SESAR Deployment Framework Partnership

Preliminary Deployment Programme V0 (PDP V0)

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1. Executive Summary

The Preliminary Deployment Programme (PDP) shall provide the initial project view of the ATM functionalities of the Pilot Common Project in order to support the successful implementation of the Regulation (EU) N°716/2014.

The PDP has been conceived to provide the implementing stakeholders with further indications concerning their project proposals versus the contents of the PCP. It consists of project clusters whose purpose is to prepare and ensure consistency, interconnection and interoperability with the implementation of the overall PCP. This will be achieved through a number of proposed high level initiatives, strictly linked to PCP requirements, whose intent is to involve and synchronize implementations from the relevant operational stakeholders.

Since there is already a delay on the delivery of the so-called baseline elements, as already addressed by the IDSG[1] through the monitoring and reporting of the Interim Deployment Programme and detailed in its Transition Report, the PDP is intended to:

- Speed up deployment of all the pre-requisites and facilitators of the PCP functionalities, in order to be ready for a timely, coordinated and synchronised deployment of PCP elements;
- Cover the deployment of mature elements of the PCP.

The timely and coordinated execution of the PDP will minimize the risk of delaying the full PCP deployment that could seriously jeopardise the operational benefits expected by its implementation.

The proposed PDP focuses on clusters of Implementation projects, which are named and referred to as “Fast Tracks”. Each Fast Track is identified as belonging to:

- Family 1 – all baseline activity, mainly covered by IDP indications, necessary for the timely and synchronised implementation of the prerequisites of the PCP;
- Family 2 – all PCP elements mature to be deployed.

Each Fast Track is described in a standard format, providing the required information on the area of interest, the scope, the involved stakeholders and the geographical applicability, in accordance with Regulation (EU) N°716/2014.

[1]The Interim Deployment Steering Group (IDSG) was established in February 2012 in order to “*consolidate the steering process for early deployment activities, as test bed for the governance mechanisms to be implemented, and ensure its continuation up to the establishment of the future deployment governance (January 2012)*”. In its plenary configuration, it consists of designated experts from the civil and military representatives of the States within the SES area and also from the relevant ATM operational stakeholders (ANSPs, Airspace users, Airports, the Network Manager (NM)), the EASA, and the SJU. The IDSG also meets in a technical configuration, called Expert Team, in order to perform detailed analysis and prepare the reports to the Single Sky Committee for positive opinion. In this configuration, membership is extended to experts from the manufacturing industry.

All Fast Tracks are grouped taking into consideration the relevant AFs they contribute to. Interdependencies between AFs are described at high level, while a direct link between the Fast Tracks and their respective AFs is shown in the indicative Gantt charts, where timing information from ESSIP and further IDP (Interim Deployment Programme) monitoring results can be identified.

The main source to identify the list of prerequisites and facilitators is the IDP (Interim Deployment Programme) and the IDSG results on the analysis of the PCP priorities and baseline essentials.

The IDSG experience has been highly valuable in order to identify the areas where major effort should be invested and where solid processes should be built, in order to ensure effective delivery from the implementation projects. Furthermore, the IDSG transition reports highlights monitoring functions to be performed by the Deployment Manager, e.g. to develop a “programmatic approach” that would address the potential ECAC needs for lower airspace/TMAs reorganization and optimization in relation to continuous descent / continuous climb application.

2. PDP specific objectives

The specific objective of the Preliminary Deployment Programme (PDP) is to provide the EC with the initial project view of the ATM functionalities of the Pilot Common Project in order to support the successful implementation of the Regulation (EU) N°716/2014.

Indeed, the PDP has also been conceived to focus on the upcoming INEA first call for the ATM and so to provide to implementing stakeholders further indications concerning their project proposals correspondence and relevance versus the contents of the PCP.

The PDP consists of projects whose purpose is to prepare and ensure cohesion, interconnection and interoperability with the implementation of the PCP. Since there is already a delay on the delivery of the so-called baseline elements and the Interim Deployment Programme (IDP), the PDP is intended to address both:

- Speed up deployment of all the pre-requisites and facilitators of the PCP functionalities, in order to be ready for a timely, coordinated and synchronised deployment of PCP elements
- Cover the deployment of mature elements of the PCP.

According to this approach in fact, the timely execution of the PDP will minimize the risk of delaying the full PCP deployment that could seriously jeopardise the operational benefits expected by the PCP implementation.

In particular, the PDP developed focuses on clusters of early Implementation projects, including their prerequisites, and preparatory actions that have already started or will start before **31/12/2016.**These clusters of early implementation projects are named and referred to as **Fast Tracks**.

3. Structure

The Preliminary Deployment Programme is organized in three levels deriving the project view of the Pilot Common Project from the ATM functionalities and sub-ATM Functionalities included in the PCP IR 716/2014. The contents of the three levels are described in the table below:

LEVEL	Name	Description
Level 1	ATM Functionalities (AF)	ATM functionality means a group of ATM operational improvements and associated enablers related to trajectory operations, airspace and surface management or to information sharing within the en-route, terminal, airport or network operating environments;
Level 2	ATM Sub-Functionalities (S-AF)	Essential operational changes (from the European ATM Master Plan level 1) selected for their performance contribution and synchronization into what an AF can be split in a more granular way".
Level 3	Early Implementation Projects cluster – **Fast Tracks**	Sampler/implementation initiatives under which local implementation projects are grouped that require coordination/ synchronization at local or regional level and/or pursue the same (part of a) Sub-Functionality

Table 1: PDP's structure

The (local) implementation projects (Level 4) belonging to the Fast Tracks will be derived from the results of the first call INEA launched in September.

From the list of ATM functionalities described in the PCP Regulation Annex, a selection of Fast Tracks has been derived, which have reached a high level of maturity and are therefore **suitable for immediate implementation**.

These Fast Tracks are fulfilling the following criteria:

- Be a **prerequisite** of the PCP needed to be deployed prior to the PCP: indicating an enabler (technical or operational) conditioning the subsequent implementation of (elements of) a PCP ATM Functionality.
- Be **facilitators** of the PCP needed to be deployed prior to the PCP: indicating is an enabler (technical or operational) not yet implemented from which the subsequent implementation of (elements of) a PCP ATM Functionality would benefit;
- Be **mature**: PCP elements that do not require additional activities to start the deployment (i.e. specific regulatory measures or additional standards);
- Be implemented in the **geographical scope** of the PCP.

According to this assessment, the Fast Tracks defined in this document are grouped according to the following criteria:

Family1	Every element to implement baseline (prerequisites and facilitators of the PCP) and all elements from IDP needed to be deployed for the PCP.
Family 2	All PCP elements ready to be deployed at certain location in the geographical scope defined by the IR, as a first step or sub-functionalities described in the annex of the Regulation (EU) N°716/2014 .

Table 2: The 2 Fast-Track clusters in the PDP

The following picture provides the graphical presentation of the 3 levels of the PDP, it allows to immediately capture derivation of the Implementation Projects clusters from the ATM functionalities and sub-functionalities, highlighting also the expected integration which will derive from the evolution PDP to full Deployment programme.

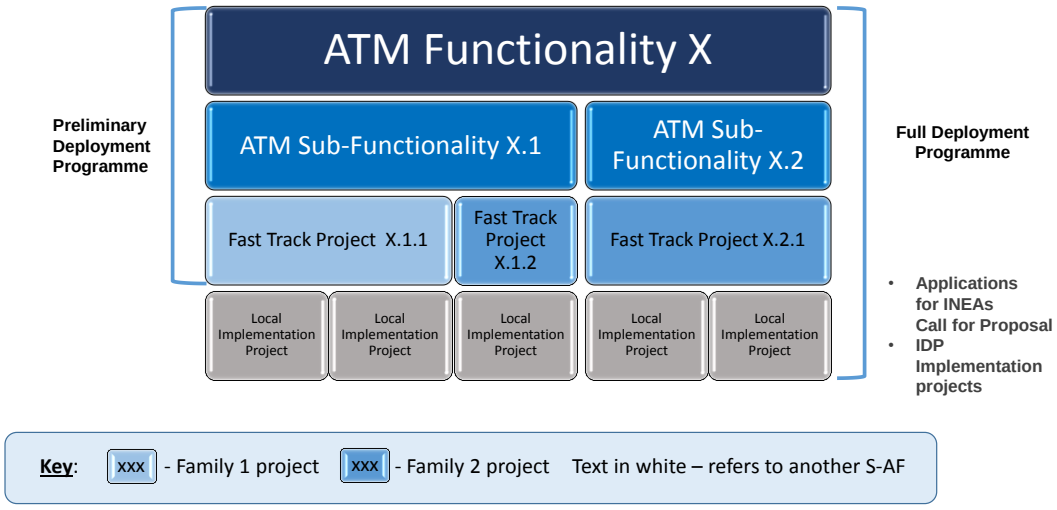

Figure 1: Typical breakdown from Level 1 to Level 3 in the PDP

The following table shows information included in the PDP Level 3 – Fast Tracks:

ITEM	Description
DESIGNATOR	Reference numbering
NAME	Name of Fast Track
SUB-AF	Name of referred Sub-ATM functionality

DESCRIPTION	Description of the Fast Track
SCOPE	Description of intended scope of the Fast Track
REFERENCES	Reference to ESSIP objectives, IDP WPs, NM plans, etc.
CONCERNED STAKEHOLDERS	Regulation (EU) N°716/2014
GEOGRAPHICAL APPLICABILITY	Regulation (EU) N°716/2014
SYNCHRONIZATION	Information where synchronization is required or needed
GUIDANCE MATERIAL	Information where to find guidance material
INTERDEPENDENCIES	Description where there are Interdependencies between Clusters or within Clusters

Table 3: Generic frame for Fast-Tracks description

4. Overall timeframe

This Preliminary Deployment Programme consists of Fast Tracks, implementation project clusters, whose purpose is to ensure the smooth and timely deployment of the elements of the PCP as defined in the IR and in the annex of the IR (mitigating the risk related to a PCP non-deployment scenario).

