
- ANSPs
- Airport Operators
- Airspace users

Where

Applicability Area
25 PCP airports
24 non-PCP airports

Status

Late

Completion rate - end 2017: **66%**

Estimated achievement: **12/2018**

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project
- Community Specification for application under the SES Interoperability Regulation EC 552/2004 - Ver. 1.1.1
- EUROCAE ED-87C, ED-116 & ED-117

Benefits

Safety
Through improved situational awareness of the controller, especially during periods of reduced visibility and darkness.

Capacity
Traffic throughput notably increased in low visibility conditions.

Operational Efficiency
More efficient control of surface traffic.

Environment
Reduction in fuel burn and emissions.

Regulators Lines of Action:

REG01	**Mandate the carriage of required aircraft equipment to enable location and identification of aircraft on the movement area (including military aircraft, as appropriate)**	31/12/2010
REG02	**Mandate the carriage of required vehicle equipment to enable location and identification of vehicles on the manoeuvering area**	31/12/2010
REG03	**Publish A-SMGCS Surveillance procedures (including transponder operating procedures) in national aeronautical information publications**	31/12/2010

ANSPs Lines of Action:

ASP01	**Install required surveillance equipment** - Install all the surveillance equipment and related systems to enable aerodrome controllers to locate and identify aircraft and vehicles on the manoeuvering area.	31/12/2010
ASP02	**Train aerodrome control staff in the use of A-SMGCS Surveillance in the provision of aerodrome control service**	31/12/2010
ASP03	**Implement approved A-SMGCS operational procedures**	31/12/2011

Airport Operators Lines of Action:

APO01	**Install required A-SMGCS control function equipment** - Install all the surveillance equipment and related systems to enable aerodrome controllers to locate and identify aircraft and vehicles on the manoeuvering area.	31/12/2010
APO02	**Equip ground vehicles** - Equip vehicles operating on the manoeuvering area to provide their position and identity to the A-SMGCS Surveillance system.	31/12/2010
APO03	**Train ground vehicle drivers**	31/12/2010

Airspace Users Lines of Action:

USE01	**Update aircrew training manual to include procedures for use of correct Mode-S transponder setting for enabling cooperative A-SMGCS detection on the movement areas**	Finalised

Changes to the Objective since previous edition:

- Added operating environment.
- Added Baku and Luxembourg airports to the applicability area.
- Removed link with DP family 2.5.2 Vehicle and Aircraft systems contributing to Airport Safety Nets.

AOP04.2 – A-SMGCS Runway Monitoring and Conflict Alerting (RMCA) (former Level 2)

Runway monitoring and conflict alerting (RMCA) (former Level 2) is the first element of the A-SMGCS 'Airport Safety Support' service. RMCA consists of an airport surface surveillance system (i.e. A-SMGCS Surveillance – former Level 1) complemented with a short term conflicting alerting tool that monitors movements on or near the runway and detects conflicts between an aircraft and another mobile as well as runway incursion by intruders. Appropriate alerts are visualized on the controller's HMI.

SESAR Key Feature:	High Performing Airport Operations
Essential Operational Change / PCP:	Pre-requisite for: - S-AF2.4 Automated Assistance to Controller for Surface Movement Planning and Routing (PCP) - S-AF2.5 Airport Safety Nets (PCP) - Integrated Surface Management (EOC)
DP Families:	2.2.1 A-SMGCS level 1 and 2
OI Steps & *Enablers*:	AO-0102, AO-0201, *CTE-S02b, CTE-S03b, CTE-S04b*
Dependencies:	AOP04.1 (A-SMGCS Surveillance)
ICAO ASBUs:	B0-SURF
Network Strategy Plan:	SO6/6
Operating Environment:	Airport
EATMN Systems:	FDPS/SDPS & HMI, SUR

When

FOC: **31/12/2017**

Who

Stakeholders:
- ANSPs
- Airport Operators

Where

Applicability Area
25 PCP airports
24 non-PCP airports

Status

Late

Completion rate - end 2017: **49%**

Estimated achievement: **12/2019**

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project
- Community Specification for application under the SES Interoperability Regulation EC 552/2004 - Ver. 1.1.1 - OJ 2010/C 330/02 / 10/2010: ETSI - EN 303 213-2, 213-3, 213-4-1, 213-4-2
- EUROCAE ED-87C, ED-116 & ED-117

Benefits

Safety

Better situational awareness and support to controller in detecting potentially hazardous conflicts on or near the runway or infringements of runway.

Operational Efficiency

More efficient control of surface traffic.

ANSPs Lines of Action:

ASP01	**Install required A-SMGCS RMCA function equipment** - Install runway monitoring and conflict alerting (RMCA) function systems in order to enable the detection of conflicts and intrusions in accordance with A-SMGCS RMCA requirements.	31/12/2017
ASP02	**Train aerodrome control staff in the use of A-SMGCS RMCA in the provision of an aerodrome control service**	31/12/2017
ASP03	**Implement approved A-SMGCS RMCA operational procedures**	31/12/2017

Airport Operators Lines of Action:

APO01	**Install required A-SMGCS RMCA function equipment** - Install runway monitoring and conflict alerting (RMCA) function systems in order to enable the detection of conflicts & intrusions in accordance with A-SMGCS RMCA requirements.	31/12/2017

Changes to the Objective since previous edition:

- Added operating environment.
- Status changed from ‘Planned delay’ to ‘Late’.
- Added Baku, Luxembourg and Zagreb airports to the applicability area.
- Sofia airport removed from applicability area.

AOP05 – Airport CDM

Implement airport CDM (A-CDM) aims to enhance the operational efficiency of airports and improve their integration into the air traffic management Network.

This is achieved by increasing the information sharing between the local ANSP, airport operator, aircraft operators, ground handlers, the NM and other airport service providers, and also by improving the cooperation between these partners. A-CDM allows to enhance the predictability of events, optimise the utilisation of resources and therefore increase the efficiency of the overall system.

SESAR Key Feature:	High Performing Airport Operations
Essential Operational Change / PCP:	- S-AF2.1 DMAN synchronised with Pre-departure sequencing (PCP) Pre-requisite for: - Collaborative Airport (EOC)
DP Families:	2.1.1 Initial DMAN 2.1.3 Basic A-CDM
OI Steps & *Enablers*:	AO-0501, AO-0601, AO-0602, AO-0603, TS-0201
Dependencies:	AOP12-ASP03 (Electronic Flight Strips)
ICAO ASBUs:	B0-ACDM, B0-RSEQ
Network Strategy Plan:	SO6/4
Operating Environment:	Airport, Network
EATMN Systems:	FDPS/SDPS & HMI

When

FOC: **31/12/2016**

Who

Stakeholders:
- ANSPs
- Airport Operators
- Airspace users
- Network Manager

Where

Applicability Area
25 PCP airports
24 non-PCP Airports

Status

Late

Completion rate - end 2017: **56%**

Estimated achievement: **04/2019**

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project
- ICAO Annex 14 - Aerodromes
- ETSI - EN 303 212 - Airport Collaborative Decision Making (A-CDM); Community Specification - Ver. 1.1.1 - OJ 2010C168/04 / 06/2010
- EUROCAE ED-141, ED-145 & ED-146

Benefits

Capacity
Improved through optimal use of facilities and services, better use of airport and ATFM slots.

Cost Efficiency
Increased airport revenue through additional flights and passengers.

Operational Efficiency
Improved system efficiency and predictability. Significant decrease in fuel burn through better timed operations.

Environment
Reduced noise and emissions due to limiting engine ground running time due to better timed operations.

ANSPs Lines of Action:

ASP01	**Define and agree performance objectives and KPIs at local level, specific to ANSP**	31/01/2013
ASP02	**Define and implement local ANS procedures for information sharing via Letters of Agreement (LoAs) and/or Memorandum of Understanding (MoU)**	31/01/2013
ASP03	**Define and implement local procedures for turnaround processes**	31/12/2016
ASP04	**Continually review and measure airport performance**	31/01/2013
ASP05	**Define and implement variable taxi-time and pre-departure sequencing procedure**	31/12/2016
ASP06	**Define and implement procedures for CDM in adverse conditions, including the de-icing**	31/12/2016

Airport Operators Lines of Action:

APO01	**Define and agree performance objectives and KPIs at local level specific to airport operations**	31/01/2013
APO02	**Define and implement local airport operations procedures for information sharing via Letters of Agreement (LoAs) and/or Memorandum of Understanding (MoU)**	31/01/2013
APO03	**Define and implement local procedures for turnaround processes in accordance with CDM manual guidelines (baseline CDM)**	31/12/2016
APO04	**Continually review and measure airport performance**	31/01/2013
APO05	**Define and implement the exchange of messages, Flight Update Message (FUM) and Departure Planning Information (DPI) between NMOC and the airport**	31/01/2014
APO06	**Define and implement procedures for CDM in adverse conditions including the de-icing**	31/12/2016

Airspace Users Lines of Action:

USE01	**Define and agree performance objectives and KPIs at local level, specific to aircraft operators**	31/01/2013
USE02	**Define and implement local aircraft operators procedures for information sharing through LoAs and/or MoU**	31/01/2013
USE03	**Define and implement local procedures for turnaround processes**	31/12/2016
USE04	**Continually review and measure airport performance**	31/01/2013
USE05	**Define and implement procedures for CDM in adverse conditions including the de-icing**	31/12/2016
USE06	**Define and agree performance objectives and KPIs at local level, specific to aircraft operators**	31/01/2013

Network Manager Lines of Action:

NM01	**Define and implement the exchange of messages, Flight Update Message (FUM) and Departure Planning Information (DPI) between NMOC and the airport**	Finalised

Changes to the Objective since previous edition:

- Added operating environment.
- Estimated achievement changed from ‘12/2018’ to ‘04/2019’
- Added Naples, Riga and Zagreb airports to the applicability area.
- Added link to ICAO GANP ASBU B0-RSEQ.

AOP10 – Time-Based Separation

Time-based separation (TBS) consists in the separation of aircraft in sequence on the approach to a runway using time intervals instead of distances. It may be applied during final approach by allowing equivalent distance information to be displayed to the controller taking account of prevailing wind conditions. Radar separation minima and wake turbulence separation (WBS) parameters shall be integrated to provide guidance to the air traffic controller to enable time-based spacing of aircraft during final approach that considers the effect of headwind.

SESAR Solutions:	Solution #64 Time-Based separation
SESAR Key Feature:	High Performing Airport Operations
Essential Operational Change / PCP:	S-AF2.3 Time-Based Separation for Final Approach
DP Families:	2.3.1 Time Based Separation (TBS)
OI Steps & *Enablers*:	AO-0303
Dependencies:	ATC07.1, ATC15.1, ATC15.2, AOP12
ICAO ASBUs:	B1-RSEQ, B2-WAKE
Network Strategy Plan:	SO6/5
Operating Environment:	Airport, Terminal, Mixed
EATMN Systems:	FDPS/SDPS & HMI, MET

When

FOC: **31/12/2023**

Who

Stakeholders:
- Regulators
- ANSPs
- Airspace users

Where

Applicability Area
16 PCP Airports

Status

Not available

Completion rate - end 2017: **7%**

Estimated achievement: **Not available**

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Capacity
Improved aircraft landing rates leading to increased airport throughput. Reduction of holding times and stack entry to touchdown times leading to reduced delays.

Environment
Reduced emissions due to reduced holding times and stack entry to touchdown times.

Safety
More consistent separation delivery on final approach.

Regulators Lines of Action

REG01	**Publish TBS operational procedures in national aeronautical information publications**	31/12/2023

ANSPs Lines of Action:

ASP01	**Ensure AMAN system is compatible with TBS support tool**	31/12/2023
ASP02	**Modify controller working position (CWP) to integrate TBS support tool with safety nets**	31/12/2023
ASP03	**Local MET info with actual glide-slope wind conditions to be provided into TBS Support tool**	31/12/2023
ASP04	**TBS support tool to provide automatic monitoring and alerting of non-conformant behaviours, infringements, wrong aircraft**	31/12/2023
ASP05	**Implement procedures for TBS operations**	31/12/2023
ASP06	**Train controllers (tower and approach) on TBS operations**	31/12/2023

Airspace Users Lines of Action:

USE01	**Train flight crews on TBS operations**	31/12/2023

Changes to the Objective since previous edition:

- Added operating environment.

AOP11 – Initial Airport Operations Plan

The airport operations plan (AOP) is a single, common and collaboratively agreed rolling plan available to all airport stakeholders whose purpose is to provide common situational awareness and to form the basis upon which stakeholder decisions relating to process optimization can be made.

It reflects the operational status of the airport and therefore facilitates demand and capacity balancing (DCB). It connects the relevant stakeholders, notably the airspace users' flight operations centre (FOC). It contains data and information relating to the different status of planning phases and is in the format of a rolling plan, which evolves over time.

SESAR Solutions:	Solution #21 Airport Operations Plan and AOP-NOP Seamless Integration
SESAR Key Feature:	High Performing Airport Operations
Essential Operational Change / PCP:	S-AF2.1 DMAN synchronised with predeparture sequencing S-AF4.2 Collaborative NOP
DP Families:	2.1.4 Initial Airport Operations Plan (AOP)
OI Steps & *Enablers*:	AO-0801-A
Dependencies:	AOP05, FCM05
ICAO ASBUs:	B1-ACDM
Network Strategy Plan:	SO6/2
Operating Environment:	Airport
EATMN Systems:	Airport Operations Centre Support Tools

When

FOC: **31/12/2021**

Who

Stakeholders:
- ANSPs
- Airport Operators
- Airspace users

Where

Applicability Area
24 PCP Airports
13 non-PCP airports

Status

On time

Completion rate - end 2017: **5%**

Estimated achievement: **12/2021**

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Capacity
Improved through optimal use of facilities and services, better use of airport and ATFM slots.

Operational Efficiency
Improved system efficiency and predictability. Significant decrease in fuel burn through better timed operations. Lower airspace user operating cost due to improved punctuality.

Environment
Reduced noise and emissions due to limiting engine ground running time due to better timed operations.

ANSPs Lines of Action:

ASP01	**Provide the required information to the AOP** - Provide and maintain AOP elements under the ANSP's responsibility. This information may include available airspace capacity, other cfactors (e.g. adjacent airports, military training areas, etc.).	31/12/2021

Airport Operators Lines of Action:

APO01	**Set up the and manage Airport Operational Plan**	31/12/2021
APO02	**Provide the required information to the AOP** - Provide and maintain and AOP elements under the airport operator's responsibility. This information includes (but is not limited to): • Possible airport configurations; • Airport usage and any restriction rule, unforeseen / temporary aerodrome constraints, • Information sharing between airport partners, • Operational capacity of airport resources, • Airport resources availability and allocation plan. - This SLoA also covers other stakeholders active in the airport environment (e.g. ground handling agents) which may feed the AOP according with the local agreements.	31/12/2021
APO03	**Train all relevant personnel**	31/12/2021

Airspace Users Lines of Action:

USE01	**Provide the required information to the AOP** - Update the AOP information under the airspace users' responsibility, notably information relating to the planning of business trajectories and about the in/outbound flights connected by a turn-round process.	31/12/2021

Changes to the Objective since previous edition:

- Added operating environment.
- Changed status from 'Not available' to 'On time'.
- Glasgow and Sarajevo airports removed from the applicability area.
- Removed link to ICAO GANP ASBU B1-NOPS.

AOP12 – Improve Runway and Airfield Safety with Conflicting ATC Clearances (CATC) detection and Conformance Monitoring Alerts for Controllers (CMAC)

This objective consists of the detection and alerting of conflicting ATC clearances (CATC) to aircraft and vehicles and non-conformance to procedures and clearances (CMAC) for traffic on the movement area.

CMAC alerts controllers when aircraft and vehicles deviate from ATC instructions, procedures. The detection of conflicting ATC clearances provides an early prediction of situations that if not corrected would end up in hazardous situations that would be detected in turn by the runway monitoring and conflict alerting (RMCA). The controller shall input all clearances given to aircraft or vehicles into the ATC system using an electronic clearance input (ECI) means such as the electronic flight strip (EFS).

SESAR Solutions:	Solution #02 Airport Safety Nets
SESAR Key Feature:	High Performing Airport Operations
Essential Operational Change / PCP:	S-AF2.1 - DMAN synchronised with pre-departure sequencing S-AF2.5 - Airport Safety Nets
DP Families:	2.1.2 Electronic Flight Strips (EFS) 2.5.1 Airport Safety Nets associated with A-SMGCS level 2
OI Steps & *Enablers*:	AO-0104-A
Dependencies:	AOP04.1, AOP04.2, AOP13
ICAO ASBUs:	B2-SURF
Network Strategy Plan:	SO6/6
Operating Environments:	Airport
EATMN Systems:	FDPS/SDPS & HMI

When

FOC: **31/12/2020**

Who

Stakeholders:
- ANSPs
- Airport Operators
- Airspace users

Where

Applicability Area
25 PCP airports

Status

Planned delay

Completion rate - end 2017: **13%**

Estimated achievement: **06/2021**

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Safety

Improved runway and airfield safety by providing early detection of hazardous situations that may potentially put the vehicles and aircraft at risk of collision. Improved situational awareness of all actors.

ANSPs Lines of Action:

ASP01	**Install required 'Airport Safety Nets'** - Deploy appropriate systems and associated procedures allowing the detection and alerting of conflicting ATC clearances to mobiles and detection of non-conformance to procedures or clearances for traffic on runways, taxiways and in the apron/stand/gate area.	31/12/2020
ASP02	**Train aerodrome control staff on the functionality of 'Airport Safety Nets'** - Train aerodrome controllers on the 'Airport Safety Nets' systems and procedures (including phraseology) in accordance with agreed training requirements.	31/12/2020
ASP03	**Implement digital systems such as electronic flight strips (EFS)**	31/12/2020

Airport Operators Lines of Action:

APO01	**Train all relevant staff on the functionality of 'Airport Safety Nets'** - Train all relevant staff (e.g. vehicle drivers) on the 'Airport Safety Nets' systems and procedures (including phraseology) in accordance with agreed training requirements.	31/12/2020

Airspace Users Lines of Action:

USE01	**Train pilots on the functionality of 'Airport Safety Nets'** - Train pilots on the 'Airport Safety Nets' systems and procedures (including phraseology) in accordance with agreed training requirements.	31/12/2020

NOTE: The actions listed above should be addressed to air navigation service providers as well as to airport operators. This is due to the fact that some major European hub airports operate their own ground control units for specific areas of responsibility at the airport. However from a MP Level 3 perspective, the airport operators providing air traffic control services qualify as ANSPs and are therefore covered by the ASP SLoAs.

Changes to the Objective since previous edition:

- Added operating environment.
- Status changed from ‘On time’ to ‘Planned delay’. Estimated achievement changed from 12/2020 to 06/2021.
- Removed link to ICAO GANP ASBU B1-SURF and added link to B2-SURF.

AOP13 - Automated Assistance to Controller for Surface Movement Planning and Routing

The A-SMGCS Routing service provides the generation of taxi routes, with the corresponding estimated taxi times for planning considerations. This function calculates the most operationally relevant route which permits the aircraft to go from stand to runway, from runway to stand or any other surface movement.

Taxi routes may be modified by the air traffic controller before being assigned to aircraft and vehicles. The controller working position allows the controller to manage surface route modification and creation.

Traffic will be controlled through the use of appropriate procedures allowing the issuance of information and clearances to traffic.

The A-SMGCS Routing Service should provide to external systems the estimated taxi-out time (EXOT) for aircraft as long as they are before pushback, if benefit provided compared to already existing A-CDM.