One of the targets of the Deployment Programme will be to ensure the implementation of the remaining elements of the Interim Deployment programme (IDP) required or facilitating the deployment of PCP elements so that the PCP objectives do not suffer a risk of late deployment. For the same purpose, additional PCP prerequisites and facilitators have been identified in the framework of the IDSG-ET, to be enclosed in the initiatives to be deployed with priority. These deployment activities are projects to be undertaken in the framework of the present call which defines the priority projects that, given their level of maturity, could be undertaken in 2014, 2015 or 2016.

Below is a full Gantt chart with all implementation activities for all Fast-Tracks under each of the 6 AFs in the PCP.

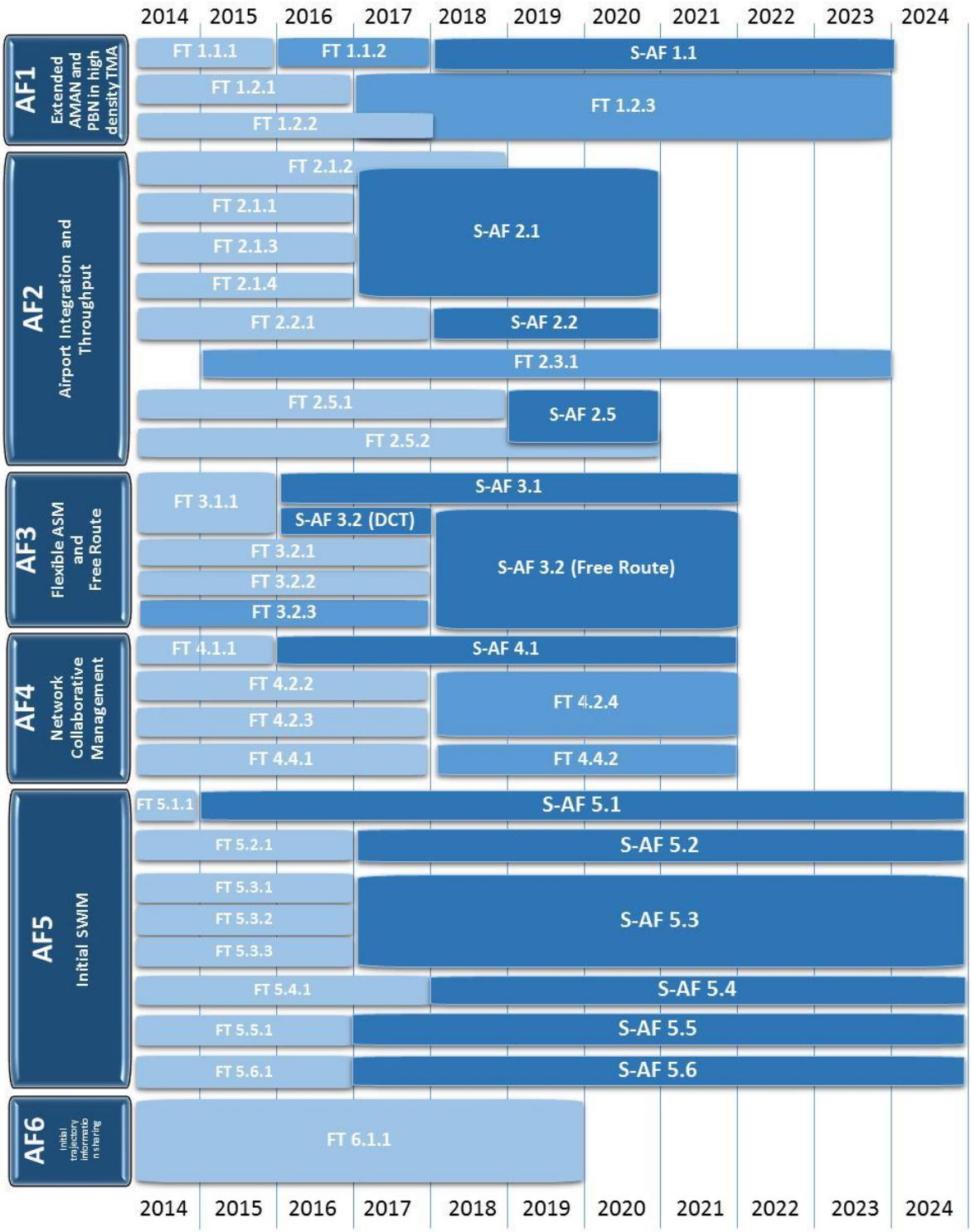

Figure 2: Overall PDP GANTT chart

Fast Tracks and in particular their delivery dates result mainly from the analysis of ESSIP and IDSG IDP monitoring activity, to be further refined at DP level on the basis of the overall picture available from the (Local) Implementation Projects.

5. Overall performance improvement

According to the PCP regulation supporting material for each AF and associated Sub AFs have been associated with an expected performance improvement contribution. These performance improvement contributions have been evaluated at the time horizon of full PCP deployment and mainly from a global network perspective.

These performance improvements are listed below as the expected target objective of the PCP complete deployment. Nevertheless the step wise approach of deployment as explained in the section 3.2.6 of the Annex B1 implies that indeed the performance improvement will be a progressive process. In the elaboration of DPs the local dimension of performance improvement will be more appearing.

It should be noted that the initial DP content is mainly focusing on the setting up of a required baseline (all the prerequisite elements) that by itself is not contributing to the PCP performance improvement objective but is necessary to enable the building up of the PCP improvements.

- *AF#1: Extended AMAN and PBN in high density TMA*

  AF 1 performances improvements are linked to the consistent and synchronized deployment of enablers by the relevant stakeholders (FT 1.2.3 involving both ANSPs and AUs and FT 1.1.2 involving several ANSPs to provide a service at a given TMA): the level of performance achieved after the FT completion could be lower than the expected one translated in the initial PCP CBA

  Environment: Reduced noise and emissions due to the better design of SIDs and STARS and to a more smooth queue management of the arrival traffic

  Cost-effectiveness: Savings in route distances as well as better fuel efficiency through increased use of more optimum arrival trajectories using more optimized descent profiles.

- *AF#2 – Airport Integration and Throughput*

  Safety: The more effective airside and landside operations management, improved situational awareness of all actors and resulting reduced congestion has a positive effect on safety

  Capacity: Enhanced airport capacity through optimal use of airside and landside facilities and services, better use of airport and ATFM slots.

  Cost-effectiveness: Punctuality improvements for all Stakeholders will reduce operating costs. The Airport Operations Programme Business case Assessment (Ref no: 04316-01 ed. 1.1., 02.2004, www.eurocontrol.int/airports) performed on the Airport CDM Applications Cluster provides an overall assessment of costs and benefits at the ECAC level. Airport CDM has been assessed as low in implementation costs and high in return of benefits.

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

- *AF#3 – Flexible Airspace Management and Free Route:*

  Safety: Improved through better co-ordination of civil and military airspace needs at the European Network level. Potential gains through more efficient airspace allocation and better knowledge of traffic environment and some enhancement through reduction in controller workload.

  Capacity: Increased through better utilization of airspace resources within and across airspace boundaries and reduced controller workload. Potential increase in productivity through dynamic adjustment of airspace resources and suppression of some flight regulations thanks to local ATFCM measures with the same ATC sector manning.

  Cost-effectiveness: Savings in route distances as well as better fuel efficiency through increased use of more optimum routes/trajectories and improved sectorization.

  Environment: Emissions reduced through the use of more optimum routes/trajectories.

- *AF#4 – Network collaborative management:*

  Safety: Optimized management of traffic demand, including high-level/peak hours traffic requests. Enhancement through reduction in controllers' workload. Enhanced by improved sharing of the network situation.

  Capacity: Optimum use of the available network capacity, Increased through suppression of flight ATFM regulations thanks to local ATFCM measures with a standardized manning of ATC sectors configuration. 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.

  Cost-effectiveness: Reduction of costs by reduction of ATFM delays, reduction of flight delays, enhanced through use of cost effective tools to access network information instead of expensive local tools or procedures and through the improved capacity

- *AF#5 – Initial System-Wide Information Management*

  AF#5 SWIM is primarily an enabler for other PCP elements that deliver benefits in safety, capacity, cost-effectiveness and environment, in AF#1, AF#3, AF#4 and AF#6.

- *AF#6 – Initial Trajectory Information Sharing*

  The only fast track in AF#6 is a 'family 1' precursor, and as such it does not deliver performance benefits in its own right, but is an enabler for other projects delivering benefits.

6. Initial set of high level risks

Below is recorded a list of high level risks that will be further broken down within the future releases of the DP.

- Implementation delay due to insufficient stakeholder commitment, with specific reference to Prerequisites implementation delay.
- Financial constraints and risks (Stakeholders i.e. Airports, may have other priorities in their investment plan)
- Recession in the Air Transport Business
- Political issues on civil-military integration / cooperation (e.g. AF3);
- Political (financial) issues on DCT / FRA when profitable overflights in upper airspace avoids high-cost areas;
- Insufficient maturity of requested ATM functionalities or sub-functionalities (e.g. AF5, AF6) and missing solutions provided by SESAR or missing regulatory or standardization elements
- Not capable data link will be available in time to support AF6 deployment (It is not obvious that the "fixed" VDL Mode 2 will be sufficient to solve the current technical issues and there is a great uncertainty regarding the calendar of implementation of the corrections. Something else could be needed but any new solution will de facto significantly delay such implementation).
- i4D depends on implementation both in aircraft systems and ground systems (both ANSPs and NM). Previous experience shows that this synchronization is challenging between stakeholders and difficulties when implementing i4D must be expected.
- Connection of ground FDP system through SWIM is essential for trajectory based operations over large areas. This consistent deployment is also a major risk regarding the target date of achievement.