SESAR Solutions:	Solutions #22 & 53
SESAR Key Feature:	High Performing Airport Operations
Essential Operational Change / PCP:	S-AF2.4 Automated assistance to controller for surface movement planning and routing
DP Families:	2.4.1 A-SMGCS Routing and Planning Functions
OI Steps & *Enablers*:	AO-0205, TS-0202
Dependencies:	AOP04.1, AOP04.2, AOP12
ICAO ASBUs:	B1-ACDM, B1-RSEQ, B2-SURF
Network Strategy Plan:	SO6/6
Operating Environment:	Airport
EATMN Systems:	FDPS/SDPS & HMI

When

FOC: **31/12/2023**

Who

Stakeholders:
- Regulators
- ANSPs

Where

Applicability Area
25 PCP airports

Status

Not available

Completion rate - end 2017: **0%**

Estimated achievement: **Not available**

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Safety
Improved through increased controllers' situational awareness for all ground movements and potential conflicts resolution.

Capacity
Increased availability of taxiway resources and reduced total taxi time by ground movements. Improved traffic flow on the aerodrome's manoeuvering area.

Operational Efficiency
Reduced fuel consumption due to reduced taxi time and reduced number of stops while taxiing.

Environment
Reduced environmental impact by reducing fuel consumption and then CO2 emissions.

Regulators Lines of Action:

REG01	**Coordination and final official approval of procedures by the local regulator is required**	31/12/2023

ANSPs Lines of Action:

ASP01	**Upgrade ATS systems to support automated assistance to air traffic controllers for surface movement planning and routing**	31/12/2023
ASP02	**Ensure the planning and routing function is used to optimise pre-departure sequencing**	31/12/2023
ASP03	**Implement operational procedures implementing automated assistance to air traffic controllers for surface movement planning and routing**	31/12/2023
ASP04	**Develop a safety assessment of the changes imposed by the implementation of automated assistance to air traffic controllers for surface movement planning and routing**	31/12/2023
ASP05	**Train all operational personnel concerned in the use of automated assistance for surface movement planning and routing**	31/12/2023

NOTE: The actions listed above should be addressed to air navigation service providers as well as to airport operators. This is due to the fact that some major European hub airports operate their own ground control units for specific areas of responsibility at the airport. However from a MP Level 3 perspective, the airport operators providing air traffic control services qualify as ANSPs and are therefore covered by the ASP SLoAs.

Changes to the Objective since previous edition:

- Added link to SESAR Solution #53 and relevant OI Step TS-0202. Description of the objective modified accordingly.
- Added new SLoA (ASP02) to cover the requirements of Solution #53. As a result, former SLoAs ASP02, ASP03 and ASP04 become now ASP03, ASP04 and ASP05 respectively.
- Added operating environment.

AOP14 – Remote Tower Services [Local]

The remote tower concept enables air traffic control services (ATS) and aerodrome flight information services (AFIS) to be provided at aerodromes where such services are either currently unavailable, or where it is difficult or too expensive to implement and staff a conventional manned facility.

This Objective proposes to remotely provide ATC services and AFIS for one aerodrome handling low to medium traffic volumes or two low-density aerodromes. The basic configuration, which does not include augmentation features, is considered suitable for ATC and AFIS provision at low density airfields. However, the level and flexibility of service provision can be enhanced through the use of augmentation technology, such as an ATC surveillance display, surveillance and visual tracking, infra-red cameras etc.

This Objective also covers the possibility to apply the remote tower concept as a contingency solution in facility known as Remote Contingency Tower (RCT).

SESAR Solutions:	Solutions #12 & #71 (one aerodrome), #52 (two aerodromes) and #13 (contingency)
SESAR Key Feature:	Advanced Air Traffic Services
Operational Change:	Remote Tower
OI Steps & *Enablers*:	SDM-0201, SDM-0204, SDM-0205
Dependencies:	No dependencies
ICAO ASBUs:	B1-RATS
Operating Environment:	Airport
EATMN Systems:	FDPS/SDPS & HMI

When

FOC: **n/a**

Who

Stakeholders:
- Regulators
- ANSPs
- Airport Operators

Where

Applicability Area
Low to medium complexity aerodromes, subject to local needs

Status

Completion rate - end 2017:
Implemented in 2 locations

Planned / ongoing in 18 locations

Applicable regulations & standards

- ED Decision 2015/014/R adopting Guidance Material on the implementation of the remote tower concept for single mode of operation
- EASA's Guidance Material on the implementation of the remote tower concept for single mode of operation
- ED Decision 2015/015/R - Requirements on Air Traffic Controller licensing regarding remote tower operations

Benefits

Cost Efficiency

Cost reduction for ATS by optimisation of ATCOs. Remote ATS facilities will be cheaper to maintain, able to operate for longer periods and enable lower staffing costs. It will also significantly reduce the requirement to maintain tower buildings and infrastructure.

Operational Efficiency

Improve the uniformity of service provision at low to medium density and remote aerodromes and increase the availability of the service (for example allowing ATS to be provided at an aerodrome which previously was unable to financially support a service). Cost benefits of RCT due to customer retention and reduced economic loss during contingency events.

Regulators Lines of Action:

REG01	**Supervise compliance with regulatory provisions**	n/a

ANSPs Lines of Action:

ASP01	**Develop, and deliver as necessary, a safety assessment of the changes imposed by the implementation of remote tower**	n/a
ASP02	**Define and implement the system improvements allowing for the implementation of remote tower** - A number of system improvements should be implemented in order to display to ATCO/AFISO in the remote tower centre an "out of the window like" (OTW) image of the airport and its vicinity and to increase ATCO/AFISO situational awareness. - In addition, all the tools and facilities available to a tower controller will also need to be remotely controlled, including, inter alia, ground-ground and ground-air communications, traffic light controls and aerodrome lighting controls.	n/a
ASP03	**Define and implement procedures and processes in support of network and local dimension imposed by the implementation of remote tower**	n/a
ASP04	**Train all operational and technical personnel concerned**	n/a
ASP05	**Implement remotely provided air traffic service for contingency situations**	n/a

Airport Operator Lines of Action:

APO01	**Define and implement local airport procedures and processes for the implementation of remote tower concept**	n/a
APO02	**Train all applicable personnel**	n/a

Changes to the Objective since previous edition:

- Various fields of the objective updated so it covers also the implementation of Remote Tower for contingency situation (SESAR Solution #13).
- Added operating environment.
- Objective moved from the 'Advanced Air Traffic Services' Key Feature to 'High Performing Airport Operations' in line with the ATM Master Plan Level 1

ENV02 – Airport Collaborative Environmental Management [Local]

Collaborative environmental management (CEM) consists in the establishment of formal working partnership arrangements between ANSP, airport and aircraft operators at individual airports to enable:

- the minimisation of noise and atmospheric emissions in particular CO_2 and NOx (including fuel burn);
- introduction of new operational changes such as airspace design, different approach or departure procedures including CDO and PBN implementation, new airport infrastructure compliance with airport related legislation and environmental certification requirements and
- the management of aircraft and airfield de-icing resulting from combined aircraft operations at the terminal airspace and ground.

These formal working arrangements will enable understanding and awareness of interdependencies and facilitate jointly agreed solutions for environmental improvements.

SESAR Key Feature:	High Performing Airport Operations
OI Steps & *Enablers*:	AO-0703, AO-0705, AO-0706
Dependencies:	No dependencies
Operating Environment:	Airport
EATMN Systems:	No impact on EATMN systems

When

FOC: **n/a**

Who

Stakeholders:
- ANSPs
- Airport Operators
- Airspace users
- EUROCONTROL

Where

Applicability Area
All ECAC airports subject to local needs

Status

Completion rate - end 2017:

Implemented in 39 airports

Planned / ongoing in 9 airports

Applicable regulations & standards

- Regulation (EU) 598/2014 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports within a Balanced Approach and repealing Directive 2002/30/EC
- EC Directive 2002/49/EC, on the assessment and management of environmental noise
- EC Directive 2008/50/EC, on ambient air quality and cleaner air
- ICAO Annex 16; Vol. I-Aircraft Noise & Vol. II-Aircraft engine emissions

Benefits

Environment

Reduction of noise, fuel burn and CO. Contributing to cost savings for airlines and CO_2 reductions for airports.

Operational Efficiency

Reduction of noise, fuel burn and CO. Contributing to cost savings for airlines and CO_2 reductions for airports.

ANSPs Lines of Action:

ASP01	**Participate actively in formal working partnership arrangements with the airport and aircraft operators to manage and control environmental impacts of air traffic procedures in and around the airport**	n/a
ASP02	**Train controllers in the environmental impacts of aircraft operations**	n/a

Airport Operators Lines of Action:

APO01	**Initiate and participate actively in the formal working partnership arrangements with the ANSP and Aircraft Operators to minimise the environmental impact of air traffic procedures**	n/a
APO02	**Ensure appropriate and relevant performance information availability at Airports**	n/a
APO03	**Ensure appropriate Airport policy and procedures and, if required, relevant infrastructures needed to manage and mitigate pollution due to de-icing activities**	n/a
APO04	**Train airport operational staff in the environmental impacts of aircraft operations**	n/a

Airspace Users Lines of Action:

USE01	**Participate actively in the formal working partnership arrangements with the ANSP and Airport to manage and control the environmental impact of aircraft operations**	n/a

EUROCONTROL Lines of Action:

AGY01	**Provide assistance and guidelines to assist airports in setting up formal partnership arrangements between ATSP, airport and aircraft operators for achieving control of environmental impact mitigation**	Finalised

Changes to the Objective since previous edition:

- Objective scope changed to ‘Local’. This implies no pre-set deadline or applicability area and, as a consequence, no status or estimated achievement date..
- Refined definition and performance benefits.
- Added operating environment.

SAF11 – Improve Runway Safety by Preventing Runway Excursions

According to ICAO, runway excursions are a persistent problem and their numbers have not decreased in more than 20 years.

The 'European Action Plan for the Prevention of Runway Excursions (EAPPRE)' contains practical recommendations with guidance materials. It considers all practicable means available ranging from the design of aircraft, airspace, procedures and technologies to relevant training of operational staff.

Central to the recommendations contained in this action plan is the uniform and consistent application of ICAO provisions.

SESAR Key Feature:	High Performing Airport Operations
Relate OI Steps & *Enablers*:	*PRO-006a*
Dependencies:	No dependencies
Operating Environment:	Airport
EATMN Systems:	AIS, MET, NAV, SUR

When

FOC: **31/01/2018**

Who

Stakeholders:
- Regulators
- ANSPs
- Airport Operators
- Airspace users
- Network Manager

Where

Applicability Area
All ECAC States except Malta

Status

Planned delay

Completion rate - end 2017: **44%**

Estimated achievement: **12/2018**

Applicable regulations & standards

- ICAO Annex 3 Meteorological Services for International Air Navigation
- ICAO Annex 6 Operation of Aircraft
- ICAO Annex 11 Air Traffic Services
- ICAO Annex 13 Aircraft Accident and Incident Investigation
- ICAO Annex 14 Aerodromes
- ICAO Annex 15 Aeronautical Information Services

Benefits

Safety
Significant improvement, through reduced risk of incidents and accidents on runways.

Regulators Lines of Action:

REG01	**Implement the appropriate parts of the 'European Action Plan for the Prevention of Runway Excursions (EAPPRE)'** - Disseminate documentation for the EAPPRE. - Establish oversight activities arrangements and monitoring/reporting mechanism. - Implement the applicable regulatory and oversight measures of the EAPPRE.	31/01/2018

ANSPs Lines of Action:

ASP01	**Implement the appropriate parts of the EAPPRE** - Participate in the local runway safety team and follow the appropriate recommendations of the EAPPRE. Recommendations address all topics related to runway operations: safety information sharing, training of ATCOs and other relevant staff, operational procedures in particular related to approach and departure, systems and infrastructure.	31/12/2014
ASP02	**Implement the appropriate parts of the EAPPRE with regards to AIS** - Review processes on the provision of information such as weather, wind and runway surface conditions. - Ensure that pilots in command/ flight crews are informed of the take-off run available (TORA) or the landing distance available (LDA) if these differ from the published data.	31/12/2014
ASP03	**Implement the appropriate parts of the EAPPRE with regards to MET** - Review processes on the provision of information such as weather, wind and runway surface conditions. - Ensure that pilots in command/ flight crews are informed of the take-off run available (TORA) or the landing distance available (LDA) if these differ from the published data.	31/12/2014

Airport Operators Lines of Action:

APO01	**Implement the appropriate parts of the EAPPRE** - Operate a Local Runway Safety Team and follow the appropriate recommendations of the EAPPRE. Recommendations address all topics related to runway operations: safety information sharing, training of relevant staff and infrastructure (runway maintenance, navaids, markings, etc). - If relevant, implement SLoAs ASP02 and ASP03 as listed in the ANSPs section above.	31/12/2014

Airspace Users Lines of Action:

USE01	**Implement the appropriate parts of the EAPPRE** - Participate in the local runway safety team and follow the appropriate recommendations of the EAPPRE. Recommendations address all topics related to runway operations: safety information sharing, training of crews, disseminating cross-wind aircraft limitations, on-board systems and operational procedures in the different phases of flight.	31/01/2018

Network Manager Lines of Action:

NM01	**Maintain the EAPPRE**	31/01/2018
NM02	**Implement the appropriate parts of the EAPPRE** - Participate in safety information sharing networks and exchange relevant information.	31/01/2018

Changes to the Objective since previous edition:

- Added operating environment.

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Enabling Aviation Infrastructure

		<15	15	16	17	18	19	20	21	22	23	24	≥25
COM10	Migrate from AFTN to AMHS												
COM11	Voice over Internet Protocol (VoIP)												
COM12	NewPENS							◇					
FCM08	Extended Flight Plan												
INF07	Electronic Terrain and Obstacle Data (eTOD)												
INF08.1	Information Exchanges via SWIM Yellow TI Profile												
INF08.2	Information Exchanges via SWIM Blue T Profile												
ITY-ACID	Aircraft Identification												
ITY-ADQ	Ensure Quality of Aeronautical Data and Aeronautical Information	◇			◇								
ITY-AGDL	Initial ATC Air-Ground Data Link Services					◇		◇					
ITY-AGVCS2	8,33 kHz Air-Ground Voice Channel Spacing below FL195					◇	◇	◇					
ITY-FMTP	Common Flight Message Transfer Protocol	◇											
ITY-SPI	Surveillance Performance and Interoperability	◇		◇		◇		◇					

◇ Indicates the existence of intermediate regulatory/contractual milestones.

The objective codes in the MP Level 3 appearing in this section refer to:

- COM – Communications
- FCM – Flow and Capacity Management
- INF – Information Management
- ITY – Interoperability

A full definition of all acronyms can be found in Annex 1-Definitions and Terminology.

COM10 – Migrate from AFTN to AMHS

AFTN / CIDIN technology is now becoming obsolescent, and is not sufficiently flexible to support future messaging requirements.

This objective is about enabling EATM Network-wide support of a specific profile of the Extended level of service of the ATSMHS (ATS Message Handling Service), as defined by ICAO. An initial transition step supporting migration to the Basic ATSMHS level of service is foreseen: existing AFTN and CIDIN users and systems will transition to more modern technology, using the ATSMHS application. Thus, the AFTN telegraphic style of working will be replaced by a store-and-forward message handling system based on international standards and providing enhanced functionality.

SESAR Key Feature:	Enabling Aviation Infrastructure
Essential Operational Change:	Predecessor of 'CNS Rationalisation' (EOC)
OI Steps & *Enablers*:	*CTE-C06c*
Dependencies:	No dependencies
Operating Environment:	Airport, Terminal, Mixed, En-Route, Network
EATMN Systems:	COM

When

FOC: **31/12/2018**

Who

Stakeholders:
- ANSPs
- Industry
- EUROCONTROL

Where

Applicability Area
All ECAC States

Status

On time

Completion rate - end 2017: **40%**

Estimated achievement: **12/2018**

Applicable regulations & standards

- EUROCONTROL Specification on the ATS Message Handling System (AMHS) - Edition 2.0 (recognised as Community Specification)

Benefits

Cost Efficiency

Use of COTS messaging systems will de-facto reduce the cost of messaging services and support any kind of message format including the exchange of new binary data leading to lower ANS provision costs.

Safety

Benefits resulting from the application of a harmonised set of safety requirements.

Security

AMHS security services may help to protect against safety hazards such as accidental or deliberate message corruption and can provide protection against undetected misdelivery.

ANSPs Lines of Action:

ASP01	**Implement AMHS capability (Basic ATSMHS) and gateway facilities to AFTN**	31/12/2011
ASP02	**Implement regional boundary gateways**	31/12/2011
ASP03	**Enhance AMHS capability (Extended ATSMHS)**	31/12/2018
ASP04	**Ensure the conformity of AMHS systems and associated procedures**	31/12/2018
ASP05	**Organise personnel awareness and training**	31/12/2018
ASP06	**Participate in ATS Messaging Management Centre (AMC) activities for ATS messaging management**	31/12/2018

Industry Lines of Action:

IND01	**Ensure the conformity of AMHS systems**	31/12/2018

EUROCONTROL Lines of Action:

AGY01	**Provide AMC (ATS Messaging Management Centre) service**	31/12/2018
AGY02	**Implement AMHS capability (Basic ATSMHS) and gateway facilities to AFTN**	Finalised
AGY03	**Enhance AMHS capability (Extended ATSMHS)**	31/12/2018
AGY04	**Develop further relevant elements of the Extended ATSMHS in AMHS Community Specification (CS)**	31/12/2018
AGY05	**Implement AMHS-CS compliance testing methodology and tools**	31/12/2018
AGY06	**Support personnel training**	31/12/2018

Changes to the Objective since previous edition:

- Added operating environment.

COM11 – Voice over Internet Protocol (VoIP)

This Implementation Objective aims at an efficient use of voice over Internet protocol (VoIP) by harmonised and coordinated implementation for ground/ground and ground part of ground/air aeronautical communications, ensuring network benefits from VoIP implementation. The initiative covers inter centre (encompassing all type of ATM Units) voice communication and the links with the ground radio stations. Inter-centre voice communications are currently mainly performed via analogue and digital circuits. This legacy ATM voice services will soon no longer be supported by the European telecommunication service providers, making the use of new technology necessary.

SESAR Key Feature:	Enabling Aviation Infrastructure
DP Families:	3.1.4 Management of Dynamic Airspace Configurations 3.2.1 Upgrade of systems (NM, ANSPs, AUs) to support Direct Routings (DCTs) and Free Routing Airspace (FRA)
OI Steps & *Enablers*:	*CTE-C05a, CTE-C05b*
Dependencies:	No dependencies
Network Strategy Plan:	SO8/4
Operating Environment:	Airport, Terminal, Mixed, En-Route, Network
EATMN Systems:	COM

When

FOC: **31/12/2020**

Who

Stakeholders:
- ANSPs *(Civil and Military providing services to GAT)*

Where

Applicability Area
All ECAC States

Status

On time

Completion rate - end 2017: **7%**

Estimated achievement: **12/2020**

Applicable regulations & standards

- ICAO - Doc 9896 ed.2 - Manual for the ATN using IPS Standards and Protocols
- EUROCAE - ED-136 - Voice over Internet Protocol (VoIP) ATM System Operational and Technical Requirements
- EUROCAE - ED-137B - Interoperability Standards for VoIP ATM Components (Volumes 1 to 5)
- EUROCAE - ED-137C - Interoperability Standards for VoIP ATM Components (Volume 1)
- EUROCAE - ED-138 - Network Requirements and Performances for VoIP ATM Systems (Parts 1 and 2)

Benefits

Safety
Maintained or improved by providing enhanced signalisation functions. Improved by providing a more resilient infrastructure.

Capacity
Maintained or improved by providing enhanced signalisation functions.

Cost Efficiency
Reduced costs by enabling flexible and dynamic use of ANSP resources, leading to long term savings

ANSPs Lines of Action:

ASP01	**Develop safety assessment for the changes** - Develop safety assessment of the changes, notably upgrades of voice communication systems to support VoIP both for inter-centre telephony and AG radio communication. - Deliver safety assessment to the NSA, if new standards are applicable or if the severity class of identified risks is 1 or 2.	31/12/2020
ASP03	**Upgrade and put into service voice communication systems to support VoIP inter-centre telephony** - The upgraded voice communication systems and their HMI shall enable inter-centre communication using VoIP telephony at all types of ATS units.	31/12/2020
ASP04	**Upgrade and put into service voice communication systems to support VoIP links to the ground radio stations** - The upgraded voice communication systems shall enable the operators to perform AG radio communication using VoIP links between VCS and ground radio stations.	31/12/2020

Changes to the Objective since previous edition:

- Added operating environment.
- Added link to DP family 3.2.1 in line with Master Plan Level 2.
- Refined performance benefits.