7. ATM Functionalities

7.1. AF#1 - Extended Arrival Management and Performance Based Navigation in high density Terminal Manoeuvring Areas

7.1.1. ATM Functionality and Sub-functionalities

Name	**AF1: Extended Arrival Management and Performance Based Navigation in high density Terminal Manoeuvring Area**
Description	Extended Arrival management (AMAN) and Performance Based Navigation (PBN) in high density Terminal Manoeuvring Areas (TMAs) improves the precision of the approach trajectory and facilitates air traffic sequencing at an earlier stage. Extended AMAN supports extension of the planning horizon out to a minimum of 180-200 Nautical Miles, up to and including the Top of Descent of arrival flights. PBN in high density TMAs covers the development and implementation of fuel efficient and/or environmental friendly procedures for arrival and departure (Required Navigation Performance 1 Standard Instrument Departures (RNP 1 SIDs), Standard Arrival Routes (STARs) and approach (Required Navigation Performance Approach (RNP APCH)).
Sub-ATM Functionalities	**S-AF1.1: Arrival Management extended to en-route Airspace** **S-AF1.2: Enhanced Terminal Airspace using RNP-Based Operations**
Target date for Sub-AF	Operations of the complete AF as from 1 January 2024 (no distinction between sub AF)
Geographical scope	Extended AMAN and PBN in high density TMAs [and associated en-route sectors] shall be operated at the airports listed in Regulation (EU 716/2014)

7.1.2. List of Fast Tracks

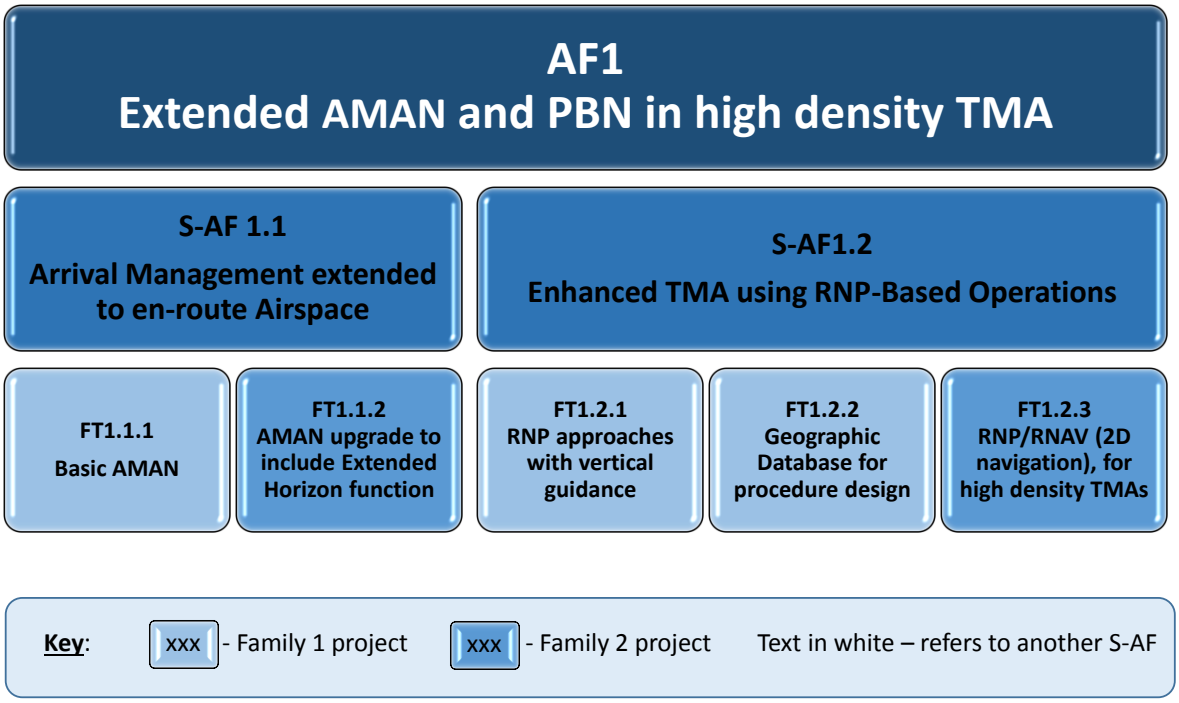

Figure 3: Structure ATM functionality AF#1 "Extended AMAN and PBN in high density TMA"

7.1.3. Family 1 - Pre-requisites and facilitators, including IDP elements

Designator	**FT 1.1.1**
Name	**Basic AMAN**
Sub-AF	Arrival Management extended to en-route Airspace
Description	Implement Basic AMAN to support traffic synchronization in high density TMAs
Scope	Basic AMAN shall: • improve sequencing and metering of arrival aircraft in selected TMAs and airports; • continuously calculate arrival sequences and times for flights, taking into account the locally defined landing rate, the required spacing for flights arriving to the runway and other criteria; • provide automated sequencing support for the ATCOs handling traffic arriving to an airport • provide simple Time To Lose / Time To Gain - TTL/TTG – information, rather than more complex direct trajectory management solutions, such as “speed to be flown”
References	*ESSIP ATC07.1*
Concerned stakeholders	ANSPs
Geographical applicability	Implementation projects will deliver “basic AMAN” as a prerequisite at any of the airports listed in Regulation (EU 716/2014) (whenever it is not already implemented). If AMAN is already implemented, it might be necessary to upgrade the functionality to meet the up-to-date requirements and/or to prepare for the automatic coordination with adjacent ACCs as required for AMAN with extended horizon (see FT1.2.1)
Synchronization	No ex-ante synchronization requirements, to be further assessed at the level of Local Implementation Projects
Guidance material	Operational evaluation is required and it is essential to consider human factors issues (e.g., roles, responsibilities, working methods, training, organization and staffing) [http://www.eurocontrol.int/sites/default/files/article/content/documents/nm/fasti-aman-guidelines-2010.pdf]
Interdependencies	Interdependencies between Clusters should be described in the table itself and will be presented in the simplified Gantt Chart

Designator	**FT 1.2.1**
Name	**RNP approaches with vertical guidance**
Sub-AF	Enhanced Terminal Airspace using RNP-Based Operations
Description	Required navigation performance (RNP) is a type of performance-based navigation (PBN) that allows an aircraft to fly a specific path between two 3D-defined points in space.
Scope	Implement approach procedures with vertical guidance APV/Baro and/or APV/SBAS (as per ESSIP NAV10).
References	*ESSIP NAV10, NOP 2014-2018/2019,*
Concerned stakeholders	*ANSPs and Airspace Users*
Geographical applicability	Implementation projects will deliver "RNP approaches with vertical guidance" at any of the airports listed in Regulation (EU 716/2014) (whenever it is not already implemented). According to ICAO AR37.11, all TMAs shall implement "RNP approaches with vertical guidance"
Synchronization	There is the need to coordinate/synchronise efforts (operational procedure and aircraft capabilities) between ANSPs and Airspace users to ensure the return of investment and/or the start of operational benefits. The deadline for full operational capability is 2016 (ICAO global plan, EASA)
Guidance material	EASA AMC 20-27 and AMC20-28 ICAO Doc9613 Performance-Based Navigation (PBN) Manual (2013) ICAO Assembly resolution 37.11

Designator	**FT 1.2.2**
Name	**Geographic database for procedure design**
Sub-AF	Enhanced Terminal Airspace using RNP-Based Operations
Description	Procurement/provision of geographic database of the TMA to support procedure design
Scope	The availability of an up-to-date geographic database (including the obstacle items) of each TMA is a prerequisite to design new procedures e.g., RNP approaches
References	ESSIP NAV10 and ITY-ADQ
Concerned stakeholders	ANSPs, airport authorities
Geographical applicability	Implementation projects will deliver "geographic database for procedure design" at any of the airports listed in Regulation (EU 716/2014) (whenever it is not already implemented).
Synchronization	There is no need for synchronization.
Guidance material	EUROCAE ER-009 / Guidance material for the generation of aerodrome mapping database (December 2012)

7.1.4. Family 2 - Mature PCP elements

Designator	**FT 1.1.2**
Name	**AMAN upgrade to include Extended Horizon function**
Sub-AF	**Arrival Management extended to en-route Airspace**
Description	Implementation of arrival management extended to en-route airspaces at high density TMAs and its associated adjacent ACCs
Scope	Arrival Management extended to en-route Airspace extends the AMAN horizon from the 100-120 nautical miles to 180-200 nautical miles from the arrival airport. Traffic sequencing may be conducted in the en-route and early descent phases. Air traffic control (ATC) services in the TMAs implementing AMAN operations shall coordinate with Air Traffic Services (ATS) units responsible for adjacent en-route sectors. The existing techniques to manage the AMAN constraints, in particular Time to Lose or Gain and Speed Advice may be used to implement this functionality
References	PCP AF1 sub functionality ESSIP ATC15*, NOP 2014-2018/2019*
Concerned stakeholders	ANSPs (operating each high density TMA and ANSPs operating associated and adjacent en route ACCs), NM, AU
Geographical applicability	Any of the airports/TMAs listed in Regulation (EU 716/2014) + adjacent ACCs (the adjacent ACC may be operated by a different ANSP than the one operating the TMA**)** Note: the Implementing rule does not specify the list of impacted ACCs.
Synchronization	There is no synchronization requirement on this PCP element. The synchronization is only needed for the implementations associated with a given AMAN
Guidance material	SESAR (05.06.04) validation reports As listed in ESSIP ATC15

Designator	**FT 1.2.3**
Name	**RNP/RNAV (2D navigation), for high density TMAs (including aircraft capabilities)**
Sub-AF	Enhanced Terminal Airspace using RNP-Based Operations
Description	Required navigation performance (RNP) is a type of performance-based navigation (PBN) that allows an aircraft to fly a specific path between two 3D-defined points in space.
Scope	Enhance arrival/departure procedures in high-density TMAs to include RNP 1 SIDs, STARs and transitions (with the use of the Radius to Fix (RF) attachment); Enable ATC systems and ATC Safety Nets to support RNP operations
References	ESSIP NAV03
Concerned stakeholders	Civil/Military ANSPs and civil/military Airspace Users
Geographical applicability	Implementation projects will deliver "RNP/RNAV (2D navigation)" at any of the airports associated with the high density TMAs listed in Regulation (EU 716/2014) (whenever it is not already implemented). All aircraft operating at high density TMAs where RNP approaches are implemented. Applicable to the military.
Synchronization	(PCP IR=The deployment of Extended AMAN and PBN in high density TMAs functionality shall be coordinated due to the potential network performance impact of delayed implementation in the airports referred to in the list. From a technical perspective the deployment of targeted system and procedural changes shall be synchronized in order to ensure that the performance objectives are met. The synchronization of investments shall involve multiple airport operators and air navigation service providers. Furthermore, synchronization during the related industrialization phase shall take place, in particular among supply industry).
Guidance material	EASA, IATA ICAO FAA guidance on airspace users as listed in ESSIP NAV03

7.1.5. Interdependencies with other sub-functionalities and/or implementation projects

Prerequisites

- As explained above, FT1.1.1 Basic AMAN is a prerequisite to FT1.1.2. AMAN upgrade to include extended horizon function.
- Similarly, FT1.2.1 RNP approaches with vertical guidance and FT1.2.2 geographic database for procedure design are prerequisites to FT1.2.3 RNP/RNAV (2D approaches) for high density TMAs.

Facilitators

- In addition, it is recognized that FT1.1.2 AMAN upgrade to include extended horizon function is supported by data exchange between ATS units. It is anticipated that in the future these data exchanges will be implemented using System Wide Information Management (SWIM) services where iSWIM functionality referred to in AF 5 is available, for the time being, required data exchange can be achieved with existing technology.
- Furthermore, downlink trajectory information as specified in AF 6, where available, will be used by the AMAN.

7.1.6. Timeline

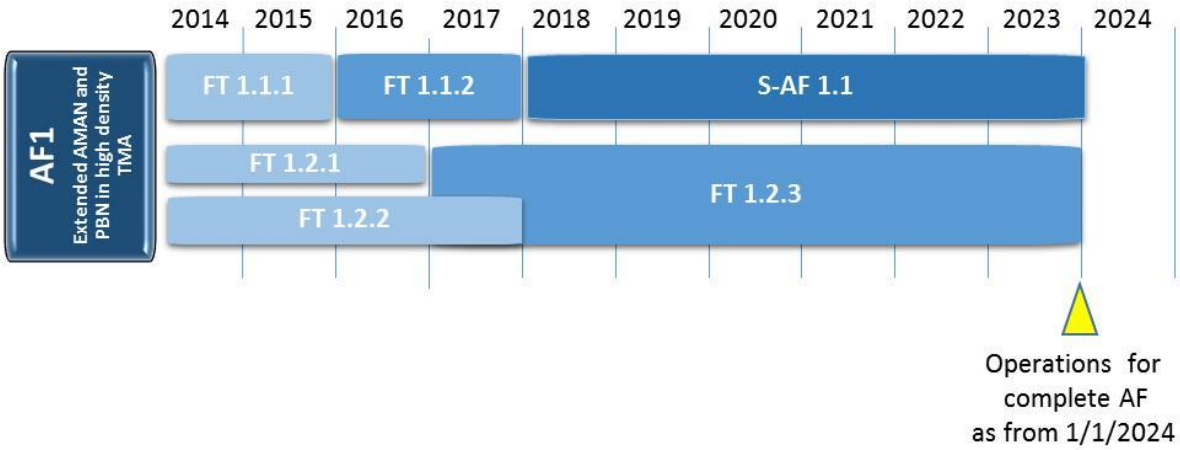

Figure 4: Indicative timeline for AF1's Fast-Tracks

The dates identified in this simplified Gantt chart result mainly from the analysis of ESSIP and IDSG IDP monitoring activity, and will be further assessed upon availability of all (local) implementation projects. Comprehensive economic appraisal of AF#1 fast-tracks implementation

7.1.7. Preliminary economic appraisal

The overall cost of AF # 1, amounting at 0.2 billion € (0.3 billion € undiscounted) [till the target implementation date 2024], would be borne by ANSPs.

7.2. AF#2 - Airport Integration and Throughput

7.2.1. ATM Functionality and Sub-functionalities

Name	AF2: Airport Integration and Throughput
Description	Airport Integration and Throughput facilitates the provision of approach and aerodrome control services by improving runway safety and throughput, enhancing taxi integration and safety and reducing hazardous situations on the runway. This functionality is composed of five sub-functionalities:
Sub-ATM Functionalities	**S-AF2.1: Departure Management synchronised with Pre-departure sequencing** **S-AF2.2: Departure Management 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**
Target date for Sub-AF	Departure Management Synchronised with Pre-departure sequencing as from 1 January 2021 Departure Management integrating Surface Management Constraints as from 1 January 2021 Time-Based Separation for Final Approach as from 1 January 2024 Automated Assistance to Controller for Surface Movement Planning and Routing as from 1 January 2024 Airport Safety Nets as from 1 January 2021
Geographical scope	Geographical scope according to Annex 2.2.1/2.2.2 of Commission Implementing Regulation (EU) N°716/2014

7.2.2. List of Fast Tracks

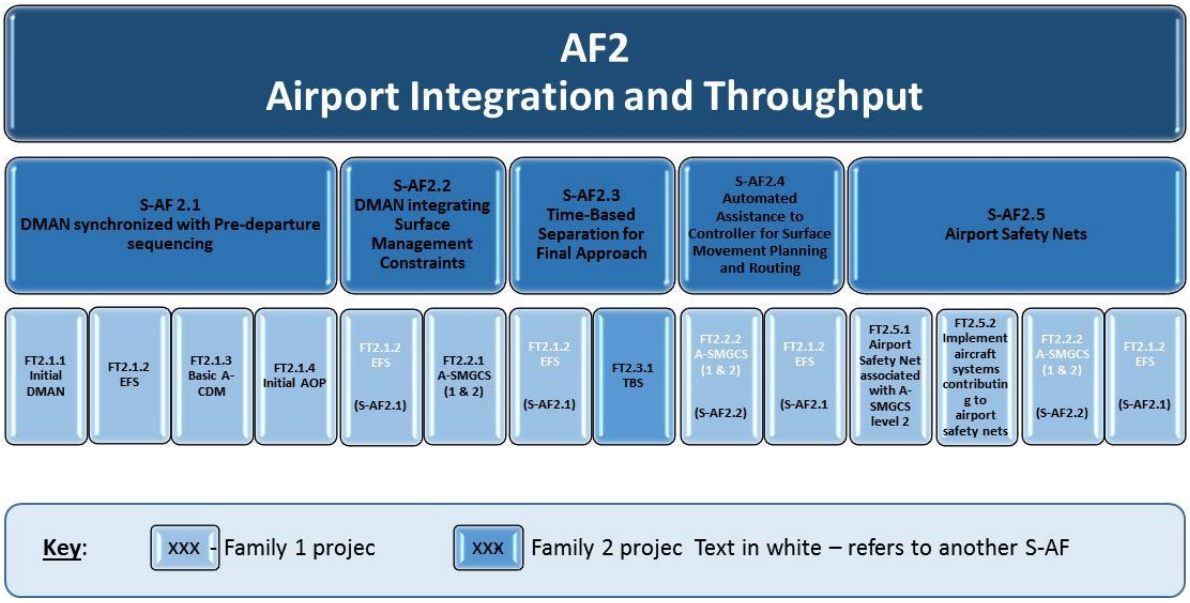

Figure 5: Structure ATM functionality AF#2 "Airport Integration and Throughput"

7.2.3. Family 1 - Pre-requisites and facilitators, including IDP elements

Designator	**FT 2.1.1**
Name	**Initial DMAN capability**
Sub-AF	**S-AF2.1: Departure Management Synchronized with Pre-departure sequencing**
Description	Operational stakeholders involved in A-CDM shall jointly establish pre-departure sequences, taking into account agreed principles to be applied for specific reasons (such as runway holding time, slot adherence, departure routes, airspace user preferences, night curfew, evacuation of stand/gate for arriving aircraft, adverse conditions including de-icing, actual taxi/runway capacity, current constraints, etc.).
Scope	Implement Basic Departure Management (DMAN) functionality to: • ensure an efficient usage of the runway take of capacity by providing an optimum and context dependent queue at the holding points • improve the departure flows at airports; • increase the predictability; • calculate Target Take Off Times (TTOT) and the Target Start-up Approval Times (TSAT) taking into account multiple constraints and preferences out of the A-CDM processes; • provide a planned departure sequence; • reduce queuing at holding point and distribute the information to various stakeholders at the airport;
References	AOP05
Concerned stakeholders	CIV/MIL ANSPs, AOP, NM, AU
Geographical applicability	Geographical scope according to Annex 2.2.1/2.2.2of Commission Implementing Regulation (EU) N°**716/2014**
Synchronization	From a technical perspective the deployment of targeted system and procedural changes shall be synchronised in order to ensure that the performance objectives are met.
Guidance material	ESSIP Plan Edition 2013 EUROCONTROL A-CDM Manual

Interdependencies	There are interdependencies within AF2 with FT2.1.2 EFS, FT2.1.3 A-CDM and FT 2.2.1 A-SMGCS Level 1-2 The sub-functionalities Departure Management Synchronized with Pre-departure sequencing may be implemented independently from the other sub-functionalities