COM12 – NewPENS

PENS (Pan-European Network Service) is an international ground/ground communications infrastructure jointly implemented by EUROCONTROL and European ANSPs in order to meet existing and future ATM communication requirements.
NewPENS builds on PENS and aims at providing a new framework and governance to reap the benefits of a single IP backbone for all ATM services. It will support SESAR requirements and the PCP functionalities, in particular, the blue SWIM Technical Infrastructure Profile which includes the exchange of flight object (FO) information. ANSPs implementing the exchange of FO information will therefore have to become NewPENS users.
The aim of NewPENS is to support all ATM services, not only for ANSPs and NM, but also military, airport and aircraft operators. It is up to these stakeholders, depending on their requirements, to join NewPENS or use public Internet network.

SESAR Key Feature:	Enabling Aviation Infrastructure
Essential Operational Change / PCP:	Enabler for AF5 Initial System Wide Information Management (SWIM)
DP Families:	5.1.2 NewPENS: New Pan-European Network Service 5.2.1 Stakeholders Internet Protocol Compliance
OI Steps & *Enablers*:	*CTE-C06b*
Dependencies:	No dependencies
ICAO ASBUs:	B1-SWIM
Network Strategy Plan:	SO2/3, SO2/4 , SO8/3, SO8/4
Operating Environment:	Airport, Terminal, Mixed, En-Route, Network
EATMN Systems:	COM

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Cost Efficiency

Significant cost savings for the international communications of all connected stakeholders compared to:
- Keeping the inter-stakeholder connections separate from the network.
- Continuing to run all international communications on bilateral international links.

Security

NewPENS shall be compliant with the Security levels requested by the applications it will support, including SWIM.

When

FOC
- 33 ANSPs: **31/12/2020**
- Other stakeholders: **31/12/2024**

Who

Stakeholders:
- ANSPs
- Airport Operators
- Airspace users
- Network Manager

Where

Applicability Area
- Area 1 (ANSPs signatories of the NewPENS Common Procurement Agreement): 33 ANSPs
- Area 2 (Other stakeholders): Stakeholders from all ECAC States not part of Area 1

Status

On time

Completion rate - end 2017: **0%**

Estimated achievement: **12/2024**

ANSPs Lines of Action:

ASP01	**Provide NewPENS connectivity infrastructure** - Adapt communications systems and infrastructure to enable connectivity between NewPENS and the ANSP's network.	Area 1: 31/12/2020 Area 2: 31/12/2024
ASP02	**Migrate to NewPENS** - Migrate the selected services and applications to NewPENS. This shall include, when and where applicable, the exchange of flight object (FO) information.	Area 1: 31/12/2020 Area 2: 31/12/2024

Airport Operators Lines of Action:

APO01	**Migrate to NewPENS, if deemed beneficial** - According to local needs and requirements, migrate to NewPENS for communications with ANSPs and NM (e.g. CDM, messages).	31/12/2024

Airspace Users Lines of Action:

USE01	**Migrate to NewPENS, if deemed beneficial** - According to local needs and requirements, migrate to NewPENS for communications with ANSPs and NM (e.g. CDM, messages).	31/12/2024

Network Manager Lines of Action:

NM01	**Adapt NM systems to allow stakeholders have access to existing data centres via NewPENS**	31/12/2024
NM02	**Migrate to NewPENS** - Migrate the selected services and applications to NewPENS including exchange of FO information.	31/12/2024

Changes to the Objective since previous edition:

- Added operating environment.
- Status set to 'On time'.

FCM08 – Extended Flight Plan

The extended flight plan (EFPL) will include the planned 4D trajectory of the flight as well as flight performance data in addition to ICAO 2012 FPL data, supporting the collaborative flight planning. It is one of the system requirements supporting the initial trajectory information.

This objective addresses the message exchange between NM systems, ANSPs' ATM system and AU's flight plan filing systems. The first phase will address the exchanges between AUs and NM. The subsequent phase, addressing he transmission of EFPL data to ANSPs will be implemented when transition to FF-ICE (Flight & Flow Information for a Collaborative Environment) is achieved.

SESAR Solutions:	Solution #37 Extended Flight Plan
SESAR Key Feature:	Enabling Aviation Infrastructure
Essential Operational Change / PCP:	S-AF4.2 Collaborative NOP S-AF4.4 Automated Support for Traffic Complexity Assessment
DP Families:	4.2.3 Interface ATM systems to NM systems
OI Steps & *Enablers*:	AUO-0203
Dependencies:	No dependencies
ICAO ASBUs:	B1-FICE
Network Strategy Plan:	SO5/1, SO5/6
Operating Environment:	Airport, Terminal, Mixed, En-Route, Network
EATMN Systems:	FDPS/SDPS & HMI

When

FOC: **31/12/2021**

Who

Stakeholders:
- ANSPs
- Network Manager
- Airspace Users

Where

Applicability Area
All ECAC States

Status

Not available

Completion rate - end 2017: **0%**

Estimated achievement: **Not available**

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project

Benefits

Operational Efficiency
Executed trajectory closer to Airspace User's preferences. Enhanced tactical flow management allows improved operational efficiency through better predictability.

Safety
Increased safety due to better traffic predictability. Reduction of over-delivery risk.

ANSPs Lines of Action:

ASP01	**Upgrade the ground systems and develop the associated procedures** - Upgrade the ground systems with the capability to receive and process EFPL information via FF-ICE/1 (Flight & Flow Information for a Collaborative Environment) and develop the associated procedures.	31/12/2021
ASP02	**Develop, and deliver as necessary, a safety assessment**	31/12/2021

Airspace Users Lines of Action:

USE01	**Upgrade the flight planning systems** - Upgrade the flight planning systems with the capability to exchange extended flight plan data with the NM and develop the associated procedures.	31/12/2021
USE02	**Train the personnel**	31/12/2021

Network Manager Lines of Action:

NM01	**Upgrade the NM systems and develop the associated procedures related to EFPL**	31/12/2021
NM02	**Upgrade the NM systems and develop the associated procedures related to FF-ICE/1**	31/12/2021

Changes to the Objective since previous edition:

- Added operating environment.

INF07 - Electronic Terrain and Obstacle Data (eTOD)

ICAO Annex 15 requires the States to provide TOD for their own territory and to announce it in the national AIPs. States need to assess the national regulations and policies in order to evaluate their suitability in relation to eTOD requirements of ICAO Annex 15.
States also need to create capabilities and processes for the origination, collection, exchange, management and distribution of eTOD information as digital datasets, ensuring the provision of up-to-date data meeting the operational requirements and in compliance with the requirements of Regulation (EC) No 73/2010 on aeronautical data quality.

SESAR Key Feature:	Enabling Aviation Infrastructure
Operational Change:	Information reference and exchange models
DP Families:	1.2.2 Geographical database for procedure design
OI Steps & *Enablers*:	*AIMS-16*
Dependencies:	ITY-ADQ
Network Strategy Plan:	SO2/5
Operating Environment:	Airport, Terminal, Mixed
EATMN Systems:	AIS

When

FOC: **31/05/2018**

Who

Stakeholders:
- Regulators
- ANSPs
- Airport Operators

Where

Applicability Area
All ECAC States except Maastricht UAC

Status

Planned delay

Completion rate - end 2017: **5%**

Estimated achievement: **11/2020**

Applicable regulations & standards

- Annex 15 - Aeronautical Information Services
- Annex 14 - Aerodromes Volume I Aerodrome Design and Operations
- Annex 4 - Aeronautical Charts
- Regulation (EC) 73/2010 on aeronautical data quality
- Regulation (EU) 139/2014 on administrative procedures related to aerodromes
- EUROCAE - ED 98 & ED119

Benefits

Safety
The availability of quality-assured electronic terrain and obstacle data from the State's authoritative sources will significantly improve situational awareness with respect to terrain or obstacle hazards, separation assurance and the visualization of approaches in challenging terrain environments, and thereby contribute to increased safety levels and performance in airborne and ground-based systems (e.g. EGPWS, MSAW, APM, SVS, A-SMGCS and Instrument Procedure Design).

Regulators Lines of Action:

REG01	**Establish National TOD policy**	30/11/2015
REG02	**Establish TOD regulatory framework**	31/12/2017
REG03	**Establish oversight of TOD implementation**	31/12/2017
REG04	**Verify the regulatory compliance of TOD implementation**	31/05/2018

ANSPs Lines of Action:

ASP01	**Plan the required activities for the collection, management and provision of TOD in accordance with national TOD policy**	30/11/2015
ASP02	**Implement the collection, management and provision of TOD in accordance with the national TOD policy and regulatory framework**	31/05/2018

Airport Operators Lines of Action:

APO01	**Plan the required activities for the collection, management and provision of TOD in accordance with national TOD policy**	30/11/2015
APO02	**Implement the collection, management and provision of TOD in accordance with the national TOD policy and regulatory framework**	31/05/2018

Changes to the Objective since previous edition:

- Added operating environment.
- Added link to DP family 1.2.2 Geographical database for procedure design.

INF08.1 - Information Exchanges using the SWIM Yellow TI Profile

SWIM comprises standards, infrastructure and governance enabling the management of information and its exchange between operational stakeholders via interoperable services.

Initial system wide information management (iSWIM) is the first element towards SWIM and supports the information exchange based on services that are in conformance with the applicable foundational SWIM specifications. These information services will be delivered over IP-based networks supported through Common Infrastructure Components (i.e. SWIM Registry and Public Key Infrastructure (PKI)).

This objective is limited to the deployment of information services allowing the information exchanges identified in the Annex of the PCP Regulation No 716/2014, and adhering to the SWIM specifications (Information services description, Information definition, Technical infrastructure - Yellow Profile).

SESAR Solutions:	Solutions #35 & #46
SESAR Key Feature:	Enabling Aviation Infrastructure
Essential Operational Change / PCP:	AF5 Initial SWIM
DP Families:	5.1.3, 5.1.4, 5.2.1, 5.2.2, 5.2.3, 5.3.1, 5.4.1, 5.5.1, 5.6.1
OI Steps & *Enablers*:	IS-0901-A, MET-0101
Dependencies:	COM12
ICAO ASBUs:	B1-DATM, B1-SWIM
Network Strategy Plan:	SO2/4, SO2/5, SO5/2, SO5/5
Operating Environment:	Airport, Terminal, Mixed, En-Route, Network
EATMN Systems:	AIS, MET, ASM/ATFCM, FDPS/SDPS & HMI

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project
- EUROCONTROL Specification for SWIM Service Description
- EUROCONTROL Specification for SWIM Information Definition
- EUROCONTROL Specification for SWIM Technical Infrastructure (TI) Yellow Profile

When

FOC: **31/12/2024**

(Only for EU States + Norway and Switzerland)

Who

Stakeholders:
- ANSPs
- Military Authorities
- Airport Operators
- Airspace Users
- Network Manager

Where

Applicability Area
All ECAC States

Status

n/a

Completion rate - end 2017: **n/a**

Estimated achievement: **n/a**

Benefits

The benefits are dependent upon the applications that will be run over the SWIM infrastructure and supporting:
- Aeronautical information exchange
- Meteorological information exchange
- Cooperative network information exchange
- Flight information exchange

ANSPs Lines of Action:

ASP01	**Implement Aeronautical information exchanges**	31/12/2024
ASP02	**Implement Meteorological information exchanges**	31/12/2024
ASP03	**Implement Cooperative Network information exchanges**	31/12/2024
ASP04	**Implement Flight Information exchanges**	31/12/2024

Airport Operators Lines of Action:

APO01	**Implement Aeronautical information exchanges**	31/12/2024
APO02	**Implement Meteorological information exchanges**	31/12/2024
APO03	**Implement Cooperative Network information exchanges**	31/12/2024
APO04	**Implement Flight Information exchanges**	31/12/2024

Military Lines of Action:

MIL01	**Implement Aeronautical information exchanges**	31/12/2024
MIL02	**Implement Meteorological information exchanges**	31/12/2024
MIL03	**Implement Cooperative Network information exchanges**	31/12/2024
MIL04	**Implement Flight Information exchanges**	31/12/2024

Airspace Users Lines of Action:

USE01	**Implement Aeronautical information exchanges**	31/12/2024
USE02	**Implement Meteorological information exchanges**	31/12/2024
USE03	**Implement Cooperative Network information exchanges**	31/12/2024
USE04	**Implement Flight Information exchanges**	31/12/2024

Network Manager Lines of Action:

NM01	**Implement Aeronautical information exchanges**	31/12/2024
NM02	**Implement Meteorological information exchanges**	31/12/2024
NM03	**Implement Cooperative Network information exchanges**	31/12/2024
NM04	**Implement Flight Information exchanges**	31/12/2024

Changes to the Objective since previous edition:

- Added operating environment.
- Changes to emphasize that the objective is about the implementation of information exchanges and not (only) the underlying infrastructure i.e. changed title, improved definition and SLoAs about implementation of infrastructure replaced by a sentence in the description of the SLoAs dealing with information exchanges.
- Added reference to the foundational EUROCONTROL SWIM Specifications.
- Applicability area extended to all ECAC States due to the link with the ICAO GANP.

INF08.2 - Information Exchanges using the SWIM Blue TI Profile

This objective addresses the exchange of flight information related to the flight object using the blue SWIM technical infrastructure (TI) profile as defined in the PCP Regulation.

System wide information management (SWIM) concerns the development of services for information exchange. SWIM comprises standards, infrastructure and governance enabling the management of information and its exchange between operational stakeholders via interoperable services. Initial system wide information management (iSWIM) supports information exchanges that are built on standards and delivered through an internet protocol (IP)-based network by SWIM enabled systems.

SESAR Solutions:	Solutions #28 & #46
SESAR Key Feature:	Enabling Aviation Infrastructure
Essential Operational Change / PCP:	AF5 Initial SWIM
DP Families:	5.1.3, 5.1.4, 5.2.1, 5.2.2, 5.2.3, 5.6.2
OI Steps & *Enablers*:	IS-0901-A, CM-0201-A
Dependencies:	COM12, INF08.1
ICAO ASBUs:	B1-DATM, B1-SWIM
Network Strategy Plan:	SO5/2, SO5/5
Operating Environment:	Airport, Terminal, Mixed, En-Route, Network
EATMN Systems:	AIS, ASM/ATFCM, FDPS/SDPS & HMI

When

FOC: **31/12/2024**

Who

Stakeholders:
- ANSPs
- Network Manager

Where

Applicability Area
All EU+ States

Status

'Initial' objective

Completion rate - end 2017: **n/a**

Estimated achievement: **n/a**

Applicable regulations & standards

- Regulation (EU) 716/2014 - Establishment of the Pilot Common Project
- EUROCONTROL Specification for SWIM Service Description
- EUROCONTROL Specification for SWIM Information Definition

Benefits

The benefits are dependent upon the applications that will be run over the SWIM infrastructure and supporting:
- Aeronautical information exchange
- Meteorological information exchange
- Cooperative network information exchange
- Flight information exchange

ANSPs Lines of Action:

ASP01	**Implement the appropriate infrastructure components in accordance with the SWIM TI Blue Profile**	31/12/2024
ASP02	**Implement Flight information exchanges**	31/12/2024

Network Manager Lines of Action:

NM01	**Implement the appropriate infrastructure components in accordance with the SWIM TI Blue Profile**	31/12/2024
NM02	**Implement Flight information exchanges**	31/12/2024

NOTE: This objective provides advance notice to stakeholders. Some aspects of the objective require further validation.

Changes to the Objective since previous edition:

- Added operating environment.
- Title changed to emphasize that the objective is about the implementation of information exchanges and not (only) the underlying infrastructure.
- Removed link to ICAO GANP ASBU B1-NOPS.

ITY-ACID - Aircraft Identification

The scope of this implementation objective is limited to the milestone of 2 January 2020 as identified in the Regulation (EU) No 1206/2011 (the ACID IR). This regulation requires that air navigation service providers, in all Member States, have the capability to establish individual aircraft identification using the downlinked aircraft identification feature, for all IFR/GAT flights. This may require a.o. the deployment of modern surveillance technologies paving the way to the rationalisation of the current infrastructure. The possibility of delayed compliance, under very specific conditions (approach area where air traffic services are provided by military units or under military supervision) is also envisaged.

SESAR Key Feature:	Enabling Aviation Infrastructure
Essential Operational Change / PCP:	Predecessor of 'CNS Rationalisation' (EOC)
OI Steps & *Enablers*:	*GSURV-0101*
Dependencies:	ITY-SPI
Network Strategy Plan:	SO8/2
Operating Environment:	Airport, Terminal, Mixed, En-Route, Network
EATMN Systems:	FDPS/SDPS & HMI, SUR

When

FOC: **02/01/2020**

Deferred compliance subject to conditions and only for services provided by military: **02/01/2025**

Who

Stakeholders:
- ANSPs
- Airspace Users

Where

Applicability Area
All ECAC States except Turkey and Ukraine

Status

On time

Completion rate - end 2017: **24%**

Estimated achievement: **01/2020**

Applicable regulations & standards

- Regulation (EU) 1206/2011 on aircraft identification for surveillance
- Regulation (EU) 1207/2011 on performance and interoperability of surveillance, as amended by Regulation (EU) 1028/2014
- ICAO Annex 2 - Rules of the Air
- ICAO Annex 10 - Surveillance Radar and Collision Avoidance Systems
- EASA CS-ACNS, initial issue

Benefits

Safety
Enhanced safety levels by ensuring that unambiguous individual aircraft identification is achieved, maintained and shared accurately throughout EATMN airspace.

Capacity
Avoidance of delays and of reduction in network capacity due to shortage of SSR transponder codes or by increased controller workload caused by code changes.

Operational Efficiency
The use of downlinked aircraft identification represents the most efficient long term solution as primary mean of identification, as shown in the impact assessment of Regulation (EU) No 1206/2011.

ANSPs Lines of Action:

ASP01	**Ensure the capability of the cooperative surveillance chain, to use the downlinked aircraft identification** - The deployment and the use of this capability will have an impact on the surveillance systems as well as on flight data processing systems, surveillance data processing systems, human machine interface systems and ground-to-ground communication systems used for the distribution of surveillance data.	02/01/2020
ASP02	**Organise personnel training and awareness**	02/01/2020
ASP03	**Develop, and deliver as necessary, a safety assessment of the changes imposed by the implementation of the capability allowing the establishment of the individual aircraft identification using the downlinked aircraft identification feature** - Derogation: For the **specific case** of approach areas where **ATS are provided by military units** or under military supervision and when procurement constraints prevent the capability of the cooperative surveillance chain, to use the downlinked aircraft identification, States shall communicate to the Commission by 31 December 2017 at the latest, the date of compliance with downlinked aircraft identification that shall not be later than **2 January 2025**. Following consultation with the NM, and not later than 31 December 2018, the Commission may review the exemptions that could have a significant impact on the EATMN.	02/01/2020

Airspace Users Lines of Action:

USE01	**Organise personnel training and awareness**	02/01/2020

Changes to the Objective since previous edition:

- Added operating environment.
- Armenia and Azerbaijan added to the applicability area.

ITY-ADQ - Ensure Quality of Aeronautical Data and Aeronautical Information

This objective is derived from Regulation (EU) No 73/2010 on the quality of aeronautical data and aeronautical information in terms of accuracy, resolution and integrity. It applies to systems, their constituents and procedures involved in the origination, production, storage, handling, processing, transfer and distribution of aeronautical data and aeronautical information.

It applies to the integrated aeronautical information package (IAIP) (with the exception of aeronautical information circulars), electronic obstacle and electronic terrain data or elements thereof, and aerodrome mapping data.

SESAR Key Feature:	Enabling Aviation Infrastructure
Essential Operational Change / PCP:	Prerequisite for: - S-AF1.2 - Enhanced Terminal Airspace using RNP-based Operations - AF5 - Initial SWIM
DP Families:	1.2.2 Geographical database for procedure design
OI Steps & *Enablers*:	IS-0202, IS-0204
Dependencies:	No dependencies
ICAO ASBUs:	B0-DATM
Network Strategy Plan:	SO2/5
Operating Environment:	Airport, Terminal, Mixed, En-Route, Network
EATMN Systems:	AIS

When

FOC: **30/06/2017**

See intermediate milestones in the SLoAs list in the second page.

Who

Stakeholders:
- Regulators
- ANSPs
- Airport Operators
- Industry

Where

Applicability Area
All EU+ States except FYROM, Georgia and Maastricht UAC

Status

Late

Completion rate - end 2017: **3%**

Estimated achievement: **12/2020**

Applicable regulations & standards

- Regulation (EU) 73/2010 on the quality of aeronautical data and aeronautical information ('the ADQ Regulation')
- Regulation (EU) 1029/2014 amending Regulation (EU) 73/2010
- ICAO Annex 15

Benefits

Safety
Improved consistency, reliability and integrity of aeronautical data and aeronautical information.

Security
Enhanced security due to the implementation of security requirements.

Regulators Lines of Action:

REG01	**Verify the compliance with data quality requirements and supervise safety assessments**	30/06/2013
REG02	**Verify the establishment of formal arrangements**	30/06/2013
REG04	**Verify that all parties comply with all data requirements**	30/06/2017

ANSPs Lines of Action:

ASP01	**Implement data quality and process requirements**	30/06/2013
ASP02	**Establish formal arrangements**	30/06/2013
ASP03	**Establish consistency mechanisms and implement timeliness requirements**	30/06/2013
ASP04	**Implement personnel and performance requirements**	30/06/2013
ASP05	**Implement a quality management system and fulfil safety and security objectives**	30/06/2013
ASP06	**Implement the common dataset and digital exchange format**	30/06/2014
ASP07	**Implement all data requirements**	30/06/2017

Airport Operators Lines of Action:

APO01	**Implement data quality and process requirements**	30/06/2013
APO02	**Implement personnel and performance requirements**	30/06/2013
APO03	**Implement a quality management system and fulfil safety and security objectives**	30/06/2013
APO04	**Implement the common dataset and digital exchange format requirements**	30/06/2014
APO05	**Implement all data quality requirements**	30/06/2017

Industry Lines of Action:

IND01	**Implement data quality and process requirements**	30/06/2013
IND02	**Implement personnel and performance requirements**	30/06/2013
IND03	**Implement a quality management system and fulfil safety and security objectives**	30/06/2013
IND04	**Implement the common dataset and digital exchange format requirements**	30/06/2014
IND05	**Implement all data quality requirements**	30/06/2017

Changes to the Objective since previous edition:

- Added operating environment.
- Status changed from ‘Planned delay’ to ‘Late’.
- Added link to DP Family 1.2.2 Geographical database for procedure design.
- Removed link to ICAO GANP ASBU B0-DATM.

ITY-AGDL - Initial ATC Air-Ground Data Link Services

The early introduction of data link services to complement voice controller pilot communications in the en-route phase is foreseen by the European Air Traffic Management Master Plan. This implementation objective requires the interoperable implementation of the first set of en-route non time-critical air-ground data link services DLIC, ACL, ACM and AMC above FL285 (Regulation (EU) 2015/310).

SESAR Key Feature:	Enabling Aviation Infrastructure
Essential Operational Change / PCP:	- A/G datalink - Pre-requisite for S-AF 6.1 Initial trajectory information sharing (i4D) (PCP)
DP Families:	6.1.1 ATN B1 based services in ATSP domain 6.1.3 A/G and G/G Multi Frequency DL Network in defined European Service Areas 6.1.4 ATN B1 capability in Multi Frequency environment in Aircraft Domain
OI Steps & *Enablers*:	AUO-0301
Dependencies:	No dependencies
ICAO ASBUs:	B0-TBO
Network Strategy Plan:	SO4/1, SO8/3
Operating Environment:	En-Route, Mixed, Network
EATMN Systems:	FDPS/SDPS & HMI, COM

When

FOC (ATS): **05/02/2018**

FOC (AUs): **05/02/2020**

(Only for EU States + Norway and Switzerland)

Who

Stakeholders:
- Regulators
- ANSPs
- Airspace Users
- Military

Where

Applicability Area

All ECAC States except Georgia, Luxembourg and Netherlands

Status

Planned delay

Completion rate - end 2017: **29%**

Estimated achievement: **12/2020**

Applicable regulations & standards

- Regulation (EU) 2015/310 on data link services
- ICAO - Annex 10 - Aeronautical Telecommunications, Volume III COM Systems, Part 1 Digital Data COM Systems - Edition 2.0
- EUROCAE Documents ED-120, ED-111.
- ETSI EN 303 214 V1.2.1 Data Link Services (DLS) System

Benefits

Safety

Through the delivery of standard and unambiguous messages (significant error and fatigue reduction), provision of a communications backup and the possibility of immediate message retrieval.

Capacity

Through both reduction of voice congestion and increase in controller and sector productivity. Capacity gain is expected from 3.4% (if 25% of flights is equipped) up to 11% (if 75% of flights is equipped). This will lead to reduction of delays.

Regulators Lines of Action:

REG03	**Ensure the publication of relevant information in the national AIP**	05/02/2018
REG04	**Ensure ATN/VDL-2 availability, security policy and address management procedures**	05/02/2018

ANSPs Lines of Action:

ASP01	**Ensure the conformity of communications, flight data and initial flight plan processing systems and associated procedures**	05/02/2018
ASP02	**Organise personnel awareness and training**	05/02/2018
ASP03	**Ensure ground communication systems comply with air-ground communication requirements** - Ensure the COM service provider (CSP) has deployed and made available ground communication systems which allow ATN/VDL-2 or alternative communication technology.	05/02/2018
ASP04	**Deploy communication infrastructure to handle air-ground data link services**	05/02/2018
ASP05	**Implement Logon Forward process**	05/02/2018
ASP06	**Implement Next Authority Notified process**	05/02/2018

Military Lines of Action:

MIL01	**Equip transport-type State aircraft**	01/01/2019

Airspace Users Lines of Action:

USE01	**Equip aircraft with data link equipment supporting the identified services**	05/02/2020
USE02	**Specify relevant operational procedures**	05/02/2020
USE03	**Arrange air-ground ATS data link service provision** - Make appropriate arrangements with CSPs serving all relevant ATS units.	05/02/2020
USE04	**Organise personnel awareness and training**	05/02/2020

Changes to the Objective since previous edition:

- Added operating environment.
- Estimated achievement changed from 12/2019 to 12/2020.
- Removed link with DP Family 6.1.2 ATN B2 based services in ATSP domain.
- Objective scope changed from EU+ to ECAC.

ITY-AGVCS2 - 8,33 kHz Air-Ground Voice Channel Spacing below FL195

This objective is derived from Regulation (EU) No 1079/2012 on the coordinated introduction of air-ground voice communications based on 8,33 kHz channel spacing. It applies to all radios operating in the VHF band allocated to the aeronautical mobile route service and all flights operating as general air traffic.
All frequency assignments need to be converted to 8,33 kHz except those used for emergency, search and rescue, VHF digital link (VDL), ACARS and those where offset carrier operation within a 25 kHz channel spacing is utilised.
States can grant exemptions on some requirements based on Article 14 of the Regulation.

SESAR Key Feature:	Enabling Aviation Infrastructure
OI Steps & *Enablers*:	*CTE-C01a*
Dependencies:	No dependencies
Network Strategy Plan:	SO8/1
Operating Environment:	Airport, Terminal, Mixed, En-Route, Network
EATMN Systems:	COM

When

Radio equipment: **31/12/2017**
Freq. converted: **31/12/2018**
State aircraft: **31/12/2020**

Who

Stakeholders:
- Regulators
- ANSPs
- Airport Operators
- Military
- Airspace Users
- Network Manager

Where

Applicability Area
All EU+ States except Georgia and Moldova

Status

Planned delay

Completion rate - end 2017: **3%**

Estimated achievement: **12/2020**

Applicable regulations & standards

- Regulation (EU) No 1079/2012 laying down requirements for voice channels spacing
- ICAO Annex 10, Volume III - Aeronautical Telecommunications

Benefits

Operational Efficiency
Optimisation of the use of the bandwidth, which is a prerequisite to a number of crucial operational improvements that will deliver benefits such as reduced delays and increased capacity. Such benefits will be postponed or even impossible if the additional frequencies required are not readily available.

Regulators Lines of Action:

REG01	**Ensure radios have 8,33 kHz channel spacing capability**	31/12/2017
REG02	**Ensure the achievement of the interim target for 8,33 kHz frequency conversions**	Finalised
REG03	**Ensure compliance with the requirements on 8,33 kHz frequency conversions**	31/12/2018

ANSPs Lines of Action:

ASP01	**Ensure conformity of voice communications systems and associated procedures**	31/12/2018
ASP02	**Convert 25 kHz frequencies to 8,33 kHz to achieve the interim target**	Finalised
ASP03	**Convert all 25 kHz frequencies to 8,33 kHz**	31/12/2018
ASP04	**Develop safety assessment**	31/12/2018
ASP05	**Organise personnel training and awareness**	31/12/2018

Military Lines of Action:

MIL01	**Equip State aircraft with radio equipment with 8,33 kHz channel spacing capability**	31/12/2020
MIL02	**Organise personnel training and awareness of military aircrew**	31/12/2020

Airport Operators Lines of Action:

APO01	**Convert all 25 kHz frequencies to 8,33 kHz**	31/12/2018
APO02	**Accommodate non-equipped vehicles**	31/12/2017
APO03	**Organise personnel training and awareness**	31/12/2018

Airspace Users Lines of Action:

USE01	**Equip aircraft with radio equipment with 8,33 kHz channel spacing capability**	31/12/2017
USE02	**Organise personnel training and awareness**	31/12/2017

Network Manager Lines of Action:

NM03	**Ensure the centralised flight planning processing and distribution service complies with the Regulation**	Finalised

Changes to the Objective since previous edition:

- Added operating environment.
- Status changed from ‘Risk of delay’ to ‘Planned delay’.

ITY-FMTP – Common Flight Message Transfer Protocol

This objective describes the requirements for the application of a flight message transfer protocol (FMTP) for information exchanges between flight data processing systems for the purpose of notification, coordination and transfer of flights between air traffic control units and for the purposes of civil-military coordination.
It is derived from Regulation (EC) No 633/2007 (including the transitional arrangements of Reg. (EU) No 283/2011) and is implemented according to Reg. (EC) No 1032/2006.

SESAR Key Feature:	Enabling Aviation Infrastructure
Essential Operational Change / PCP:	- IP Network - Pre-requisite for SWIM-related operational changes and PCP AF5 (Initial SWIM)
OI Steps & *Enablers*:	*CTE-C06*
Dependencies:	No dependencies
ICAO ASBUs:	B0-FICE, B1-FICE
Network Strategy Plan:	SO8/3
Operating Environment:	Airport, Terminal, Mixed, En-Route, Network
EATMN Systems:	COM

When

FOC: **31/12/2014**

Who

Stakeholders:
- ANSPs
- Military

Where

Applicability Area
All ECAC States

Status

Late

Completion rate - end 2017: **71%**

Estimated achievement: **12/2018**

Applicable regulations & standards

- Regulation (EC) 633/2007 laying down requirements for the application of a flight message transfer protocol (FMTP)
- Regulation (EU) 283/2011 amending Regulation (EC) 633/2007
- EUROCONTROL - SPEC 100 - Specification of Interoperability and Performance Requirements for the Flight Message Transfer Protocol (FMTP) - Edition 2.0 - OJ 2007/C 188/03 / 06/2007

Benefits

Cost Efficiency
More cost efficient as X.25 maintenance costs are increasing while TCP/IP costs are lower.

ANSPs Lines of Action:

ASP01	**Upgrade and put into service communication systems to support information exchange via FMTP between FDPS(s) for the purpose of notification, coordination and transfer of the flights between ATC units**	31/12/2014
ASP02	**Develop safety assessment for the changes**	31/12/2014
ASP03	**Train technical staff** - Train technical staff to supervise and maintain communication systems which support information exchange via FMTP between FDPS(s).	31/12/2014

Military Lines of Action:

MIL01	**Upgrade and put into service communication systems to support information exchange via FMTP between FDPS(s) for the purpose of notification, coordination, transfer of the flights and civil-military coordination between ATS units and controlling military units**	31/12/2014

Changes to the Objective since previous edition:

- Added operating environment.
- Estimated achievement changed from 12/2018 to 12/2019.
- Added link to ICAO GANP ASBU B1-FICE.

ITY-SPI – Surveillance Performance and Interoperability

Objective derived from Regulation (EC) 1207/2011; its goal is to establish performance, interoperability, spectrum protection and safety requirements for surveillance and implement all necessary facilitating procedures. In addition to the performance and interoperability requirements to be fulfilled by the ANSPs, aircraft operators need to ensure that all aircraft operating IFR/GAT in the EU comply with the applicable ADS-B Out, Mode S elementary and enhanced surveillance requirements. With these requirements the Regulation also ensures that airborne installations are "future proof", i.e. they will be able to support all surveillance techniques currently used or planned.

SESAR Key Feature:	Enabling Aviation Infrastructure
Essential Operational Change / PCP:	Predecessor of 'CNS Rationalisation' (EOC)
OI Steps & *Enablers*:	*GSURV-0101*
Dependencies:	No dependencies
ICAO ASBUs:	B0-ASUR
Network Strategy Plan:	SO8/3, SO8/4
Operating Environment:	Airport, Terminal, Mixed, En-Route, Network
EATMN Systems:	FDPS/SDPS & HMI, SUR

Applicable regulations & standards

- Regulation (EU) 1207/2011 on performance and interoperability of surveillance, as amended by Regulation (EU) 1028/2014 and Regulation (EU) No 2017/386
- ICAO Annex 10 - Surveillance Radar and Collision Avoidance Systems
- EASA - Certification Specifications for Airborne Communications Navigation and Surveillance, initial issue

Benefits

Safety
Improved safety through the deployment of surveillance solutions in non-radar areas.

Capacity
Capacity increase through the deployment of surveillance solutions in areas where currently procedural separation is applied.

Operational Efficiency
The application of surveillance based separation instead of procedural separation will allow the airspace users to fly more efficient trajectories.

When

FOC: **07/06/2020**

See intermediate milestones in the SLoAs list in the second page.

Who

Stakeholders:
- Regulators
- ANSPs
- Military
- Airspace Users

Where

Applicability Area
All EU+ States

Status

Risk of delay

Completion rate - end 2017: **29%**

Estimated achievement: **06/2020**

Regulators Lines of Action:

REG01	**Conduct safety oversight for the existing surveillance chain**	By 05/02/2015

ANSPs Lines of Action:

ASP01	**Ensure interoperability of surveillance data**	By 12/12/2013
ASP02	**Conduct Safety Assessment for the existing surveillance chain**	By 05/02/2015
ASP03	**Conduct Safety Assessment for changes introduced to the surveillance infrastructure**	By 12/12/2013
ASP04	**Ensure the training of personnel**	By 12/12/2013

Military Lines of Action:

MIL01	**Carriage and operation of Mode S Elementary Surveillance avionics**	By 07/06/2020
MIL02	**Carriage and operation of Mode S Enhanced Surveillance and ADS-B Out avionics**	By 07/06/2020
MIL03	**Ensure the training of personnel**	By 07/06/2020

Airspace Users Lines of Action:

USE04	**Carriage and operation of Mode S Elementary Surveillance avionics**	By 07/06/2020
USE05	**Carriage and operation of ADS-B Out avionics**	By 07/06/2020
USE06	**Carriage and operation of Mode S Enhanced Surveillance avionics**	By 07/06/2020
USE07	**Ensure the training of personnel**	By 07/06/2020

Changes to the Objective since previous edition:

- Added operating environment.

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5. RISK MANAGEMENT

This chapter addresses the most significant risks associated with the timely delivery of the Implementation Objectives of the Master Plan Level 3 and its impact in the delivery of its strategic view. Determining risks does not imply that they will actually materialise, rather that these risks have been identified and are adequately managed.

A risk may be defined as an undesired event or series of events, which reduce confidence in the Master Plan Level 3. Their occurrence may represent a potential obstacle towards delivering the timely and efficient deployment of the Implementation Objectives underpinning the technologies and procedures of the SESAR Baseline and SESAR 1.

The process of identification of risks for the Master Plan Level 3 has been carried out with the intention to be in support to the framework of the overall Master Plan risk management process. For this reason, whenever possible, the Level 3 risks have been linked with those identified at Level 1 as they can be considered as specific cases of Level 1 risks or contributing to them. Also, this chapter focus on critical risks that affect the Implementation Plan as a whole (or a large important part of it) and not on local risks or impacting a specific implementation objective.

The table below contains the identified Level 3 risks along with a description of the risk, its impact or consequences, proposed mitigation actions and the link to the Level 1 risk as presented in Chapter 7 of the Master Plan Executive View (Level 1) – Edition 2015.

Risk	Description	Consequences/Impact	Mitigation/Actions	Level 1 Link
Delays in the implementation of the SESAR baseline	The implementation operational changes of the SESAR baselines, especially those that are pre-requisites or facilitators for PCP and other SESAR 1 solutions, is delayed	• Performance gains not realised. • Knock-on effect on PCP (and SESAR 1) implementation.	By SJU, EUROCONTROL, SDM, all stakeholders: • Closely monitor SESAR baseline implementation and identify delays in critical elements. Assess impact on dependent implementations; • Align business plans with the timely delivery of the SESAR baseline; • Take advantage of funding opportunities to recover delays in implementation of PCP-related elements; • Take on board military requirements.	MP5-Delays in the implementation of the Pilot Common Project (PCP)

Risk	Description	Consequences/Impact	Mitigation/Actions	Level 1 Link
Delays in data-link implementation	Data-link is an important enabler for a range of SESAR solutions. Delays in implementation and legal issues must be resolved.	• Delay in supporting the evolution of En-route / TMAs and Airport traffic (based on the ATM Master Plan): o For En-route and TMAs 4D Link serving i4D evolving into Full 4D business trajectories and User preferred routes; o At Airports, DL serving e.g. D-TAXI, AOC • Delay in ensuring that "Capacity meets Demand".	By EASA, SJU, SDM, all stakeholders: • ELSA study recommendations; • SDM's DLS Recovery Plan; • Deployment of data-link services as per SDM's Recovery Plan; • Adhere to EC Reg. 2015/310 for implementation: Feb 2018 for the ground and Feb 2020 for the airborne side; • Adhere to PCP Reg. 716/2014 with respect to AF6 (i4D); • Take on board military requirements.	MP5-Delays in the implementation of the Pilot Common Project (PCP)
"Two-speed" deployment of Master Plan Level 3 at ECAC level	Unsynchronised deployment of the Master Plan Level 3 between EU and non-EU members States, especially those not having access to EU funding	• Impact on interoperability at ECAC level. • Economies of scale not realised.	By SJU, EUROCONTROL, impacted stakeholders: • Make best use of the EUROCONTROL working arrangements to ensure buy-in from non-EU States in the implementation of the Master Plan Level 3; • Where possible, stakeholders to make use of funding opportunities that EU makes available for non-EU members.	MP6 - Investments to support deployment beyond 2020 are not secured
Insufficient buy-in for SESAR 1, non-(P)CP operational changes / solutions	Implementing stakeholders focus their investment plans only on the (P)CP delivery leaving aside other SESAR 1 operational changes / solutions	• Not wide deployment of affected solutions. • No/low return on investment on R&D work.	By SJU, EUROCONTROL and all stakeholders: • Implement a governance structure that ensures appropriate involvement of all relevant parties in the decision-making process for the production and endorsement of the Master Plan Level 3. • Implement a robust, clear and transparent process for the selection of Implementation Objectives to be incorporated into the Master Plan Level 3, including clear deployment criteria.	MP7 - Governance structure is not capable of ensuring successful deployment

Risk	Description	Consequences/Impact	Mitigation/Actions	Level 1 Link
Lack of common strategy and long term planning for CNS at EU level may lead to insufficient investments in that area and may delay the deployment of SESAR	The exact characteristics of ground based infrastructure and its evolution are still unknown.	• Impact on interoperability. • Delays in implementation of concepts depending on infrastructure evolution (e.g. i4D).	By EC, SJU, SDM, all stakeholders: • CNS Rationalisation; • NAV Strategy; • SUR Strategy; • COM Strategy; • Take on board military requirements.	n/a
Unclear role of the Level 3 Implementation Plan and its scope	The concept of MP Level 3 Plan has significantly evolved since the edition 2016. The 2017 edition includes: • Old legacy objectives, mainly related to SESAR 1 baseline objectives. Many of them cover ITY regulations; • Objectives addressing PCP content (DP families); • Local objectives with no deadline and voluntary applicability area.	• Lack of understanding of MP Level 3 plan; • Lack of credibility and sense of need of MP Level 3; • Multiple reporting.	By SJU, EUROCONTROL, all stakeholders: • Set a stable concept of MP Level 3 (definition, criteria to feed the content, etc.) that clarifies the interrelations with other plans/ programmes (MP L2, CPs, DP, ICAO ASBUs...)	MP7 - Governance structure is not capable of ensuring successful deployment.
Missing indications on airspace users intentions/plans to deploy	There are some mechanisms (PRISME fleet…) to survey airborne deployment, but there is no consultation mechanism in L3 Report to collect airlines' plans for deployment.	• New ATM functions are more collaborative and require ground and airborne capabilities. Lack of visibility on airborne deployment plans can affect ANSP's confidence in BCA.	By SJU, airspace users: • Enlarge the L3 Plan and Report consultation to airspace users.	MP7 - Governance structure is not capable of ensuring successful deployment.