Designator	**FT2.1.2**
Name	**Electronic Flight Strips (EFS)**
Sub-AF	**S-AF2.1: Departure Management Synchronised with Pre-departure sequencing**
Description	Implement Digital Flight Data Management System, such as EFS, improve situational awareness of towers controllers by: • having data updates, received from an FDP system or by manual inputs, automatically available at all connected working positions; • performing Data inputs generally by simple mouse clicks or by selecting data from menus so that no time-absorbing interactions are needed; • presenting the flight plan data in a clear and easy to read way; • allowing combination with advanced tools like AMAN, DMAN; A-SMGCS and to support Airport-CDM **Ref. S-AF2.5** Digital systems, such as EFSs, shall integrate the instructions given by the air traffic controller with other data such as flight plan, surveillance, routing, published rules and procedures.
Scope	The operational context of electronic dialogue as automated assistance to controller during coordination and transfer addresses the facilities and processes for data exchange between ATC components serving ATC units for the purpose of achieving: • The electronic dialogue in co-ordination prior to the transfer of flights from one ATC unit to the next. In the scope of this objective the implementers should use OLDI messages in order to perform an electronic dialogue : • The transfer of communication from one ATC unit to the next ATC unit of such flights. In the scope of this objective the implementers should use OLDI messages in order to perform an electronic dialogue: • The coordination processes that support the exchange of OLDI messages related to the Basic procedure The system permits controllers to conduct screen to screen coordination between adjacent ATSUs / sectors reducing workload associated with coordination, integration and identification tasks. The system supports coordination dialogue between controllers and transfer of flights between ATSUs, and facilitates early resolution of conflicts through inter ATSU/sector coordination. **Ref. S-AF2.4** The flight data processing system shall be able to receive planned and

	cleared routes assigned to aircraft and vehicles and manage the status of the route for all concerned aircraft and vehicles. **Ref. S-AF2.5** The controller working position shall allow the air traffic controller to manage surface route trajectories. Tower Runway Controller support tools shall provide the detection of Conflicting ATC Clearances and shall be performed by the ATC system based on the knowledge of data such as the clearances given to mobiles by the Tower Runway Controller, the assigned runway and holding point. Working procedures shall ensure that all clearances given to aircraft or vehicles are input in the ATC system by the controller on the Electronic Flight Strip (EFS). ATCOs shall be alerted when mobiles deviate from ATC instructions, procedures or route, potentially placing the mobile at risk. The introduction of Electronic Flight Strips (EFS) means that the instructions given by the ATCO are now available electronically and shall be integrated with other data such as flight plan, surveillance, routing, published rules and procedures. The integration of this data shall allow the system to monitor the information and when inconsistencies are detected, an alert is provided to the ATCO (e.g. No push-back approval) Furthermore, Digital Flight Data Management Systems will help to make consolidated flight data from different sources available to the controller and thus enhance situational awareness by indicating process steps and alerts in connection with AOP functionalities.
References	ATC15 + 17, ITY- COTR, COM9, FMTP, AOP05 The new ESSIP objective ATC17 complements the (mandatory) requirements of basic notification, coordination and transfer functionalities which are already covered in ESSIP objective ITY- COTR and regulated by Regulation (EC) N°1032/2006.
Concerned stakeholders	CIV/MIL ANSPs, AOP.AU,NM
Geographical applicability	Geographical scope according to Annex 2.2.1/2.2.2 of Commission Implementing Regulation (EU) N°**716/2014**
Synchronization	From a technical perspective the deployment of targeted system and procedural changes shall be synchronized in order to ensure that the performance objectives are met. This synchronization of investments shall involve multiple airport operators and air navigation service providers. Furthermore synchronization during the related industrialization phase shall take place, in particular among supply industry and standardization bodies

Guidance material	ESSIP Plan Edition 2013 EUROCONTROL A-CDM Implementation Manual, ESARR4 and related docs. EUROCONTROL Study report ITWP (Integrated Tower Working Position)
Interdependencies	S-AF2.2 Departure Management integrating Surface Management Constraints S-AF2.3 Time-based separation for final approach A-AF2.4 Automated Assistance to Controller for Surface Movement Planning and Routing A-AF2.5 Airport Safety Nets

Designator	**FT2.1.3**
Name	**Basic A-CDM**
Sub-AF	**S-AF2.1: Departure Management Synchronised with Pre-departure sequencing**
Description	A-CDM is the concept, which aims at improving operational efficiency at airports and improves their integration into the Air Traffic Flow and Capacity Management (ATFCM) by increasing information sharing and improving cooperation between all relevant stakeholders (local ANSP, airport operator, aircraft operators, NM, other airport service providers).
Scope	The Airport CDM concept is built on the following elements: - The foundations for Airport CDM are Information Sharing and the Milestone Approach. They consist in collaborative information sharing and monitoring of the progress of a flight from the initial planning to the take-off. Those two elements allow the airport partners to achieve a common situational awareness and predict the forthcoming events for each flight. - Variable Taxi Time Calculation, Collaborative Pre-Departure Sequencing and CDM in Adverse Conditions allow the airport partners to further improve the local management of airport operations, whatever the situation at the airport. Once A-CDM has been implemented locally, the link with the ATMN can be strengthened through the exchange of flight update messages between the CDM airport and the NM. This last building block of the A-CDM concept facilitates the flow and capacity management, helps reduce uncertainty and increases efficiency at the network level.
References	AOP05, IDP Objective 3.1, 3,2
Concerned stakeholders	CIV/MIL ANSPs, AOP, NM, AU
Geographical applicability	Geographical scope according to Annex 2.2.1/2.2.2of Commission Implementing Regulation (EU) N°**716/2014**
Synchronization	Operational stakeholders involved in A-CDM shall jointly establish pre-departure sequences, taking into account agreed principles to be applied for specific reasons (such as runway holding time, slot adherence, departure routes, airspace user preferences, night curfew, evacuation of stand/gate for arriving aircraft, adverse conditions including de-icing, actual taxi/runway capacity, current constraints, etc.). The deployment of Airport Integration and Throughput functionality shall be coordinated due to the potential network performance impact of delayed implementation in the targeted airports. From a technical perspective the deployment of targeted system and procedural changes shall be synchronized in order to ensure that the performance objectives are met. This synchronization of investments

	shall involve multiple airport operators and air navigation service providers. Furthermore synchronization during the related industrialization phase shall take place, in particular among supply industry and standardization bodies The concept of A-CDM constitutes the basis for airports to establish predictability in processes related to aircraft turn-around and as such feeds the AOP with essential and critical information concerning capacity issues as well as availability. This information is integrated in the NOP (ref. S-AF4.2 Collaborative NOP).
Guidance material	ESSIP Plan Edition 2013 EUROCONTROL A-CDM Implementation Manual, Functional req. doc. Ed. 4.0
Interdependencies	Interdependencies exist between FT2.1.3 A-CDM and S-AF4.2: Collaborative NOP (FT 4.2.1 A-CDM). Within S-AF2.1 dependencies can be expected with FT2.1.1 Initial DMAN and between S-AF2.2 A-SMGCS L1-2 and FT2.1.3

Designator	**FT2.1.4**
Name	**Initial Airport Operational Plan (AOP)**
Sub-AF	**S-AF2.1: Departure Management Synchronised with Pre-departure sequencing**
Description	The Airport element that reflects the operational status of the Airport and therefore facilitates Demand and Capacity Balancing is the Airport Operations Plan (AOP). The AOP 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 naturally evolves over time. The 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. There are strong interdependencies with S-AF4.2 Collaborative NOP as well as with S-AF5.5 Cooperative Network Information Exchange.
Scope	The ATM stakeholders' planning processes and working methods are included in the AOP. The initial AOP is partly integrated in the NOP which provides a rolling picture of the network situation used by stakeholders to prepare their plans and their inputs to the network CDM processes (e.g. negotiation of airspace configurations). NM Information will be freely exchanged by Operational stakeholders by means of defined cooperative network information services, using the yellow SWIM TI Profile.
References	ESSIP FCM05
Concerned stakeholders	CIV/MIL ANSPs, AOP, NM, AU
Geographical applicability	ECAC airports
Synchronization	The deployment of Network Collaborative Management functionality shall be coordinated and synchronized with the AOP due to the potential network performance impact of delayed implementation. The synchronization of investments shall involve multiple air navigation service providers, airports and the Network Manager. The concept of A-CDM constitutes the basis for airports to establish predictability in processes related to aircraft turn-around and as such feeds the AOP with essential and critical information concerning capacity issues as well as availability. This information is integrated in the NOP (ref. S-AF4.2 Collaborative NOP).

Guidance material	ESSIP Plan Edition 2013, NOP portal User´s guide, SESAR WP6, IATA - Standard Schedules Information Manual - Edition 23
Interdependencies	S-AF4.2: Collaborative NOP(FT 4.2.4 Initial Connectivity AOP/NOP) S-AF5.5: Cooperative Network Information Exchange(FT 5.5.1 Interface and data Requirements of AF4 NOP)

Designator	**FT2.2.1**
Name	**A-SMGCS Level 1/2**
Sub-AF	**S-AF2.2 Departure Management integrating Surface Management Constraints**
Description	Advanced Surface Movement Guidance and Control System (A-SMGCS) is a system providing routing, guidance and surveillance for the control of aircraft and vehicles in order to maintain the declared surface movement rate under all weather conditions within the aerodrome visibility operational level (AVOL) while maintaining the required level of safety. A-SMGCS Level 1 provides ATC with the position and automatic identity of: - All relevant aircraft on the movement area; - All relevant vehicles on the manoeuvring area. Traffic will be controlled through the use of appropriate procedures allowing the issuance of information and clearances to traffic on the basis of A-SMGCS Level 1surveillance data. A-SMGCS Level 2 is a L1 system complemented byte A-SMGCS function to detect potential conflicts on runways, taxiways and intrusions into restricted areas and provide the controllers with appropriate alerts. A-SMGCS Level 1 is a prerequisite for A-SMGCS Level 2. ***Ref S-AF2.4*** Advanced Surface Movement Guidance and Control Systems (A-SMGCS) shall provide optimized taxi-time and improve predictability of take-off times by monitoring of real surface traffic and by considering updated taxi times in departure management. ***Ref S-AF2.5*** Airport Safety Nets shall integrate A-SMGCS surveillance data and controller runway related clearances; Airport Conformance Monitoring shall integrate A-SMGCS Surface Movement Routing, surveillance data and controller routing clearances A-SMGCS shall include the advanced routing and planning function referred to in Point 2.1.4 above to enable conformance monitoring alerts A-SMGCS shall include a function to generate and distribute the appropriate alerts. These alerts shall be implemented as an additional layer on top of the existing A-SMGCS Level 2 alerts and not as a replacement for them.
Scope	The departure sequence at the runway shall be optimized according to the real traffic situation reflecting any change off-gate or during taxi to the runway. A-SMGCS shall provide optimized taxi-time and improve predictability of take-off times by monitoring of real surface traffic and by considering updated taxi times in departure management regardless of meteorological or other impacting conditions. ***Ref S-AF2.4*** The routing and planning function shall calculate the most operationally relevant route as free as possible of conflicts which permits the aircraft to go from stand to runway, from runway to stand or any other surface movement