Risk	Description	Consequences/Impact	Mitigation/Actions	Level 1 Link
Exaggerated expectations on maturity prevent timely deployment decision	Stakeholders tend to request all industrialisation work done before they consider deployment. In return the industry requests a contract before performing any industrialisation work. Incorporation of an implementation objective into MP Level 3 means that the objective has passed the Industrial Research and Validation phase (i.e. has passed V3) and that stakeholder(s) are basically interested in the deployment. I.e. the industrialisation and all the standardisation work can start at this moment.	Industrialisation will not start without a preceding deployment decision. And the deployment will be postponed from year to year.	MP Level 3 should explicitly include the whole industrialisation phase to expedite the related activities, e.g. standardisation.	MP7 - Governance structure is not capable of ensuring successful deployment.

Table 2 - Identified Master Plan Level 3 risks

6. SESAR SOLUTIONS IDENTIFIED FOR FUTURE COORDINATION

This chapter presents a subset of SESAR 1 Solutions that PJ20-WP2.8 identified for a potential future coordinated approach taking into account the following aspects:

- the technological and economic maturity for deployment, stemming in particular from the results of the SJU's development and validation work;
- the significant contribution to performance, interoperability and harmonisation of ATM systems;
- the need and added value of a synchronised deployment.

The outcome of the work undertaken by PJ20-WP2.8 was later further elaborated by the SJU and this constitutes the basis of the information presented in this chapter.

For each Solution, the chapter provides:

- Description of the solution and of the problem addressed by it;
- ATM Dependencies and Operating Environment – presenting the links to other elements of the Master Plan, ICAO GANP ASBUs, PCP, Network Strategy Plan and Operating environment;
- System Impact – presenting the current and new system capabilities for both ground and airborne systems;
- Standardisation and regulatory needs;
- Performance benefits.

The following table provides a list of the identified Solutions included in this chapter.

Sol ID	Solution Title
#01	Runway Status Lights (RWSL)
#04	Enhanced traffic situational awareness and airport safety nets for vehicle drivers
#21	Airport Operations Plan (AOP)
#34	Digital Integrated Briefing
#47	Guidance assistance through airfield ground lighting
#54	Flow Based Integration of Arrival and Departure Management
#55	Precision approaches using GBAS CAT II/III based on GPS L1
#56	Enhanced ATFM Slot Swapping
#60	Enhanced Short Term Conflict Alert (STCA) for Terminal Manoeuvring Areas (TMAs)
#61	Controller Working Position (CWP) Airport – Low Cost and Simple Departure Data Entry Panel
#69	Enhanced STCA with down-linked parameters
#109	Air traffic services (ATS) datalink using Iris Precursor
#113	Optimised low-level instrument flight rules (IFR) routes for rotorcraft

Table 3 - SESAR Solutions Identified for Future Coordination

Solution #01 - Runway Status Lights (RWSL)

Problem Addressed by the Solution

Increasing the awareness of the actual and instantaneous runway usage to flight crew and vehicle drivers that operate at or near the active runway.

Reducing the number of hazardous and conflicting situations on the active runway and the occurrence probability of the most severe runway incursions (Cat. A and B).

Solution Description

The SESAR Solution "Runway Status Lights (RWSL)" will provide a fully automated and independent system that uses A-SMGCS surveillance data to switch dynamically on and off additional and dedicated airfield lights on the runway and on the runway entry taxiways.

It will directly inform the flight crews / vehicle drivers about the instantaneous runway usage. Runway status lights switched "on" is an indication that the runway is unsafe for entering (for line-up or crossing) or for taking-off.

ATM Dependencies and Operating Environment

SESAR Key Feature	High-Performing Airport Operations
Operational Changes	Enhanced Airport Safety Nets
OI Steps / *Enablers*	AO-0209 - Enhanced Runway Usage Awareness
ICAO ASBUs	B2-SURF Optimised surface routing and safety benefits
Link with PCP	AF2 (Automated Assistance to Controller for Surface Movement Planning and Routing, Airport Safety Nets)
Network Strategy Plan	Not applicable
Operating Environments	Airport

System Impact

Ground Systems

Current system Capability

A-SMGCS surveillance, airport safety support as well as routing & planning services are assumed to be already deployed at the airport.

New Capability

On the Airport Operator side:

The airfield ground lighting system shall be installed or upgraded to provide the runway status lights. These include two types of high intensity LED lights:

- Runway entrance lights (RELs), warning an aircraft/vehicle about to enter the runway from a taxiway that the runway is not safe to enter;

- Take-off hold lights (THLs) warning pilots that it is not safe to take-off from the runway;

Embedded in the pavement, the red warning lights alert the pilot or the vehicle driver the instant the runway is unsafe due to the detection of mobile behaviour by the A-SMGCS.

On the Airport Operator or ATC side (depending on the local context):

- An RWSL management processor shall be available to determine runway usage and implement the RWSL safety logic, using the A-SMGCS surveillance data as input to switch on and off the Runway Status Lights accordingly.

On the ATC side:

- The A-SMGCS system shall be upgraded to interface the RWSL management processor to display RWSL status information to the controller and to allow RWSL deactivation by the Tower supervisor.
- Tower A-CWP interfaced to the RWSL management tool to display the appropriate status information and provide the appropriate control functions.
- Depending on local context, an enhanced A-SMGCS Core Surveillance function might be required to ensure that the RWSL are switched on/off at the right time, without downgrading the runway capacity.

Airborne Systems

No impact on airborne systems

Standardisation and Regulatory Needs

Standardisation Needs	New standard needed to define interfaces and information exchanges of Runway Status Light Management Tool. Since an ARIWS operates independently of A-SMGCS (see ICAO Annex 14 Volume 1 chapter 9.12), it would not seem relevant to include it in a revision of ED-87
Regulatory Needs	The requirements for RWSL were published Issue 4 of CS-ADR-DSN dated 8 Dec 2017. CS ADR-DSN.M.706 Runway status lights (RWSL) AMC on A-SMGCS, including safety aspects, harmonised application of the roles and responsibilities of all actors involved

Performance Benefits

Safety

The safety benefit reported is less severe and less frequent runway incursions due to an increase of runway usage awareness through accurate and timely indication of runway occupancy.

The level of safety benefits will depend on the local runway configuration, frequency of traffic crossing the departure runway(s) and related risk of conflicts and incursions. A rough estimation of safety benefits done at Paris-CDG was around 50% decrease in the number of runway incursions, including the most severe ones.

It will directly inform the flight crews / vehicle drivers about the instantaneous runway usage. RWSL can be operated in all visibility conditions. This runway status is an indication that the runway is unsafe for entering (for line-up or crossing) or for taking-off. However status of RWSL (runway safe) shall never be used as a conditional clearance to enter or use the runway as this will eliminate the expected safety gain, if not even negatively impacted.

Operational Efficiency

As well as the clear safety consequences, runway incursions can negatively impact operational efficiency through causing go-arounds and rejected take-offs. Reducing runway incursions can, therefore, improve operational efficiency

Solution #04 - Enhanced traffic situational awareness and airport safety nets for vehicle drivers

Problem Addressed by the Solution

Increased situational awareness is essential for operations at airports especially in adverse weather conditions or other similar operating situations. Situational awareness is important for vehicle drivers, as they need to operate within the manoeuvring area regardless of weather conditions.

To be able to keep safe operations in all-weather conditions and to optimize airport throughput it is necessary to implement systems allowing an increased situational awareness for those vehicle drivers who are allowed to operate in the manoeuvring area and provide alerts / warnings in case a potential hazardous situation tends to occur.

Solution Description

This solution includes:

- The provision to the vehicle driver of an Airport Moving Map, combined with the position and identification information of other ground traffic, including aircraft
- The provision of appropriate alerts/warnings
- The operational requirements and technical specifications for the development of alert/warning systems to detect potential hazardous situations in which the vehicle could be involved, including risk of collision with aircraft and infringement of restricted or closed areas..

ATM Dependencies and Operating Environment

SESAR Key Feature	High-Performing Airport Operations
Operational Changes	Enhanced Airport Safety Nets
OI Steps / *Enablers*	AO-0204 Airport Vehicle Driver's Traffic Situational Awareness AO-0105 Airport Safety Net for Vehicle Drivers
ICAO ASBUs	B1-SURF Enhanced safety and efficiency of surface operations B2-SURF Optimised surface routing and safety benefits
Link with PCP	AF2 (Automated Assistance to Controller for Surface Movement Planning and Routing, Airport Safety Nets)
Network Strategy Plan	Not applicable
Operating Environments	Airport

System Impact

Ground Systems

Current system Capability

A-SMGCS surveillance, airport safety support as well as routing & planning services are assumed to be already deployed at the airport.

New Capability

The enhanced traffic situational awareness system can be implemented in two forms:

- On-board alert generation; or
- Alerts generated by a centralised server connected to an A-SMGCS.

On the Airport Operator side:

- Vehicles operating on the manoeuvring area shall be equipped with:
  - On-board vehicle system to display situational awareness and alert information.
  - GNSS for determining own-ship position; and
  - ADS-B broadcast for sharing own-ship position.
- Where warnings and alerts are generated on-board the vehicle:
  - On-board vehicle safety net alerts shall be generated. Depending of the type of alert, it should be either displayed on an HMI and/or provided with an audio alert; and
  - ADS-B IN receiver and processing capability capability to receive position reports from surrounding traffic.
- Where warnings and alerts are generated by a centralised server:
  - Data link connectivity for receipt of surrounding traffic data, alerts and warnings and details of closed areas.

Vehicles shall be equipped with a moving map display that will be used for the display of:

- Airport layout, including the restricted and closed areas;
- Vehicle's own position;
- Surrounding traffic (aircraft and vehicles);
- Area infringement and traffic alerts (with aircraft only), together with an aural alert; and
- System status display and HMI for limited manual inputs from the vehicle driver.

On the airport Operator or ATC side (where alerts and warnings are generated on a centralised server):

- An ADS-B receiving station shall be installed to receive position reports from mobiles;
- A ground server shall be installed and connected to the A-SMGCS surveillance function in order to process the surveillance data and generate the alerts and warnings; and
- A data link shall be available for the uplink and periodic update of the surrounding traffic information to the vehicle, and also to uplink the warnings and alerts to the vehicles.

Airborne Systems

No impact on airborne systems

Standardisation and Regulatory Needs

Standardisation Needs New standard needed for the required interface with A-SMGCS for traffic situational awareness:

- Required interfaces between different stakeholder frameworks;
- Required roles/responsibilities between the systems/constituents from functional point of view;
- Performance requirements (e.g. timeliness, availability, integrity, continuity etc.).

Regulatory Needs AMC on A-SMGCS, including safety aspects, harmonised application of the roles and responsibilities of all actors involved.

Performance Benefits

Safety

The Airport Moving Map, combined with the Ground Traffic information display, will improve the situational awareness of vehicle drivers. This improved situational awareness, combined with an alerting/warning system in case potential hazardous situations are detected, will not only improve safety for the vehicles operating in the manoeuvring area but also provide a safety enhancement for aircraft operations, both on taxiways and runways, at the airport.

Operational Efficiency

It can improve operational efficiency by reducing the number of errors made by vehicle drivers, which can cause taxi delay, aborted take-offs and go-arounds.

Solution #21 - Airport Operations Plan (AOP)

Problem Addressed by the Solution

Better planning and execution of airport operations will improve the utilization of airport resources and infrastructure. Information sharing between airport and network will assure the best overall system outcome while addressing the performance and business needs actors. Full integration of Airports into the ATM Network planning function, taking into considerations all the operations impacting the airport airside and landside processes, will allow for accurate Demand Capacity Balancing enhancing time-based operations, reducing in-air and on-ground holding and improving overall Airport and Network performance.

Solution Description

The SESAR solution "Airport Operations Plan (AOP) and its seamless integration with the network operations Plan (NOP)" supports the European ATM Masterplan's key feature of Network Collaborative Management and Dynamic Capacity Balancing. By using the concept of High Performing Airport Operations, it will achieve the full integration of airports into the ATM network.

As ground nodes of the network, airports will contribute to achieve the performance goals through an integrated airport management framework where all stakeholders (aircraft operators, airport operator, local ANSP, ground handlers and Network Manager) are involved using common data sources and collaborative agreed procedures.

The AOP phase 2 supports airport operations with an increased scope and timescale of data shared between airport and Network Manager, building upon the Pre-SESAR Airport Collaborative Decision Making (A-CDM) baseline. It consists of a set of performance services and a suite of enabling applications to maintain performance in all operating conditions, ranging from normal operations to adverse and exceptional conditions such as meteorological phenomena or disruptive events as ad-hoc runway closure.

The AOP phase 2 is grounded on two new services developed for dealing with normal, adverse and exceptional operating conditions:

1. Steer Airport Performance – establish the performance goals and Key Performance Indicator thresholds,
2. Monitor Airport performance – monitor performance against the agreed goals.

The AOP phase 2 addresses the further enhancement of A-CDM and deployment of airport management tools in order to improve the airport performance and through data sharing with the Network Manager (NMOC) also the performance of the ATM Network.

ATM Dependencies and Operating Environment

SESAR Key Feature	High-Performing Airport Operations
Essential Operational Changes	Collaborative Airport
OI Steps / *Enablers*	AO-0801 – Collaborative Airport Planning Interface AO-0802-A – A-CDM process enhanced through integration of landside (passenger only) process outputs AO-0803 – Integration of airports into ATM through Monitoring of Airport Transit View

ICAO ASBUs	B1-ACDM Optimised airport operations through A-CDM total airport management
Link with PCP	AF 2 and AF 4 (Collaborative NOP and Calculated Take-off Time to Target Times for ATFCM purposes)
Network Strategy Plan	SO6/2 Improve NM/Airport/ATC operational partnership, starting with the integration of AOPs into the Network Operations Plan
Operating Environments	Airport, Network

System Impact

Ground Systems

Current system Capability

Airport CDM systems allow the sharing of CDM information between all stakeholders, but do not have automatic monitoring and steering of airport performance, and not all CDM data is necessarily made available to the network in real time. Some airports have already implemented a subset of the features of AOP.

New Capability

The improvements build upon the A-CDM, introducing automation in support of the AOP performance monitoring and steering functions. The new system shall incorporate the following:

- The Airport transit view (ATV) data, which supports the management of the turnaround process by linking the trajectories of inbound and outbound flights,
- Information of passenger flow data, for which relevant milestones shall be established in order to allow their consideration in the pre-departure sequencing processes and support TTOT stability;
- The automatic monitoring of ATV aircraft and passenger events and milestones against the plan all along the ATV, and triggering of alerts when there is a deviation above an agree threshold; and
- The AOP shall be connected to the AOP via SWIM, and shall make available to the network all the network-relevant data; in particular, the AOP shall exchange from NM Arrival Planning Information (API) and support the participation of the airport in TT allocation processes;
- MET-data integration into the AOP processes.

Airborne Systems

No impact on airborne systems

Standardisation and Regulatory Needs

Standardisation Needs Standards needed:

- Update of EN 303 212 Airport Collaborative Decision Making (A-CDM) Community Specification (Communication 2010/C168/04).
- The existing A-CDM standard and Community Specifications based on Eurocontrol and EUROCAE documents should be reviewed. The agreed new information elements to be exchanged by stakeholders will need to be consistent with the AIXM to ensure a common understanding and use of the data; and to allow integration with the existing A-CDM baseline. This process should result in the standardisation of AOP information (data format, data quality etc.) and documented in a manner that ensures commonality of deployment at airports.

Regulatory Needs There is no new regulatory need identified.

Performance Benefits

Capacity

Through increased predictability in airport and network operations the AOP and the AOP management support tool(s) contributes to a better and more efficient use of existing/available network and airport (runways, taxiways, aprons and terminal) capacity (so called airport throughput).

Environment

Increased/improved predictability will enhance Demand-Capacity Balancing of both the network and the airport resulting in less in-air and on-ground (with engines on) holding, improving fuel burn and reducing emissions.

Operational Efficiency

- More efficient use of existing/available network and airport (runways, taxiways, aprons and terminal)
- More seamless and smooth processes lead to higher predictability, flexibility and resilience in operations.

Solution #34 - Digital Integrated Briefing

Problem Addressed by the Solution

Traditionally, the pre-flight briefing takes the form of a “Pre-flight Information Bulletin (PIB)”. Even for an intra-European flight, it may comprise up to 30-40 pages of NOTAM messages, all in upper case. Filtering and prioritisation are significantly limited by the free text nature of the NOTAM message. MET messages may be embedded in textual format as well, while weather maps are presented separately. Airspace Users are increasingly complaining about the difficulty to understand the NOTAM information and to detect the really relevant events. These may be hidden between many other messages that have no real impact on the flight. Airspace users are also complaining about the growing size of the traditional PIB, due to significant increase in the number of NOTAM messages issued worldwide. This has been multiplied by four between 2000 and 2015! The AIS and MET information provided to pilots and dispatchers as pre-flight briefing products and services needs to become more user-friendly: easier to understand, better prioritised, with the aim to improve the pilot awareness and to reduce the workload.

Solution Description

The SESAR Solution “Digital integrated briefing” consists of an innovative approach to pilot briefing through the use of digital aeronautical data, in particular Digital NOTAM (encoded as “events” in AIXM format), and digital MET data (METAR, TAF, SIGMET in the ICAO iWXXM format). The AIS and MET information provided to pilots and dispatchers in the form of briefing products and services, will be easier to understand, better prioritised and will reduce the pilot workload.

The Digital Integrated Briefing will solve the issues by introducing the following key changes:

- generation of the briefing products from digital aeronautical data (in particular from Digital NOTAM) instead of providing a list of NOTAM messages;
- extensive graphical presentation of the information that affects elements that are usually displayed on aeronautical maps (taxiway/runway/apron closures, navaids unserviceable, temporary obstacles, airspace restrictions, etc.);
- use of normal sentence case for the textual/tabular part of the briefing
- joint presentation of the aeronautical and MET events that may have a combined effect on the flight trajectory (such as airspace restrictions and significant weather);
- the possibility for interactive briefing, thus allowing the pilot/dispatcher to highlight/prioritise information that is more relevant for each individual flight.

The main benefits are improved human performance for IFR/VFR pilots and dispatchers. In turn, this can bring positive effects in the cost-efficiency of airspace users, in flight predictability and in the fuel efficiency.

The Digital Integrated Briefing is currently targeted for ground use (FOC/WOC, pre-flight briefing rooms and ARO offices). Some enablers (Digital NOTAM and digital MET data) support the use in the cockpit, in all phases of flight, while enablers for transmission into the cockpit are not yet mature (see IS-0206 Digital Integrated Briefing during flight execution phase.

ATM Dependencies and Operating Environment

SESAR Key Feature	Enabling Aviation Infrastructure
Operational Changes	Digital Integrated Briefing
OI Steps / *Enablers*	IS-0205 Digital Integrated Briefing for pre-flight phase

ICAO ASBUs	B1-DATM Service improvement through integration of all digital ATM information B1-SWIM Performance improvement through the application of SWIM
Link with PCP	PCP AF5 (meteorological and aeronautical iSWIM services)
Network Strategy Plan	SO2/5 Implement the European ATM Information Management Service (EAIMS) as the common reference for aeronautical and airspace data
Operating Environments	Airport, Network

System Impact

Ground Systems

Current system Capability

Today 20,000 NOTAM (on average) are currently in force world-wide. Many of these are given to flight crews for pre-flight briefing resulting in Pre-flight Information Bulletin (PIB) in the range of 10-50 pages for an internal European flight.

Due to the current limited information filtering capabilities of the text NOTAM format, between 40% and sometimes up to 90% of the information given in PIB has no direct impact on the flight for which it was provided.

Related to this and as foreseen in the PCP and prescribed in existing regulatory framework Regulation (EU) 716/2014 (PCP); ATM Functionality 5, already overs a complete change in paradigm of how information is managed along its full lifecycle and across the whole European ATM system with the on-going roll-out of:

- SWIM
- Baseline digital aeronautical data (EAD/national systems)
- Digital airport MET data (ICAO Annex 3)
- AIS (EAD/national) systems shall provide aeronautical information electronically based on iSWIM services with AIXM formatted payload, including the Digital NOTAM.
- Aeronautical MET service providers shall provide the MET data prescribed by the ICAO Annex 3, as iSWIM services with iWXXM formatted payload.

New Capability

- for the provision of aeronautical and meteorological information
  - All NOTAMs originated by Airport and ANSPs shall be created and published in the Digital NOTAM format and made available for use by airspace users.
- for pre-flight briefing for pilots and dispatchers
  - The NM generated Pre-flight Briefing shall be based on aeronautical and meteorological iSWIM services, including the Digital NOTAM;
  - Whenever an ANSP generates a Pre-flight Briefing, this shall be based on aeronautical and meteorological iSWIM services, including the Digital NOTAM.

Airborne Systems

No impact on airborne systems

Standardisation and Regulatory Needs

Standardisation Needs

Standard needed:

Global Specification for the provision of Digital NOTAM including harmonised coding rules, in accordance to the ISO/IEC process and in accordance with existing SWIM specifications (see item * below). This global specification will refine and replace initial Eurocontrol Specifications “For the provision of Digital NOTAM including harmonised coding rules” .

*EUROCONTROL Specifications for:

- SWIM Service Description
- SWIM Information Definition
- - SWIM Technical Infrastructure Yellow Profile.

Regulatory Needs

Regulation to be published:

The EC implementing Regulation No 73/2010 (Aeronautical Data Quality) is going to be repealed by the EASA RMT.0477 "Technical requirements and operational procedures for aeronautical information services and aeronautical information management", NPA - 26/04/2016 for which an Opinion is due in Q1 2018 and which will cover the Digital NOTAM.

Performance Benefits

Safety

The issue of very large PIB (20-30 pages for a cross-European flight) is frequently mentioned by pilots as a difficulty when trying to comply with the legal obligation for reading and understand all the NOTAM that can affect their flight, while they are also under time pressure to fulfil other pre-departure tasks.

The graphical presentation of digital NOTAM data should facilitate the task of finding the relevant information (geospatial and temporal filtering) and understanding the aeronautical and meteorological information relevant for a specific flight. For example, a visual “work in progress” symbol on the airport map is much easier to spot as compared with the same information presented in the PIB text.

This leads to a reduction in the number of incidents that are sometimes due to the lack of informational awareness, such as airspace infringements, attempts to use a closed runway or runway excursions, attempts to use a closed airport surface, temporary changes in operational procedures, etc.

Operational Efficiency

In terms of benefits, the graphical presentation of digital information, a better filtering and a more logical organisation of the pre-flight information bulletins improve pilot and dispatcher awareness, improve briefing efficiency and reduces the risk of information being misunderstood or missed.

Solution #47 - Guidance assistance through airfield ground lighting

Problem Addressed by the Solution

Low-visibility conditions can increase taxi times as pilots navigate their way to the required location (stand, runway, de-icing area, etc.). Unfamiliarity with an airport's layout may cause confusion to pilots resulting in deviations from planned taxi route increased workload for both pilots and controllers and ultimately in an increased risk of runway incursion conflicts.

Solution Description

Airfield Ground Lighting (AGL) offers a unique opportunity to guide aircraft around the airport. By linking the lighting infrastructure with the taxi route management system (routing & Planning), the airport can provide an unambiguous route for the flight crew to follow.

The solution may require advanced technology in the lighting system, and in the control tower. The airfield lighting control system needs to turn on the lights ahead of an aircraft, and off immediately behind. To achieve this, taxiway centre line lights are automatically and progressively switched on and off in segments as the aircraft moves along its assigned taxi route. Stop bars are automatically activated at intersections and the pilot simply receives a single instruction to 'follow-the-greens'. The solution strongly relies on the surface movement surveillance system to provide accurate aircraft position data.

ATM Dependencies and Operating Environment

SESAR Key Feature	High-Performing Airport Operations
Essential Operational Changes	Integrated Surface Management
OI Steps / *Enablers*	AO-0222-A - Enhanced Guidance Assistance to mobiles based on the automated switching of Taxiway (centreline) lights and Stop bars according to the "Airfield Ground Lighting" operational service.
ICAO ASBUs	B2-SURF Optimised surface routing and safety benefits
Link with PCP	AF2 (Automated Assistance to Controller for Surface Movement Planning and Routing, Airport Safety Nets)
Network Strategy Plan	Not applicable
Operating Environments	Airport

System Impact

Ground Systems

Current system Capability

A-SMGCS surveillance, airport safety support as well as routing & planning services are assumed to be already deployed at the airport.

New Capability

On the Airport Operator side:

- The airport taxiways should be equipped with AGL, preferably in single-lamp-control mode. This would allow lights to be progressively turned on ahead of an aircraft to provide guidance to the pilot about the authorised route.

On the Airport Operator or ATC side (depending on the local context):

- The A-SMGCS processing should be upgraded to translate taxi routes given by controllers to individual aircraft and vehicles into commands to the AGL system (taxiway centreline lights and stop bars), to monitor the spacing between mobiles and to determine priorities between mobiles at intersections. The AGL control system would need to be modified to allow interface to the A-SMGCS system.
- The controller working positions should be upgraded to allow the display of activated lights on the radar display and the management of the lights and routes via HMI functionality (e.g. route updates and input of clearances).

Airborne Systems

No impact on airborne systems

Standardisation and Regulatory Needs

Standardisation Needs	New standard needed for the required interface with A-SMGCS for traffic situational awareness: • Required interfaces between different stakeholder frameworks; • Required roles/responsibilities between the systems/constituents from functional point of view; • Performance requirements (e.g. timeliness, availability, integrity, continuity etc.).
Regulatory Needs	AMC on A-SMGCS, including safety aspects, harmonised application of the roles and responsibilities of all actors involved.

Performance Benefits

Safety

Safety contribution with regard to assigned route adherence. Many airport layouts are very complex and taxiing errors occur, which can have safety, efficiency and cost implications. Providing a clear, simple and unambiguous visualisation to the pilot can reduce the incidence of potentially hazardous situations.

Operational Efficiency

Operational efficiency is improved by:

- Reducing taxiing errors, which can result in aircraft leaving the taxiway on to soft ground, facing another opposite-direction aircraft on the taxiway, or long taxi re-route instructions;
- Reducing rejected take-offs and go-arounds caused by taxiing errors.

Solution #54 - Flow Based Integration of Arrival and Departure Management

Problem Addressed by the Solution

Two separate sequences were presented to the Controllers (AMAN and DMAN sequences), which did not take into account each other's constraints

Solution Description

Integrated Arrival and Departure management aims at increasing throughput and predictability at an airport by improved co-ordination between En-Route/Approach and Tower controllers. Arrival and Departure flows to the same runway (or for dependent runways) are integrated by setting up fixed arrival departure pattern for defined periods. The successive pattern might be chosen by the operators or provided by an optimization algorithm considering arrival and departure demand. Departure flow to the runway is managed by pre-departure sequencing (integrating route planning) while arrival flow to the runway is managed by arrival metering

ATM Dependencies and Operating Environment

SESAR Key Feature	Advanced Air Traffic Services
Essential Operational Changes	AMAN/DMAN Integration Including Multiple Airports
OI Steps / *Enablers*	TS-0308 Flow based Integration of Arrival and Departure Management
ICAO ASBUs	B2-RSEQ - Coupled AMAN-DMAN
Link with PCP	AF1 (Arrival Management extended to en routeAirspace) and AF2 (Departure management Synchronised with Pre-departure sequencing, Departure Management integrating Surface management Constraints)
Network Strategy Plan	SO6/5 Deliver Airport/TMA efficient operations, in all weather conditions SO4/1 Modernise the local/FAB system capabilities including ATC planning functions and Controller tools
Operating Environments	Airport, Terminal, Mixed

System Impact

Ground Systems

Current system Capability

Today AMAN systems support the establishment of the sequence of arrival traffic and DMAN systems provide the pre-departure sequence, but the AMAN arrival and the DMAN departure rates are set independently from each other.

The arrival controller manages spacing between 2 aircraft on arrival to allow the insertion of a departure from the same runway or a dependent runway. The provision of this spacing is difficult to optimise in the current situation as it requires ad hoc coordination between the arrival controller in APP and the controller managing the runway.

New Capability

- AMAN and DMAN systems shall be coupled and shall provide with an integrated and shared view on the planned runway sequence to the relevant TWR and approach CWPs.
- Coupled AMAN/DMAN shall operate in a master/slave configuration; the AMAN setting-up gaps (AFIs) to be filled by the DMAN.

This integration shall rely on a stable and optimised departure sequence supported by an enhanced DMAN as described in PCP sub AF 2.1 and 2.2.

Airborne Systems

No impact on airborne systems

Standardisation and Regulatory Needs

Standardisation Needs	There are no new standards needed for this Solution.
Regulatory Needs	To ensure a harmonised application of the functional system, including defining roles and responsibilities of the various actors, it is recommended that AMC be made available.

Performance Benefits

Environment

The coupling of AMAN with DMAN has been shown to save departure fuel and improve local air quality due to a reduction in the taxi-out time during peak traffic (up to 7% savings in taxi-out fuel).

Capacity

The coupling of AMAN with DMAN optimises the use of the runway, allowing an increase in runway throughput (up to 8% increase).

Solution #55 Precision approaches using GBAS CAT II/III based on GPS L1

Problem Addressed by the Solution

Solution #55 focuses only on the use of GBAS CAT II/CAT III for Low Visibility. In situation of low visibility conditions, there is a need to protect the ILS operations in critical and sensitive areas. These areas result in restricted ground movements and extra spacing margins between aircraft in order to accommodate the longer Runway Occupancy Time (ROT). At capacity-constrained airports, this leads to flights being diverted or cancelled.

Solution Description

Solution #55 aims at improving Low Visibility Operations using GBAS Cat II/III based on GPS L1. This will enable precision approach procedures relying on GNSS signals and composed of ground and airborne segments thus improving resilience in low visibility conditions.

To address the problem of protecting critical and sensitive areas this solution proposes the use of GBAS, which has limited -GBAS Local Object Consideration Areas- or no protection areas, usually located outside aircraft movement areas.

GBAS supports enhanced levels of service for all phases of approach, landing and departure. The solution is based on the existing single frequency GPS L1 (1575.42 MHz). Future GBAS based CAT II/III solutions may make use of multi-constellations and/or multi-frequency signals.

ATM Dependencies and Operating Environment

SESAR Key Feature	High-Performing Airport Operations
Essential Operational Changes	CNS rationalisation LVPs using GBAS
OI Steps / *Enablers*	AO-0505-A Improve Low Visibility Operation using GBAS Cat II/III based on GPS L1: Use GBAS Cat II/III based on GPS L1 for precision approaches.
ICAO ASBUs	B0-APTA, B1-APTA
Link with PCP	PCP AF1
Network Strategy Plan	SO6/5 Deliver Airport/TMA efficient operations, in all weather conditions
Operating Environments	Airport

System Impact

Ground Systems

Current system Capability

- ILS cat I, II, III
- SBAS cat I
- GBAS cat I

New Capability

- For Cat II/III operations ILS remains the primary means of navigation. ILS CAT II/III operation will be progressively replaced by GBAS CAT II/III operation.
- GBAS shall function as the main CAT II/III system at major/selected airports. GBAS CAT II/III will enable partial decommissioning of ILS CAT II/III on selected airports reducing ANS cost. Increased runway throughput under CAT II/III due to reduced protection zones. Dual frequency MultiConstellation to be considered as soon as it is mature.

Airborne Systems

Current system Capability

- A/C-02a Enhanced positioning using GBAS single frequency

New Capability

- A/C 56a Flight management and guidance to support GBAS cat II/III

Standardisation and Regulatory Needs

Standardisation Needs

Standards to be updated:

- DO-246E "GBAS ICD" airborne systems
- DO-253D "GBAS MOPS"
- ED-114B - MOPS for GBAS ground systems to support precision approach and landing (CATIII)
- Annex 10 - SARPs for CAT II/III using GPS L1 (GAST D) and associated required changes in EUR Doc.13 / PANS ATM / PANS OPS / Annex 11 / Annex 15.

New standard needed:

Standardisation is required for the use of on DME/DME positioning during RNP procedure in the absence of aircraft positions based on satellite navigation (e.g. during GNSS outages). EUROCAE WG107 is dealing with it.

Regulatory Needs

Regulatory needs:

- Forthcoming updated Annex I to EU 2017/373 is deemed compatible with this solution (GLS being one type of the defined precision approach procedure see proposed definition of 'Instrument approach procedure (IAP)' in EASA NPA 2016-09).
- Integration of the ICAO Annex 10 and associated SARPS and Doc in EU regulations (e.g. OPS regulation, and ATM/ANS regulation).
- On GLS, if a distinct phraseology between ILS and GBAS is needed, so as to avoid misunderstandings,this should be reflected in the regulatory requirements (ongoing at ICAO ATMOPS).
- Review of the EC Implementing Regulation (EU) No 391/and in particular Article 16 "Modulation of air navigation charges" (for GBAS operations).

Performance Benefits

Environment

The environmental benefits is in saving fuel due to the resilience of the system in being able to operate also in low visibility conditions, thus reducing the additional flight time associated with diversions and airborne holding. Fuel savings result in direct reductions in CO2 emissions (by factor of 3.15).

Reactionary delays can result in more landings occurring during night time periods. Increased resilience can reduce this delay thereby reducing the associated noise impact.

Higher (intercept) final approach not 4,000 ft but 7,000 ft will support new noise abatement procedures depending on local conditions.

Cost-Efficiency

Reduced ground infrastructure for precision approaches.

One GBAS station can provide approaches for multiple runway ends as well as multiple approaches per runway end. The GBAS station in the long term is much more cost efficient than the ILS in terms of less maintenance and flight inspection required.

Operational Efficiency

Fewer flights will be cancelled or diverted saving the Airspace User costs. To be noted that cancellations also affect the subsequent legs planned with those aircraft.

Reducing airport (runway) capacity propagates delays through the network. Avoiding the loss of runway capacity will reduce the level of delay and avoid the associated costs. As LVC often occur during the morning peak hours the reactionary delays can be significant.

Capacity

Runway throughput will be increased under CAT II/III due to reduced protection zones:

- Increased runway capacity (e.g. 2 additional movements under CAT II operations at high-capacity airports; 100% GBAS traffic mix).
- • Reduced overall airport delay (e.g. significant reduction of overall airport delay under CAT II operations).

Safety

Where ILS CAT II / III are installed on all runways of an airport, their replacement by GBAS CAT II / III shall maintain safety level.

The generalisation of PBN procedures at all runway ends will improve the operational performance, including their safety.

Solution #56 - Enhanced ATFM Slot Swapping

Problem Addressed by the Solution

In today operations, “ATFM slot swapping” allows Airspace Users (AU) to request to the Network Manager (NM) a rearrangement of their own flights subject to a regulation in order to better suit their needs.

However, the current process has some limitations and the AU requests for rearrangement to NM are not always satisfied.

Solution Description

This SESAR solution improves the process of Air Traffic Flow Management (ATFM) slot swapping currently used by Airspace Users (AU) to prioritize their flights during pre-tactical part of operations. The Enhanced Slot Swapping increases flexibility for Airspace Users and provides a wider range of possibilities, by facilitating the identification of possible swaps for a subject-regulated flight and by reducing the rate of rejection of swap request by refining current processes.

The solution is supported by the provision of a new web based tool (“eSS” Tool, enhanced Slot Swapping) which provides a Slot-swapping interface between Aircraft Operators and the NM Operating Centre, allowing:

1. Identification of viable swaps;
2. Multi-swap: capability to swap the same flight up to three times instead of a single swap today. This feature allows the improvement of a flight by swapping it up to three consecutive times, therefore distributing the delay among three other flights. This may be particularly useful in case of long delays or instability of the regulation (e.g. weather deterioration);
3. Slot substitution on Cancellation: capability to substitute the ATFM slot of a cancelled flight for another flight.

This solution is already addressed in the Master Plan Level 3 by Implementation Objective FCM09 (see page 62).

Solution #60 - Enhanced Short Term Conflict Alert (STCA) for Terminal Manoeuvring Areas (TMAs)

Problem Addressed by the Solution

STCA (Short Term Conflict Alert) is a ground system designed and deployed as last Safety Net against the risk of collisions between aircraft due to separation loss.

Enhanced STCA can be used both in En-Route and TMA radar environments to improve prediction of potential conflicts and reduce false alert rate.

The difficulty of STCA development lies with the need to avoid a high false alert rate versus the need of ensure that all risk of collision always triggers a timely warning.

To be effective in TMA STCA requires a specific tuning to account for lower separation minima and the increased frequency of turns, climbs and descents.

Solution Description

This solution consists of using enhanced algorithms for STCA that allow the consideration of multiple hypothetic trajectories per flight in order to improve STCA performance in the TMA environment, where flights may not always follow a pre-defined route.

Enhancing the STCA for TMA operations based on multi-hypothesis algorithm will improve the warning times and increase the rate of genuine alerts, while maintaining the rate of nuisance alerts at a level that is operationally acceptable.

This solution is already addressed in the Master Plan Level 3 by Implementation Objective ATC02.9 (see page 72).

Solution #61 - Controller Working Position (CWP) Airport – Low Cost and Simple Departure Data Entry Panel

Problem Addressed by the Solution

Flight plans need to be filed, as a minimum, three hours in advance giving details of the Estimated Off Block Time (EOBT) based upon the operator's scheduled departure time. Depending on circumstances, the difference between the estimated and actual time the aircraft departs can vary by 15 minutes either way. This leads to a considerable degree of inaccuracy of the data within the network.

The situation is improved at airports that have implemented A-CDM or are Advanced ATC Tower airports.

This level of uncertainty about departures makes it difficult to judge when a regulation needs to be applied and, erring on the side of caution when they need to be applied some two hours in advance, regulations are often applied unnecessarily. It can also impact on sector management, leading to sectors being split for longer than necessary resulting in an inefficient use of the operations room resources, or worse an unexpected overload for a sector leading to a possible safety event.