References	ESSIP AOP05, AOP04.1 and AOP04.2.
Concerned stakeholders	CIV/MIL ANSPs, AOP, AU
Geographical applicability	Geographical scope according to Annex 2.2.1/2.2.2of Commission Implementing Regulation (EU) N°**716/2014**
Synchronization	DMAN systems shall take account of variable and updated taxi times from A-SMGCS to calculate the TTOT and TSAT. Interfaces between DMAN and A-SMGCS routing shall be developed - DMAN integrating A-SMGCS constraints using a digital system, such as Electronic flight Strips (EFS) with an advanced A-SMGCS routing function shall be integrated into flight processing systems for departure sequencing and routing computation - – An A-SMGCS routing function shall be deployed.
Guidance material	ESSIP Plan Edition 2013 EUROCONTROL A-CDM Implementation Manual ICAO doc 9830
Interdependencies	The implementation of the sub-functionalities Departure management integrating surface management constraints require the availability of the sub-functionality S-AF2.4 “Automated assistance to controllers for surface movement planning and routing (A-SMGCS level 2+”) The implementation of A-SMGCS Level 1 is a pre-requisite for the implementation of A-SMGCS Level 2.

Designator	**FT2.5.1**
Name	**Airport Safety Nets associated with A-SMGCS Level 2**
Sub-AF	**A-AF 2.5 Airport Safety Nets**
Description	Airport safety nets consist of the detection and alerting of conflicting ATC clearances to aircraft and deviation of vehicles and aircraft from their instructions, procedures or routing which may potentially put the vehicles and aircraft at risk of a collision.
Scope	The scope of this sub-functionality includes the Runway and Airfield Surface Movement area. ATC support tools at the aerodrome shall provide the detection of Conflicting ATC Clearances as well as deviations from ATC instructions, procedures or routes and shall be performed by the ATC system based on the knowledge of data including the clearances given to aircraft and vehicles by the air traffic controller, the assigned runway and holding point. The air traffic controller shall input all clearances given to aircraft or vehicles into the ATC system using a digital system, such as the EFS. Different types of conflicting clearances shall be identified (for example Line-Up vs. Take-Off). Some may only be based on the air traffic controller input; others may in addition use other data such as A-SMGCS surveillance data. Airport Safety Nets tools shall alert air traffic controllers when aircraft and vehicles deviate from ATC instructions, procedures or routes. The detection of Conflicting ATC Clearances shall aim to provide an early prediction of situations that if not corrected would end up in hazardous situations that would be detected in turn by the runway incursion monitoring system (RIMS) if in operation
References	SAF11, SESAR OI AO-0104-A, AO-0209, SURF IA, DO-323 ICAO Annex 10 – Telecomm., ICAO Annex 14 - Aerodromes
Concerned stakeholders	CIV/MIL ANSPs, AOP, AU
Geographical applicability	Geographical scope according to Annex 2.2.1/2.2.2of Commission Implementing Regulation (EU) N°716/2014
Synchronization	Ref. FT2.2.1 A-SMGCS Level 1-2
Guidance material	EAPRI, EAPRE
Interdependencies	The implementation of the sub-functionalities Airport Safety Nets require the availability of the sub-functionality S-AF2.4 “Automated assistance to controllers for surface movement planning and routing (A-SMGCS level 2+)” Ref. FT2.2.1 A-SMGCS Level 1-2

Designator	**FT 2.5.2**
Name	**Implement aircraft systems contributing to airport safety nets**
Sub-AF	**Airport safety nets**
Description	This fast-track represents a facilitator to the safety-focused PCP deployment. The objective is to equip aircrafts with safety related systems to improve situational awareness, reduce the risks of runway incursion, runway confusion and runway excursions and thus contribute to the overall airport safety net for high-density airports.
Scope	Airport safety nets consist of the detection and alerting of conflicting ATC clearances to aircraft and deviation of vehicles and aircraft from their instructions, procedures or routing which may potentially put the vehicles and aircraft at risk of a collision. The scope of this fast-track project includes aircraft technology in the scope of avionic or electronic flight bag based systems with the objective to conclude the ground based airport safety net with specific airborne systems and technology. This leads to an improved situational awareness and thus improves the quality of the overall safety net. The main benefit is related to the increase of runway usage awareness, and consequently an increase of runway safety. On-board systems and technology uses airport data coupled with on-board sensors to monitor the movement of an aircraft around the airport and provide relevant information to the flight crew. Further applications of on-board systems are related to continuous monitoring of aircraft landing performance, providing pilots with a real-time, constantly updated picture. The on-board systems detect potential and actual risk of collision with other traffic during runway operations and provide the Flight Crew with the appropriate alert. An on-board airport safety net will improve safety in runway operations, mostly at airports where no safety net is provided to controllers.
References	OFA01.02.01 Airport safety nets OFA01.02.02 Enhanced situational awareness AUO-0605-A Airport Safety Nets for Pilots in Step 1
Concerned stakeholders	AU
Geographical applicability	Geographical scope according to Annex 2.2.1/2.2.2 of Commission Implementing Regulation (EU) N°716/2014
Synchronization	Not applicable

Guidance material	Airbus Runway Overrun Prevention System (ROPS) Honeywell Runway Awareness and Advisory System (RAAS)
Interdependencies	

7.2.4. Family 2 – Mature PCP elements

Designator	**FT 2.3.1**
Name	**Time-based Separation**
Sub-AF	**S-AF2.3 Time-based Separation**
Description	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 parameters shall be integrated in a TBS support tool providing guidance to the air traffic controller to enable time-based spacing of aircraft during final approach that considers the effect of the headwind.
Scope	The objective is to recover loss in airport arrival capacity currently experienced in headwind conditions on final approach under distance-based wake turbulence radar separation rules. By using time-based parameters, this loss is mitigated, having a positive effect on runway throughput and runway queuing delays. Minimum radar separation is not affected. Whilst TBS (Time-Based Separation) operations are not exclusive to a headwind on final approach, the current deployment proposal is specifically targeted at realizing the potential capacity benefits in these currently constraining conditions. Radar separation minimum and vortex separations parameters shall be integrated in the Time Based Separation support tool that provide guidance to the controller to achieve the time proposed spacing to counter the effect of the headwind.
References	SJU OI step AO-0303 Time Based Separation for Final Approach - full concept
Concerned stakeholders	CIV/MIL ANSPs, AU
Geographical applicability	Geographical scope according to Annex 2.2.1/2.2.2of Commission Implementing Regulation (EU) N°**716/2014**
Synchronization	From a technical perspective the deployment of targeted system and procedural changes shall be synchronized in order to ensure that the performance objectives are met. This synchronization of investments shall involve multiple airport operators and air navigation service providers. Furthermore synchronization during the related industrialization phase shall take place, in particular among supply industry and standardization bodies
Guidance material	SESAR SJU Time Based Separation Full Solution

Interdependencies	**5.1.1 Interdependencies with FT 2.5.1 Airport Safety Nets**

Interdependencies with other sub-functionalities and/or implementation projects

The following prerequisites are required:

- Digital systems, such as EFS, A-CDM and initial DMAN for Departure Management Synchronised with Pre- departure sequencing
- Digital systems, such as EFS, initial DMAN and A-SMGCS level 1 & 2 for Departure Management integrating Surface Management Constraints
- Digital systems, such as EFS for TBS
- Digital systems, such as EFS and A-SMGCS level 1 & 2 for Automated Assistance to Controller for Surface Movement Planning and Routing
- Digital systems, such as EFS and A-SMGCS surveillance for Airport Safety Nets. The sub-functionalities "Departure Management Synchronised with Pre-departure sequencing" and "Time Based Separation for Final Approach" may be implemented independently from the other sub-functionalities.

Interdependencies with other sub-functionalities not yet implemented will be addressed when updating the deployment programme.

7.2.6. Timeline

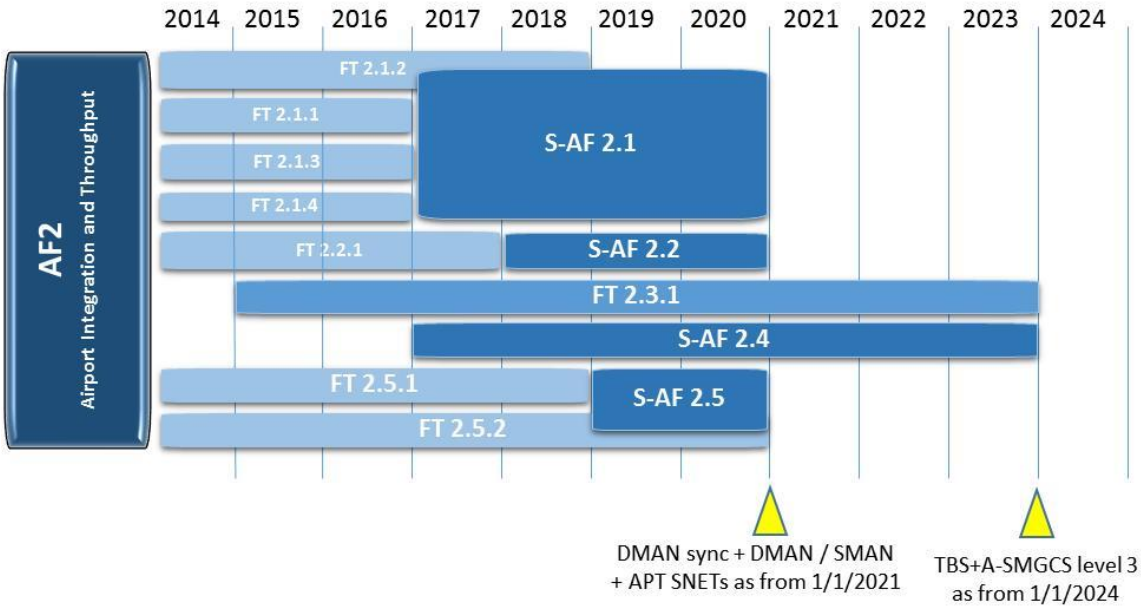

Figure 6: Indicative timeline for AF2's Fast-Tracks

The dates identified in this simplified Gantt chart result mainly from the analysis of ESSIP and IDSG IDP monitoring activity, and will be further assessed upon availability of all (local) implementation projects.

7.2.7. Preliminary economic appraisal

The overall cost for AF#2 (up to end of 2016) is estimated at 131.5 Million €.

7.3. AF#3 - Flexible Airspace Management and Free Route

7.3.1. ATM Functionality and Sub-functionalities

Name	**AF3: Flexible Airspace Management and Free Route**
Description	Combined operation of Flexible Airspace Management and Free Route enable airspace users to fly as closely as possible to their preferred trajectory without being constrained by fixed airspace structures or fixed route networks. It further allows operations that require segregation, for example military training, to take place safely and flexibly, and with minimum impact on other airspace users.
Sub-ATM Functionalities	**S-AF3.1: Airspace Management and Advanced Flexible Use of Airspace** **S-AF3.2: Free Route**
Target date for Sub-AF	DCT as from 1 January 2018 FRA as from 1 January 2022
Geographical scope	Flexible Airspace Management and Free Route shall be provided and operated in the airspace for which the Member States are responsible at and above flight level 310 in the ICAO EUR region

7.3.2. List of fast tracks

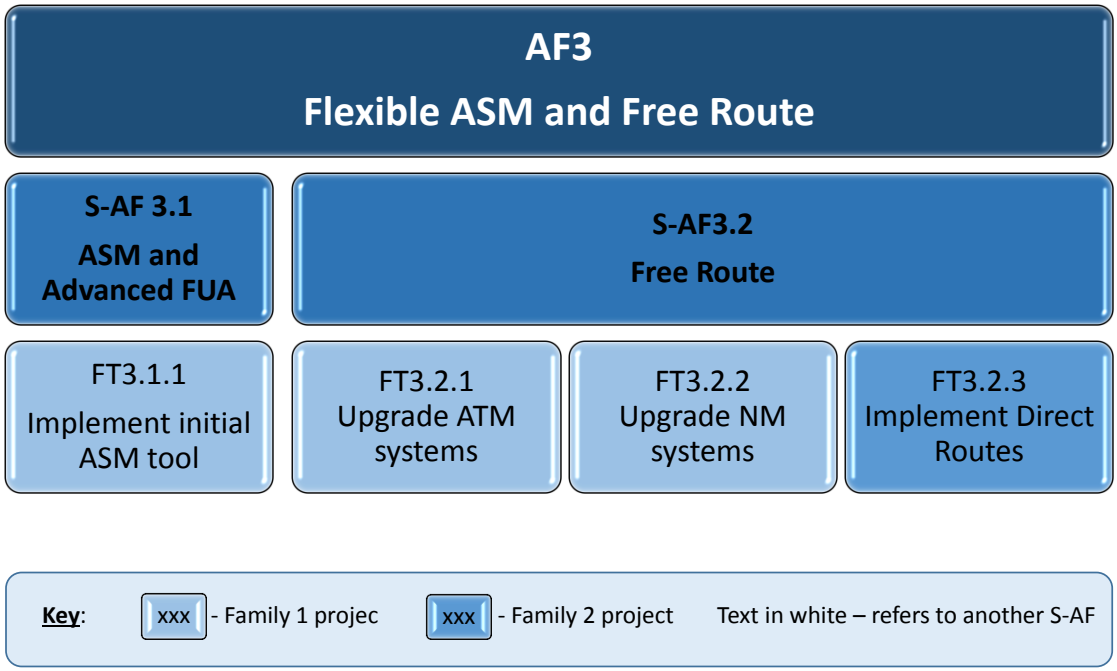

Figure 7: Structure ATM functionality AF#3 "Flexible ASM and Free Route"

7.3.3. Family 1 - Pre-requisites and facilitators, including IDP elements

Designator	**FT3.1.1**
Name	**Initial ASM tool to support AFUA**
Sub-AF	Airspace Management and Advanced Flexible Use of Airspace
Description	Implement ASM tools to support coordination of airspace resources
Scope	ASM support system shall: • manage airspace reservations more flexibly in response to airspace user requirements; • share changes in airspace status with all concerned users, in particular Network Manager, air navigation service providers and (Civil/Mil) airspace users; • support the fixed and conditional route networks currently in place; • Be able to respond to changing demands for airspace; Enhancements to the Network Operations Plan (NOP) shall be achieved through a cooperative decision-making process between all involved operational stakeholders.
References	ESSIP AOM19, FCM05, DP WP 2.1.1, NOP 2014-2018/2019
Concerned stakeholders	CIV/MIL ANSPs, NM, AU
Geographical applicability **(extract from IR PCP)**	Flexible Airspace Management shall be provided and operated in the airspace for which the Member States are responsible in the ICAO EUR region.
Synchronization	Synchronization with NM and AUs, Synchronization among neighbouring ANSPs when Cross border areas are managed
Guidance material	As stated in ESSIP AOM19, FCM05
Interdependencies	Implementation of an ASM support tool is a prerequisite for the implementation of the advanced FUA, by allowing short-term (up to real-time) airspace management.

Designator	**FT 3.2.1**
Name	**Upgrade ATM systems to support DCT**
Sub-AF	Free Route
Description	Upgrade relevant ATM systems to be capable to process flight data over geographical coordinates instead of usual predefined COPs and airways.
Scope	Flight Data Processing Systems shall have to be capable to coordinate and transfer the control of flights over geographical coordinates instead of usual predefined COPs. MONA function has to be capable to monitor the flight path of flights along geographical coordinates instead of usual predefined air routes. MTCD function has to be capable to plan the further flight path of flights along geographical coordinates instead of usual predefined air routes. Upgrade, if necessary, AU flight planning systems to support direct routing operations,
References	*ESSIP AOM21*, NOP 2014-2018/2019
Concerned stakeholders	ANSPs, AU
Geographical applicability	Free Route shall be provided and operated in the airspace for which the Member States are responsible at and above flight level 310 in the ICAO EUR region.
Synchronization	Implementation of a (technical) pre-requisite for DCT: There is no need for synchronization. Synchronization with neighbouring systems will be required, when Cross-border DCTs will be implemented
Guidance material	As stated in ESSIP AOM21
Interdependencies	Upgrade of ATM and NM systems in support of DCT operations are technical prerequisites Interdependencies between these systems exist via their interfaces.

Designator	**FT 3.2.2**
Name	**Upgrade NM systems to support direct routings operations**
Sub-AF	Free Route
Description	Upgrade of NM systems (e.g. ADR, DDR, NOP, IFPS) to support direct routing operations.
Scope	Implement system improvements (ADR and Airspace Management tools), Procedures and processes to support direct routings.
References	ESSIP AOM21; Partially IDP WP2.1.2, NOP 2014-2018/2019
Concerned stakeholders	ANSPs, NM
Geographical applicability **(extract from IR PCP)**	Free Route shall be provided and operated in the airspace for which the Member States are responsible at and above flight level 310 in the ICAO EUR region.
Synchronization	Implementation of a (technical) pre-requisite for DCT: There is no need for synchronization. Coordinated initiatives to be undertaken with FABs
Guidance material	As stated in ESSIP AOM21
Interdependencies	Upgrade of ATM and NM systems in support of DCT operations are technical prerequisites Interdependencies between these systems exist via their interfaces.

7.3.4. Family 2 – Mature PCP elements

Designator	**FT 3.2.3**
Name	**Direct routes**[2]
Sub-AF	Free Route
Description	Implementation of Direct Routings above FL 365
Scope	Implement Direct Routings as a first step towards Free Route operations. Direct Routing airspace is defined laterally and vertically (above FL365) with a set of entry/exit conditions where published direct routings are available. Within this airspace, flights remain subject to air traffic control. Direct routing can be implemented in a limited way during defined periods. DCT shall be published in aeronautical publications as described in the European Route Network Improvement Plan of the Network Manager.
References	ESSIP AOM21, IDP WP2.1, NOP 2014-2018/2019
Concerned stakeholders	NM, ANSP, AU
Geographical applicability	Free Route shall be provided and operated in the airspace for which the Member States are responsible at and above flight level 310 in the ICAO EUR region. In a first step, DCT shall be introduced above FL 365 because this has been recognized by all ANSPs as the optimum starting point for incremental implementation. *However, each state, based on operational environment (such as airspace structure, ATM system limitations) can choose a different lower level of initial Free Route Airspace implementation.*
Synchronization	There is the need to coordinate/synchronize efforts (operational procedure and aircraft capabilities) between ANSPs, NM and Airspace users to ensure the return of investment and/or the start of operational benefits. Coordinated activities DCT implementation at FAB and inter-FAB level
Guidance material	As stated in ESSIP AOM21. Direct Routing operations at a local level are already implemented in several ANSPs. (Portugal, Austria, Ireland, Finland...)

[2] *Implementation of Direct routes (DCT) has already been covered by the IDP* WP2.3. *Due to the fact, that DCT is a first but important step towards Free Route, this fast track is listed under family 2 rather than under family 1 where it should be listed according to the definition.*

	Regional or multi-national operations have been conducted in the framework of SESAR demonstration projects such as WE-FREE and FRAMAK.
Interdependencies	The implementation of direct routes is strongly dependent of airspace design and in particular of civil/military coordination. This fast track is dependent upon S-AF-3.1 on Advanced Flexible Use of Airspace.