The #61 Solution supports the extension Departure Planning Information (DPI) to integrate the departure planning info from medium and small -size airports expected to enhance the network benefit and improve the flow management process. The concept aims to improve integration of departure planning data from medium-size airports or small-size airports when serving a complex airspace with dense traffic through improved availability of aircraft pre-departure information to the ATM Network, through the provision of specific TWR tools (a low cost Departure Data Entry Panel, Electronic Flight Progress Strips (EFPS)) providing accurate electronic pre-departure information to the NMOC.

Solution Description

The use of a simple Airport Departure Data Entry Panel (ADDEP) improves the integration of medium-size airports by providing a low-cost solution to compute and share aircraft electronic pre-departure data to the ATM network, between the tower and approach controllers, as well as the tower and the Network Manager concerning the departure status of aircraft under their control.

The scope of solution #61 could be broadened to include all medium-size airports are not yet Advanced ATC Tower airports, thus avoiding restricting it only to those airports which are not equipped with EFS. The universal availability of more accurate departure data will significantly improve the performance of network management by improving capacity management, network efficiency and safety of operations.

ATM Dependencies and Operating Environment

SESAR Key Feature	High-Performing Airport Operations
Essential Operational Changes	Collaborative Airport
OI Steps / *Enablers*	DCB-0304 - Airport CDM applied to Interconnected Regional Airports
ICAO ASBUs	B1-NOPS Enhanced flow performance through network operational planning
Link with PCP	PCP AF4 (Collaborative NOP)

Network Strategy Plan	SO6/3 Implement the Advanced Tower concept (tower with DPI messaging)
Operating Environments	Airport, Network

System Impact

Ground Systems

Current system Capability

NM B2B interfaces are capable of receiving DPI messages and NM systems are capable of using departure planning information to improve the prediction of aircraft take-off time. The ADDEP is already implemented at a few airports, but most small to medium sized airports do not share departure planning information with the network.

New Capability

TWR ATC units that do not operate DPI sharing A-CDM processes shall be equipped with an airport data entry panel (ADDEP) allowing the capability of recording departure planning milestones and exchanging them with the NM and to the local flow management centre if applicable.

Airborne Systems

No impact on airborne systems

Standardisation and Regulatory Needs

Standardisation Needs	There is no new standardisation need identified for this solution. DPI messages are already standardised (Eurocontrol ATS Data Exchange Presentation (ADEXP) specification). The operation procedures for DPI messages exchanges are defined in the relevant NM manuals and guidelines (Collaboration Human Machine Interface (CHMI) ATFCM manual, NM Flight Progress Messages Document, B2B manual and ATFCM user's manual).
Regulatory Needs	There is no new regulatory need identified for this solution.

Performance Benefits

Safety

There will be an overall slight improvement in the safety of operations through the provision of timely and accurate information, which reduces the probability of overload in an ATC sector.

Capacity

Improved confidence in NM traffic load predictions will allow to reduce capacity buffers, which will effectively result in increased capacity.

Operational Efficiency

The improved data will increase predictability within the Network Manager flow management systems for demand on a sector, leading to :

- better decision making concerning when to open or close a sector;
- fewer unnecessary regulations leading to a reduction of ATFM delays
- fewer overloads as sudden increases in demand will be rare

A significant improvement in traffic predictability due to an improvement of Estimated Take-Off Time (ETOT) accuracy at medium/small airports. In SESAR trials 6% of flights were outside a 10-minute margin of error, compared with 43% without ADDEP.

Solution #69 - Enhanced STCA with down-linked parameters

Problem Addressed by the Solution

STCA (Short Term Conflict Alert) is a ground system designed and deployed as last Safety Net against the risk of collisions between aircraft due to separation loss.

Enhanced STCA can be used both in En-Route and TMA radar environments to improve prediction of potential conflicts and reduce false alert rate.

The difficulty of STCA development lies with the need to avoid a high false alert rate versus the need of ensure that all risk of collision always triggers a timely warning.

Solution Description

This solution consists of enhancing the STCA safety net with selected flight level (SFL) information down-linked from the aircraft.

Enhancing the STCA with the information downlinked from the aircraft will improve the warning times, decrease the rate of nuisance alerts and maintain or improve the rate of genuine alerts

ATM Dependencies and Operating Environment

SESAR Key Feature	Advanced Air Traffic Services
Operational Changes	Enhanced Safety Nets
OI Steps / *Enablers*	CM-0807-A Enhanced Short Term Conflict Alert using Mode S EHS data
ICAO ASBUs	B1-SNET Ground based safety nets on approach
Link with PCP	Not applicable
Network Strategy Plan	SO7/2 Improve Network Safety, with NM's support as relevant
Operating Environments	En-route, Mixed, Terminal

System Impact

Ground Systems

Current system Capability

Several ATS units already operate STCA, but they may not use the SFL DAP. The SFL is received by ground systems, but may not be displayed in the CWP. The cleared flight level (CFL) can be entered into the ground system by controllers and is generally presented in the CWP, but may not be integrated with the display of STCA alerts.

New Capability

The deployment of this capability requires that the cleared flight level (CFL) and the selected flight level (SFL) are presented in the en route/TMA CWP and that the SFL is considered against the CFL as part of the STCA conflict detection algorithm. The display of STCA alerts shall integrate the CFL and SFL when relevant.

Airborne Systems

Current system Capability

Aircraft are today equipped with Mode-S enhanced surveillance (EHS) transponder capability which is required and sufficient for the DAP functionality.

New Capability

There is no impact on airborne equipment, as the required equipment is already available on aircraft flying in the SES airspace.

Standardisation and Regulatory Needs

Standardisation Needs	Standard needed: Standard based on “Guidance documentation for Short Term Conflict Alert- Part I, Part II and Part III”, 2017, Eurocontrol. Note: This also addresses the use of the aircraft downlinked parameter (SFL) for reduction of STCA nuisance alerts.
Regulatory Needs	Regulatory need: To ensure a harmonised application of the functional system including ensuring roles and responsibilities it is recommended that AMCs are available.

Performance Benefits

Safety

A comparative analysis of STCA enhanced with the SFL DAP against conventional STCA showed that the use of the SFL DAP:

- improves warning times;
- decreases the rate of nuisance alerts;
- maintains or increases the rate of genuine alerts.

Solution #109 - Air traffic services (ATS) datalink using Iris Precursor

Problem Addressed by the Solution

The datalink deployment in Europe is affected, amongst other by VDLM2 capacity issue. As per the ELSA recommendations and the SDM "Datalink services overall architecture proposals", introduces SATCOM class B as a means to alleviate the VDLM2 load and augment datalink performance and availability.

Besides offering an alternative technology enabling datalink services in Europe, SATCOM will also allow:

- Expanding ATN Baseline 2 benefits out of VHF range, in Oceanic areas, or places in Europe with no VDLM2 coverage
- Offer an interoperability alternative for (non-EU) aircraft without ATN/OSI capability over VDLM2.

Solution Description

SATCOM Class B offers a viable option for air traffic services (ATS) datalink using existing satellite technology systems based on the existing SwiftBroadband (SBB) satellite network from Inmarsat or future Iridium services to augment datalink performance and availability

The technology can be used to provide end-to-end air–ground communications for i4D operations, connecting aircraft and air traffic management ground systems.

ATM Dependencies and Operating Environment

SESAR Key Feature	Enabling Aviation Infrastructure
Operational Changes	CNS rationalisation
OI Steps / *Enablers*	- *CTE-C7a VDL2 infrastructure optimisation (note: description to be updated)* - *CTE-C02f - Future Satcom for ATM : (class B Satcom)* - *CTE-C02c - A/G Datalink over ATN/OSI - Multi frequency (note : this enabler should be linked to the solution)* - *A/C-33- ATN/OSI over SATCOM*
ICAO ASBUs	B1-TBO Improved traffic synchronisation and initial trajectory based operations
Link with PCP	Complements PCP AF6 (Initial trajectory information sharing)
Network Strategy Plan	SO 8/1 -Ensure an optimised and cost-efficient use of the aeronautical radio frequencies. SO5/1 - Enable 4D trajectories at planning level, in cooperation with airspace users and ANSPs.
Operating Environments	Network, En-route, Mixed, Terminal, Airport

System Impact

Ground Systems

Current system Capability

Current DLS systems rely on the VDLM2 link.

New Capability

- ANSPs shall make appropriate provisions for the interconnection of the VDLM2 and SATCOM infrastructures.

A number of options are identified for this interconnection:

- The SATCOM service area may be interfaced with the existing A/G router via service contracts,
- The SATCOM service area may be directly interfaced with the ANSPs ATN Router(s)
- The SATCOM service area may be interfaced with a common G/G ATN backbone router.

Airborne Systems

To complement the VDLM2 link with SATCOM, aircraft will need to implement:

- Airborne systems capable to support ATN/OSI exchanges over SATCOM class B satellite services
- Airborne ATN router for the connection to both VDLM2 and SATCOM class B or via IP tunnelling techniques.

Standardisation and Regulatory Needs

Standardisation Needs

Standard needed:

- ED-92 MOPS for aircraft VDLMode 2 to reflect the best in the class requirements

Regulatory Needs

Regulatory need:

- RMT.0524 Data link services, ToRs 2018 Q1, Opinion- 2019 Q2. Datalink services over satellite are not specifically included in this RMT. This should be addressed.
- Certification and AMC material for SATCOM in accordance with the Class B MASPS (ED-242)
- Review of the Commission Implementing Regulation (EU) No 391/2013 to strengthen Article 16 "Modulation of air navigation charges" implementation (to incentivise use of SATCOM for ATN/OSI or ATN/IPS Datalink)

Performance Benefits

Cost Efficiency

Enables market driven approach for connectivity which will result in reduction of communication cost.

Operational Efficiency

Supports the deployment of Trajectory Based Operation (ATN baseline 2) and offers increased security capabilities

Offers flexibility to Airspace Users to connect to ATN network either via VDL2 or via SATCOM.

Additional benefit: Spectrum

The availability of an alternative link will alleviate the pressure on the VDL2 spectrum by offloading some of the datalink load.

Solution #113 - Optimised low-level instrument flight rules (IFR) routes for rotorcraft

Problem Addressed by the Solution

Usually the rotorcraft operators face significant weather and terrain-related challenges when performing specific flight operations (e.g. civil transport, medical emergencies, etc.) and due to their different operational characteristics to fixed wing aircraft, (lower speed and vulnerability to bad weather) rotorcraft operations inside controlled airspace and terminal manoeuvering areas (TMA) are often limited to visual flight rules (VFR) flights. Flights under instrument flight rules (IFR) are often constrained or even prohibited. For these reasons, rotorcraft operations are confined to flying only when meeting strict visibility standards (VMC – Visual Meteorological Conditions), limiting drastically their access in controlled airspace and accordingly the operations to and from airport included in class "A" airspace (e.g. TMA - Terminal Area).

In addition, low clouds, fog, rain and snow, and the possible presence of mountains and valleys affect seriously safety and success of concerned operations.

The implementation of Low Level IFR routes for rotorcraft can improve flight safety, equity, accessibility, and TMA capacity enhancing weather resilience of rotorcraft operations.

Solution Description

SESAR Solution "Optimised Low Level IFR routes for rotorcraft" consists of a series of innovative IFR routes at very low flight level and based on GNSS (SBAS/EGNOS) technology, using an enhanced Required Navigation Performance (RNP 1.0 / 0.3) that allow an optimized use of the airspace within Medium dense/complex Terminal Manoeuvring Area.

These are both arrival/departure routes to an airport/heliport in the TMA or routes to transit the TMA airspace (arrival/departure locations are outside the TMA). The Solution is looking to replace the existing RC VFR routes with IFR routes – with a focus on those existing today which the ANSP and RC know to have issues.

This solution is already addressed in the Master Plan Level 3 by Implementation Objective NAV12 (see page 96).

Annex 1. Definitions and Terminology

Implementation Objective Designators

Implementation Objective designators can take two forms:

1) In the form ABCXY where:

- ABC is the acronym of one of the designated ATM areas of work shown in the table below.
- XY is the serial number for the implementation Objective in the area of work it covers.

AOM = Airspace Organisation and Management	**HUM** = Human Factors
AOP = Airport Operations	**INF** = Information Management
ATC = Air Traffic Control	**ITY** = Interoperability
COM = Communications	**NAV** = Navigation
ENV = Environment	**SAF** = Safety Management
FCM = Flow and Capacity Management	

Table 4 - Implementation objective designators

2) (Only for Objectives related to SES Regulations) In the form XYZ-ABCD where:

- XYZ is the acronym of the SES area covered by the legislation and
- ABCD…, an acronym that stipulates the subject.
  Example: 'Interoperability' & 'Coordination and Transfer' ITY-COTR

Stakeholder Groups Designators

The following stakeholder group designators are used:

REG – State Authorities	**INT** – International Organisations and Regional Bodies
ASP – Air Navigation Service Providers (*Civil and Military providing services to GAT*)	**IND** – Aeronautics Industry AGY - EUROCONTROL Agency (non-Network Manager)
APO – Airport Operators	**NM** – Network Manager
MIL – Military Authorities (the MIL SLoAs are actions applicable exclusively to Military Authorities)	
USE – Airspace Users	

Table 5 - Stakeholder group designators

Applicability Area(s)

The objective applicability area(s) list the States/Airports having committed to implement the objective and/or being mandated to do so by a Regulation.

The following terms are used to define the Applicability Area of the different Objectives:

- **ECAC**: Refers to the States members of the European Civil Aviation Conference + Maastricht UAC.
- **EU +**: Refers to the States members of the European Union (including Maastricht UAC) extended to other States who have signed agreements with the EU to implement the SES legislation i.e., Norway, and Switzerland pursuant to their contractual commitment to implement the SES legislation and in the states signatory to the European Common Aviation Area Agreement (ECAA), Albania, Bosnia and Herzegovina, FYROM, Georgia, Montenegro, Serbia and Moldova.
- **EU:** Refers to the States members of the European Union.
- **25 PCP Airports:** Refers to the airports identified in ATM Functionality 2 of the PCP Regulation as the Geographical Scope for all its sub-functionalities except 'Time-Based Separation'.

  The 25 airports are: London-Heathrow, Paris-CDG, London-Gatwick, Paris-Orly, London-Stansted, Milan-Malpensa, Frankfurt International, Madrid-Barajas, Amsterdam Schiphol, Munich Franz Josef Strauss, Rome-Fiumicino, Barcelona El Prat, Zurich Kloten, Düsseldorf International, Brussels National, Oslo Gardermoen, Stockholm-Arlanda, Berlin Brandenburg Airport, Manchester Ringway, Palma De Mallorca Son San Juan, Copenhagen Kastrup, Vienna Schwechat, Dublin, Nice Cote d'Azur and Istanbul Ataturk Airport.
- **17 PCP Airports:** Refers to the airports identified in ATM Functionality 2 of the PCP Regulation as the Geographical Scope for the sub-functionality 'Time-Based Separation'.

  The 17 airports are: London-Heathrow, London-Gatwick, Paris-Orly, Milan-Malpensa, Frankfurt International, Madrid-Barajas, Amsterdam-Schiphol, Munich Franz Josef Strauss, Rome-Fiumicino, Zurich Kloten, Düsseldorf International, Oslo Gardermoen, Manchester Ringway, Copenhagen Kastrup, Vienna Schwechat, Dublin and Istanbul Ataturk Airport.

Implementation Objective Deadlines

The following terminology is used to define Implementation objective deadlines:

- **Initial Operational Capability (IOC)** - Indicates the date of the first possible operational deployment.
- **Full Operational Capability (FOC)** - Indicates the date by which full operational capability should be achieved by all involved stakeholders.
- **Timescales (for Objectives related to SES Regulations)** – Indicates the applicability dates of the regulatory requirements.

(Level 3) Dependencies

This entry in the Objective Deployment Views (DVs) lists the other objectives in the MP Level 3 that enable or impact the implementation of the Objective being described in the DV. Note that the dependencies are not "bi-directional", i.e. Free Route is dependent on the implementation of MTCD, but not vice versa.

Performance Benefits / Key Performance Areas

The Key Performance Areas used in this document are in line with those defined in Chapter 3 ('Performance View) of the Level 1 of the European ATM Master Plan Edition 2015.

Annex 2. Applicability to Airports

Several Implementation Objectives are applicable to specific European airports. For the Objectives related to the PCP, the area of applicability fully includes the list of airports as defined in the PCP Regulation. However, the scope of some of the airport Objectives is substantially broader than the PCP as some airports have committed to implementation even if not explicitly targeted by the PCP Regulation. The applicability area for all airport Objectives is consolidates in the following table:

Legend:

✓ In the applicability area & completed ○ In the applicability area & not completed yet - Not in the applicability area

PCP – Objective linked to a PCP sub-functionality
PCP-PR – Objective identified as a predecessor for a PCP sub-functionality
PCP-FC – Objective identified as a facilitator for a PCP sub-functionality

PCP Airports

State	Airport	ICAO code	AOP04.1 (PCP-PR)	AOP04.2 (PCP-PR)	AOP05 (PCP-PR)	AOP10 (PCP)	AOP11 (PCP)	AOP12 (PCP)	AOP13 (PCP)	ATC07.1 (PCP-FC)	ENV01
AT	Vienna	LOWW	✓	✓	○	○	○	○	○	○	✓
BE	Brussels	EBBR	✓	✓	✓	-	○	✓	○	○	✓
CH	Zurich	LSZH	✓	✓	✓	○	○	○	○	✓	○
DE	Berlin Brandenburg	EDDB	○	○	○	-	○	○	○	○	-
DE	Frankfurt Main	EDDF	✓	○	✓	○	○	○	○	✓	✓
DE	Düsseldorf	EDDL	○	○	✓	○	○	○	○	○	✓
DE	Munich	EDDM	✓	✓	✓	○	○	○	○	✓	✓
DK	Copenhagen	EKCH	✓	✓	✓	○	○	○	○	✓	✓
ES	Barcelona	LEBL	✓	○	✓	-	○	○	○	✓	○
ES	Madrid Barajas	LEMD	✓	○	✓	○	○	○	○	✓	○
ES	Palma de Mallorca	LEPA	✓	○	✓	-	○	○	○	✓	✓
FR	Nice	LFMN	✓	✓	○	-	○	○	○	✓	✓
FR	Paris, Charles de Gaulle	LFPG	✓	✓	✓	-	○	○	○	✓	✓
FR	Paris, Orly	LFPO	✓	✓	✓	○	○	○	○	✓	✓

State	Airport	ICAO code	AOP04.1 (PCP-PR)	AOP04.2 (PCP-PR)	AOP05 (PCP-PR)	AOP10 (PCP)	AOP11 (PCP)	AOP12 (PCP)	AOP13 (PCP)	ATC07.1 (PCP-FC)	ENV01
IE	Dublin	EIDW	✓	✓	✓	○	○	○	○	✓	✓
IT	Milan Malpensa	LIMC	○	○	✓	○	○	○	○	-	✓
IT	Rome Fiumicino	LIRF	○	○	✓	○	○	○	○	-	✓
NL	Amsterdam Schiphol	EHAM	✓	✓	✓	○	○	○	○	✓	✓
NO	Oslo Gardermoen	ENGM	✓	✓	✓	○	○	○	○	✓	○
SE	Stockholm Arlanda	ESSA	✓	○	✓	-	○	○	○	✓	✓
UK	Manchester	EGCC	○	○	○	○	○	○	○	○	✓
UK	London Gatwick	EGKK	✓	✓	✓	○	✓	✓	○	✓	✓
UK	London Heathrow	EGLL	○	○	✓	✓	○	✓	○	✓	✓
UK	London Stansted	EGSS	✓	✓	○	-	○	○	○	○	✓

Non-PCP Airports

State	Airport	ICAO code	AOP04.1	AOP04.2	AOP05	AOP10	AOP11	AOP12	AOP13	ATC07.1	ENV01
AM	Yerevan	UDYZ	-	-	-	-	-	-	-	-	✓
AZ	Baku	UBBB	✓	✓	-	-	-	-	-	-	✓
BE	Antwerp	EBAW	-	-	-	-	-	-	-	-	○
BE	Charleroi	EBCI	-	-	-	-	-	-	-	-	✓
BE	Liege	EBLG	-	-	-	-	-	-	-	-	✓
BE	Ostende	EBOS	-	-	-	-	-	-	-	-	○
BA	Sarajevo	LQSA	-	-	-	-	-	-	-	-	○
BG	Sofia	LBSF	✓	-	-	-	-	-	-	-	-
CH	Geneva	LSGG	✓	✓	✓	-	○	-	-	○	○
CZ	Prague	EKPR	✓	✓	✓	-	-	-	-	○	-
DE	Hamburg	EDDH	-	-	-	-	○	-	-	-	✓
DE	Cologne-Bonn	EDDK	-	-	-	-	-	-	-	-	✓
DE	Nurnberg	EDDN	-	-	-	-	○	-	-	-	✓

State	Airport	ICAO code	AOP04.1	AOP04.2	AOP05	AOP10	AOP11	AOP12	AOP13	ATC07.1	ENV01
DE	Stuttgart	EDDS	-	-	-	-	○	-	-	-	✓
DE	Hannover	EDDV	-	-	-	-	○	-	-	-	✓
EE	Tallinn	EETN	✓	✓	○	-	-	-	-	-	✓
FI	Helsinki	EFHK	✓	✓	✓	-	-	-	-	✓	✓
FR	Toulouse	LFBO	○	○	-	-	○	-	-	-	✓
FR	Lyon	LFLL	✓	○	✓	-	✓	-	-	-	✓
FR	Marseille	LFML	○	○	-	-	○	-	-	-	✓
GR	Athens	LGAV	○	○	○	-	-	-	-	-	-
GR	Iraklion	LGIR	-	-	○	-	-	-	-	-	-
GR	Rhodes	LGRP	-	-	○	-	-	-	-	-	-
GR	Thessaloniki	LGTS	○	○	-	-	-	-	-	-	-
HR	Zagreb	LDZA	-	○	○	-	○	-	-	-	○
HU	Budapest	LHBP	✓	○	○	-	-	-	-	-	✓
IT	Bergamo Orio al Serio	LIME	-	-	○	-	-	-	-	-	-
IT	Milan Linate	LIML	○	○	✓	-	○	-	-	-	✓
IT	Naples	LIRN	-	-	✓	-	-	-	-	-	-
IT	Venezia	LIPZ	○	○	✓	-	○	-	-	-	✓
LT	Vilnius	EYVI	✓	✓	○	-	-	-	-	-	✓
LU	Luxembourg	ELLX	✓	○	-	-	-	-	-	-	○
LV	Riga	EVRA	✓	✓	○	-	-	-	-	○	○
PL	Warsaw	EPWA	○	○	○	-	-	-	-	○	✓
PT	Lisbon	LPPT	○	○	○	-	○	-	-	○	✓
RO	Bucharest	LROP	○	○	-	-	○	-	-	○	○
RS	Belgrade	LYBE	-	-	-	-	-	-	-	-	○
SE	Göteborg	ESGG	-	-	-	-	-	-	-	-	✓
SE	Malmö-Sturup	ESMS	-	-	-	-	-	-	-	-	✓
SE	Umea	ESNU	-	-	-	-	-	-	-	-	✓

State	Airport	ICAO code	AOP04.1	AOP04.2	AOP05	AOP10	AOP11	AOP12	AOP13	ATC07.1	ENV01
SK	Bratislava	LZIB	-	-	-	-	-	-	-	-	○
TR	Ankara	LTAC	✓	✓	-	-	-	-	-	-	-
TR	Antalya	LTAI	✓	✓	○	-	-	-	-	-	○
TR	Istanbul Ataturk	LTBA	✓	✓	○	-	-	○	○	✓	○
UA	Kyiv Boryspil	UKBB	○	○	○	-	-	-	-	✓	✓
UK	Birmingham	EGBB	-	-	○	-	-	-	-	-	✓
UK	London Luton	EGGW	-	-	○	-	-	-	-	-	✓
UK	Bristol	EGGD	-	-	-	-	-	-	-	-	✓
UK	London City	EGLC	-	-	-	-	-	-	-	-	-
UK	Newcastle	EGNT	-	-	-	-	-	-	-	-	✓
UK	Nottingham East Midlands	EGNX	-	-	-	-	-	-	-	-	✓
UK	Glasgow	EGPF	-	-	-	-	-	-	-	-	✓
UK	Edinburgh	EGPH	✓	✓	○	-	-	-	-	-	✓

Annex 3. Links between Implementation Objectives and Families of the Deployment Programme 2018

The following table indicates the links between the implementation objectives and the corresponding Families as defined in the edition 2018 of the Deployment Programme.

Objective Designator	Objective Title	DP 2018 Family Designator and Title
AOM13.1	Harmonise OAT and GAT Handling	-
AOM19.1	ASM Tools to Support AFUA	3.1.1 ASM Tool to support AFUA
AOM19.2	ASM Management of Real-Time Airspace Data	3.1.2 ASM management of real time airspace data
AOM19.3	Full Rolling ASM/ATFCM Process and ASM Information Sharing	3.1.3 Full rolling ASM/ATFCM process and ASM information sharing
AOM19.4	Management of Pre-defined Airspace Configurations	3.1.4 Management of dynamic airspace configurations
AOM21.1	Direct Routing *	3.2.1 Upgrade of ATM systems to support Direct Routing and Free Routing 3.2.3 Implement published Direct Routings (DCTs)
AOM21.2	Free Route Airspace	3.2.1 Upgrade of ATM systems to support Direct Routing and Free Routing 3.2.4 Implement Free Route Airspace
AOP04.1	A-SMGCS Surveillance (former Level 1)	2.2.1 A-SMGCS level 1 and 2
AOP04.2	A-SMGCS Runway Monitoring and Conflict Alerting (RMCA) (former Level 2)	2.2.1 A-SMGCS level 1 and 2
AOP05	Airport CDM	2.1.1 Initial DMAN 2.1.3 Basic A-CDM
AOP10	Time-Based Separation	2.3.1 Time Based Separation (TBS)
AOP11	Initial Airport Operations Plan	2.1.4 Initial Airport Operations Plan (AOP)
AOP12	Improve Runway and Airfield Safety with Conflicting ATC Clearances (CATC) detection and Conformance Monitoring Alerts for Controllers (CMAC)	2.1.2 Electronic Flight Strips (EFS) 2.5.1 Airport Safety Nets associated with A-SMGCS level 2
AOP13	Automated Assistance to Controller for Surface Movement Planning and Routing	2.4.1 A-SMGCS Routing and Planning Functions
AOP14	Remote Tower Services	-
ATC02.8	Ground-Based Safety Nets	3.2.1 Upgrade of ATM systems to support Direct Routing and Free Routing
ATC02.9	Enhanced STCA for TMAs	-
ATC07.1	AMAN Tools and Procedures	1.1.1 Basic AMAN
ATC12.1	Automated Support for Conflict Detection, Resolution Support Information and Conformance Monitoring	3.2.1 Upgrade of ATM systems to support Direct Routing and Free Routing
ATC15.1	Information Exchange with En-route in Support of AMAN	1.1.2 AMAN upgrade to include Extended Horizon function
ATC15.2	Arrival Management Extended to En-route Airspace	1.1.2 AMAN upgrade to include Extended Horizon function
ATC17	Electronic Dialogue as Automated Assistance to Controller during Coordination and Transfer	3.2.1 Upgrade of ATM systems to support Direct Routing and Free Routing
ATC18	Multi Sector Planning En-route - 1P2T	*No direct link, although implementation is recommended in Family 3.2.1*
COM10	Migrate from AFTN to AMHS	-

COM11	Voice over Internet Protocol (VoIP)	3.1.4 Management of Dynamic Airspace Configurations 3.2.1 Upgrade of systems (NM, ANSPs, AUs) to support Direct Routings (DCTs) and Free Routing Airspace (FRA)
COM12	NewPENS	5.1.2 NewPENS: New Pan-European Network Service 5.2.1 Stakeholders Internet Protocol Compliance
ENV01	Continuous Descent Operations	-
ENV02	Airport Collaborative Environmental Management	-
ENV03	Continuous Climb Operations	-
FCM03	Collaborative Flight Planning	4.2.3 Interface ATM systems to NM systems
FCM04.1	STAM Phase 1	4.1.1 STAM Phase 1
FCM04.2	STAM Phase 2	4.1.2 STAM Phase 2
FCM05	Interactive Rolling NOP	4.2.2 Interactive Rolling NOP 4.2.4 AOP/NOP Information Sharing
FCM06	Traffic Complexity Assessment	4.4.2 Traffic Complexity tools
FCM07	Calculated Take-off Time (CTOT) to Target Times for ATFCM Purposes	4.3.1 - Target Time for ATFCM purposes 4.3.2 - Reconciled target times for ATFCM and arrival sequencing
FCM08	Extended Flight Plan	4.2.3 Interface ATM systems to NM systems
FCM09	Enhanced ATFM Slot Swapping	-
INF07	Electronic Terrain and Obstacle Data (eTOD)	1.2.2 Geographic Database for procedure design, to be added after meeting with SDM
INF08.1	Information Exchanges using the SWIM Yellow TI Profile	5.1.3 Common SWIM Infrastructure Components 5.1.4 Common SWIM PKI and Cybersecurity 5.2.1 Stakeholders Internet Protocol Compliance 5.2.2 Stakeholders SWIM Infrastructures Components 5.2.3 Stakeholders SWIM PKI and Cybersecurity 5.3.1 Upgrade / Implement Aeronautical Information Exchange system / service 5.4.1 Upgrade / Implement Meteorological Information Exchange system / service 5.5.1 Upgrade / Implement Cooperative Network Information Exchange system/service 5.6.1 Upgrade / Implement Flights Information Exchange system / service supported by Yellow Profile

INF08.2	Information Exchanges using the SWIM Blue TI Profile	5.1.3 Common SWIM Infrastructure Components 5.1.4 Common SWIM PKI and Cybersecurity 5.2.1 Stakeholders Internet Protocol Compliance 5.2.2 Stakeholders SWIM Infrastructures Components 5.2.3 Stakeholders SWIM PKI and Cybersecurity 5.6.2 Upgrade / Implement Flights Information Exchange system / service supported by Blue Profile
ITY-ACID	Aircraft Identification	-
ITY-ADQ	Ensure Quality of Aeronautical Data and Aeronautical Information	1.2.2 Geographic Database for procedure design, to be added after meeting with SDM
ITY-AGDL	Initial ATC Air-Ground Data Link Services	6.1.1 ATN B1 based services in ATSP domain 6.1.3 A/G and G/G Multi Frequency DL Network in defined European Service Areas 6.1.4 ATN B1 capability in Multi Frequency environment in Aircraft Domain
ITY-AGVCS2	8,33 kHz Air-Ground Voice Channel Spacing below FL195	-
ITY-FMTP	Common Flight Message Transfer Protocol	-
ITY-SPI	Surveillance Performance and Interoperability	-
NAV03.1	RNAV 1 in TMA Operations	-
NAV03.2	RNP 1 in TMA Operations	1.2.3 RNP 1 Operations in high density TMAs (ground capabilities) 1.2.4 RNP 1 Operations (aircraft capabilities)
NAV10	RNP Approach with Vertical Guidance	1.2.1 RNP APCH with vertical guidance 1.2.2 Geographic Database for procedure design
NAV12	Optimised Low-Level IFR Routes in TMA for Rotorcraft	-
SAF11	Improve Runway Safety by Preventing Runway Excursions	-

* *AOM21.1 was achieved during 2017 and therefore removed from the Implementation Plan 2018. It is kept in this table for traceability purposes.*

Table 6 - Links between Implementation Objectives and Deployment Programme Families

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Annex 4. Acronyms and Abbreviation

A

AAB	Agency Advisory Body (EUROCONTROL)
ACAS	Airborne Collision Avoidance System
ACC	Area Control Centre
A-CDM	Airport Collaborative Decision Making
ACH	ATC Flight Plan Change
ACID	Aircraft Identification
ACL	ATC Clearance
ACP	Accept (message)
ADEXP	ATC Data Exchange Presentation
ADQ	Aeronautical Data Quality
ADR	Airspace Data Repository
ADS	Automatic Dependent Surveillance
ADS-B	Automatic Dependent Surveillance – Broadcast
ADS-C	Automatic Dependent Surveillance - Contract
AFTN	Aeronautical Fixed Telecommunications Network
AIC	Aeronautical Information Circular
AIM	Aeronautical Information Management
AIP	Aeronautical Information Publication
AIRAC	Aeronautical Information Regulation and Control
AIS	Aeronautical Information Service
AIXM	Aeronautical Information Exchange Model
AMAN	Arrival Manager
AMC	Acceptable Means of Compliance
AMC	Airspace Management Cell
AMHS	ATS Message Handling Service
ANS	Air Navigation Service
ANSP	Air Navigation Service Provider
AO	Airline Operator
AOM	Airspace Organisation and Management
AOP	Airport Operations Plan
APL	ATC Flight Plan
APM	Approach Path Monitor
APO	Airport Operations
APOC	Airport Operations Centre
APP	Approach
APV	Approach with Vertical Guidance
APW	Airborne Proximity Warning
ASM	Airspace Management
A-SMCGS	Advanced Surface Movement Control and Guidance System
ASP	Air Navigation Service Providers
ASTERIX	All Purpose Structured EUROCONTROL Radar Information Exchange
ATC	Air Traffic Control
ATFCM	Air Traffic Flow and Capacity Management
ATFM	Air Traffic Flow Management
ATCO	Air Traffic Control Officer

B

B2B	Business to Business

C

CAA	Civil Aviation Authority
CBA	Cost Benefit Analysis
CCO	Continuous Climb Operations
CDM	Collaborative Decision Making
CDN	Coordination (message)
CDO	Continuous Descent Operations
CDR	Conditional Route
CEM	Collaborative Environmental Management
CFIT	Controlled Flight Into Terrain
CHMI	Collaboration Human Machine Interface
CIAM	Collaboration Interface for Airspace Management
CNMF	Central Network Management Function
CNR	Management of Common Network Resources Service
CNS	Communications, Navigation and Surveillance
COD	SSR Code Assignment
COF	Change of Frequency (message)
COM	Communications
CONOPS	Concept of Operations
COTS	Connection-mode Transport Service

CPDLC	Controller Pilot Data Link Communications
CPR	Correlated Position Reports
CRAM	Conditional Route Availability Message
CSP	Communications Service Provider

D

DCT	Direct Routing
DDR	Demand Data Repository
DLIC	Data Link Initiation Capability
DME	Distance Measuring Equipment
DP	Deployment Programme
DPI	Departure Planning Information

E

EAD	European Aeronautical Database
EAPPRE	European Action Plan on the Prevention of Runway Excursion
EASA	European Aviation Safety Agency
EATM	European Air Traffic Management
EATMN	European Air Traffic Management Network
EC	European Commission
ECAA	European Common Aviation Area
ECAC	European Civil Aviation Conference
EGNOS	European Geostationary Navigation Overlay Service
EGPWS	Enhanced Ground Proximity Warning System
ERNIP	European Route Network Improvement Plan
ESSIP	European Single Sky ImPlementation
ETFMS	Enhanced Tactical Flow Management System
ETSI	European Telecommunications Standards Institute
ETSO	European Technical Standard Order EU European Union
EUROCAE	European Organisation for Civil Aviation Equipment

F

FAB	Functional Airspace Block
FANS	Future Air Navigation Systems (ICAO)
FAS	Flight Plan and Airport Slot Consistency Service
FCM	Flow and Capacity Management
FDP	Flight Data Processing
FDPS	Flight Data Processing System
FIS	Flight Information Services
FL	Flight Level
FMS	Flight Management System
FMTP	Flight Message Transfer Protocol
FOC	Full Operational Capability
FPL	Filed Flight Plan
FRA	Free Route Airspace
FSA	First System Activation
FUA	Flexible Use of Airspace
FUM	Flight Update Message
FYROM	Former Yugoslav Republic of Macedonia

G

GAT	General Air Traffic
GBAS	Ground Based Augmentation System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System

H

HMI	Human Machine Interface
HOP	Hand-Over Proposal (message)

I

IANS	Institute of Air Navigation Services
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
IFPL	Individual Filed Flight Plan
IFPS	Initial Flight Plan Processing System
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IND	Aeronautics Industry
INF	Information Management
INT	International Organisations and Regional Bodies
IP	Internet Protocol
IR	Implementing Rule
ISO	International Standardisation Organisation

ITU	International Telecommunications Union
ITY	Interoperability

J

JU	Joint undertaking

K

KHz	Kilohertz
KPA	Key Performance Area
KPI	Key Performance Indicator

L

LARA	Local and Regional ASM application
LoA	Letter of Agreement
LPV	Lateral Precision with Vertical Guidance Approach
LSSIP	Local Single Sky ImPlementation

M

MAS	Manual Assumption of Communication (message)
MET	Meteorology
MHz	Megahertz
MIL	Military Authorities
MP L3	Master Plan Level 3
Mode S	SSR Selective Interrogation Mode
MONA	Monitoring Aids
MoU	Memorandum of Understanding
MSAW	Minimum Safe Altitude Warning
MTCD	Medium Term Conflict Detection
MTOW	Maximum Take-Off Weight
MUAC	Maastricht Upper Area Control (Centre)

N

N/A	Not applicable
NATO	North Atlantic Treaty Organisation
NAV	Navigation
NETOPS	Network Operations Team
NM	Network Manager
NMOC	Network Manager Operations Centre
NOP	Network Operations Plan
NOTAM	Notice to Airmen
NPA	Notice of Proposed Amendment
NPA	Non Precision Approach
NSA	National Supervisory Authority

O

OAT	Operational Air Traffic
OI	Operational improvements
OLDI	On Line Data Interchange
OPC	Operational Communications

P

PA	Precision Approach
PAC	Preliminary Activation message
PANS-OPS	Procedures for Air Navigation Services – Aircraft Operations
PBN	Performance Based Navigation
PCP	Pilot Common Project
PDS	Pre-Departure Sequencing
PENS	Pan-European Network Service
P-RNAV	Precision RNAV

R

RAD	Route Availability Document
RAP	Referred Activate (message)
REG	National Regulatory Authorities/NSAs
RF	Radio Frequency
RJC	Reject (message)
RMCA	Runway Monitoring and Conflict Alerting
RNAV	Area Navigation
RNP	Required Navigation Performance
ROF	Request on Frequency
RRV	Referred Revision (message)
R/T	Radio Telephony

S

SAF	Safety
SBAS	Satellite Based Augmentation System
SBY	Stand-By (message)
SDM	SESAR Deployment Manager
SDM	SDM Supplementary Data Message
SES	Single European Sky
SESAR	Single European Sky ATM Research

SJU	SESAR Joint Undertaking
SLoA	Stakeholder Line(s) of Action
SSR	Secondary Surveillance Radar
STAM	Short-Term ATFCM Measures
STCA	Short Term Conflict Alert
SUR	Surveillance
SVS	Synthetic Vision System
SWIM	System-Wide Information Management

T

TBD	To Be Determined
TBO	Time-Based Operations
TBS	Time-Based Separation
TCAS	Traffic Alert and Collision Avoidance System
TCP/IP	Transmission Control Protocol / Internet Protocol
TIM	Transfer Phase Initiation Message
TOD	Terrain and Obstacle Data
TMA	Terminal Control Area
TWR	Tower Control Unit

U

UAC	Upper Area Control (Centre)
UDPP	User-Driven Prioritisation Process
USE	Airspace Users
UUP	Updated Airspace Use Plan

V

VCS	Voice Communications System
VDL	VHF Digital Link
VFR	Visual Flight Rules
VHF	Very High Frequency
VNAV	Vertical Navigation
VoIP	Voice over Internet Protocol

W

WAM	Wide Area Multilateration

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