7.3.5. Interdependencies with other sub-functionalities and/or implementation projects

S-AF3.1:

Operational stakeholders shall be able to interface with the necessary systems (e.g. NOP/EAD) as specified in AF 4 (Network Collaborative Management) and AF 5 (Initial System Wide Information Management).

S-AF3.2:

When available, FRA and DCT shall be supported by Network Manager and SWIM systems specified in AF 4 (Network Collaborative Management) and AF 5 (Initial System Wide Information Management).

7.3.6. Timeline

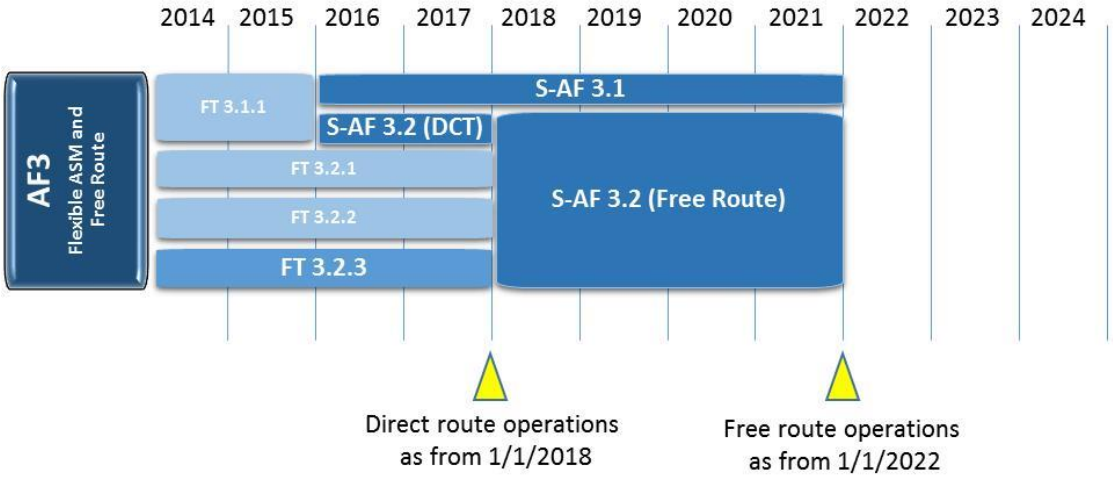

Figure 8: Indicative timeline for AF3's Fast-Tracks

The dates identified in this simplified Gantt chart result mainly from the analysis of ESSIP and IDSG IDP monitoring activity, and will be further assessed upon availability of all (local) implementation projects.

7.3.7. Preliminary economic appraisal

The overall cost of AF # 3, amounting at **0.7 billion €** [till the target implementation date 2021], would be shared by the different stakeholders' categories as follows:

- ANSPs: 75% of total investment;
- Military: 22% of total investment;
- Network Manager: 2% of total investment;
- Airspace Users (ground investment): 1% of total investment.

7.4. AF#4 - Network Collaborative Management

7.4.1. ATM Functionality and Sub-functionalities

Name	**AF4: Network Collaborative Management**
Description	Network Collaborative Management improves the European ATM network performance, notably capacity and flight efficiency through exchange, modification and management of trajectory information. Flow Management shall move to a Cooperative Traffic Management (CTM) environment, optimizing the delivery of traffic into sectors and airports and the need for Air Traffic Flow and Capacity Management (ATFCM) measures.
Sub-ATM Functionalities	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
Target date for Sub-AF	Operational stakeholders and Network Manager shall operate Network Collaborative Management as from 1 January 2022
Geographical scope	Network Collaborative Management shall be deployed in the EATMN. In ATC centres in Member States where civil-military operations are not integrated(Austria, Belgium, Czech Republic, France, Ireland, Italy, Portugal, Romania, Slovakia and Spain), Network Collaborative Management shall be deployed to the extent required by Regulation (EC) N°552/2004, point 4 of Part A of Annex II

7.4.2. List of fast tracks

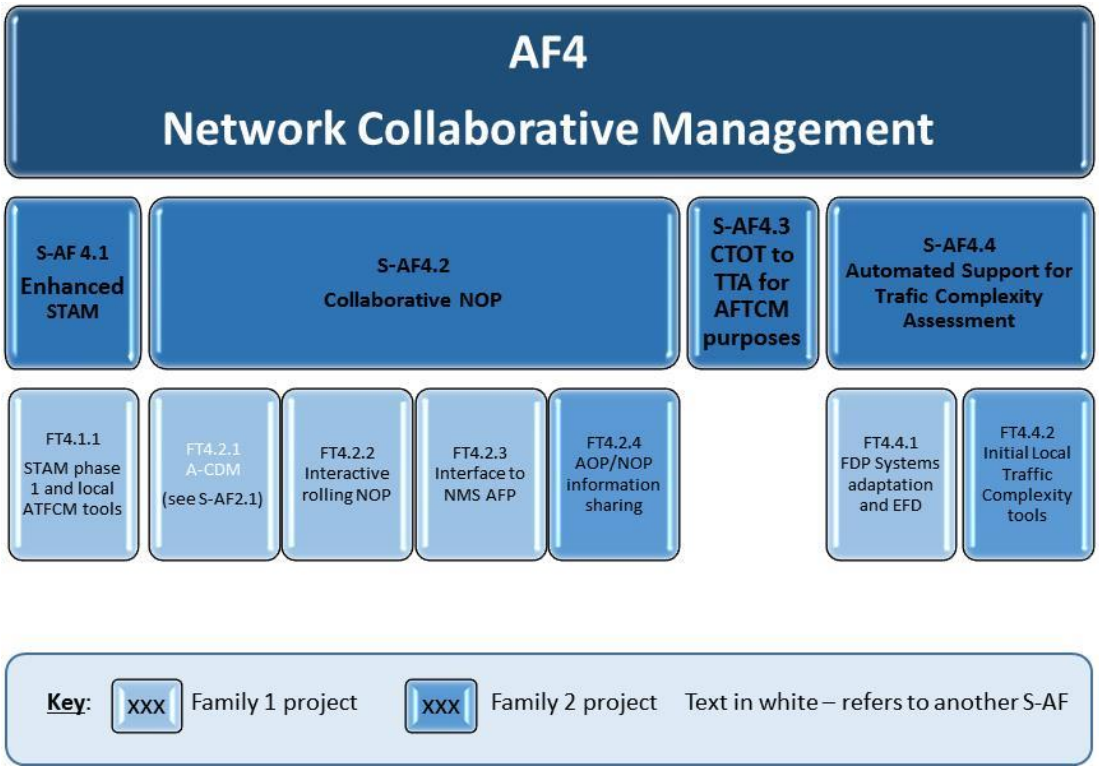

Figure 9: Structure ATM functionality AF#4 "Network collaborative management"

7.4.3. Family 1 - Pre-requisites and facilitators, including IDP elements

Designator	**FT 4.1.1**
Name	**STAM phase 1 and local ATFCM tools**
Sub-AF	**Enhanced Short Term ATFCM Measures**
Description	STAM is consisting of an approach to smooth sector workloads by reducing traffic peaks through short-term application of minor ground delays, appropriate flight level capping and exiguous rerouting to a limited number of flights. These measures are capable of reducing the traffic complexity for ATC with minimum curtailing for the airspace users. STAM is based on high-quality data for prediction and accurate traffic analysis and will be an important contribution to dynamic DCB. The impact of the forecasted traffic peak on the workload is analysed using occupancy counts and indicators available in flight lists. A STAM solutions is investigated seeking minimum impact on AUs: either 1) dynamic capacity improvements based on short-notice reconfiguration changes or negotiations with military authorities, to increase time of availability of airspace engaged for air force activity, or 2) cherry-picking actions based on the identification of the flights creating the complexity, thanks to enhanced flight list attributes providing FMPs with the accurate flight status and aircraft attitude. Possible actions would include in order of priority: the allocation of small defined ground delay to specific flights, flight level reassignments or route changes negotiated with AOs and in the last resort interventions on airborne flights coordinated with adjacent FMPs when needed.
Scope	A close working relationship between ANSP/FMP, AU and NMF, which would monitor both the real demand, the effective capacity of sectors having taken into account the complexity of expected traffic situation replaces the rigid application of ATFM regulations based on standard capacity thresholds as the pre-dominant tactical capacity measure. The target of the Short Term ATFCM Measures (STAM) is to replace En Route CASA regulations for situations where the capacity is nominal. Implement Short-term ATFCM measures (STAM) in terms of minor ground delays, flight level capping and minor re-routings applied to a limited number of flights as described in ESSIP FCM04 and extend the Implementation subsequently throughout the entire EATMN.
References	*ESSIP FCM04, IDP WP1.2*

Concerned stakeholders	CIV/MIL ANSPs, AOP, NM
Geographical applicability (extract from IR PCP)	Network Collaborative Management shall be deployed in the EATMN. In ATC centres in Member States where civil-military operations are not integrated (Austria, Belgium, Czech Republic, France, Ireland, Italy, Portugal, Romania, Slovakia and Spain), Network Collaborative Management shall be deployed to the extent required by Regulation (EC) N°552/2004, point 4 of Part A of Annex II.
Synchronization	The deployment of Network Collaborative Management functionality shall be coordinated due to the potential network performance impact of delayed implementation in a wide geographical scope involving a number of stakeholders. From a technical perspective the deployment of targeted system and procedural changes shall be synchronized to ensure that the performance objectives are met. This synchronization of investments shall involve multiple air navigation service providers and the Network Manager. Furthermore synchronization during the related industrialization phase shall take place (supply industry and standardization bodies in particular).
Guidance material	ESSIP Plan Edition 2013 SESAR P13.02.03 - STAM concept design& System specifications SESAR P13.02.03 - STAM Trial VP-522 Safety Plan EUROCONTROL - CFMU HUMAN MACHINE INTERFACE (CHMI) ATFCM REFERENCE GUIDE - Edition 7.0 13/03/2012

Designator	**FT 4.2.2**
Name	**Interactive rolling NOP**
Sub-AF	**Collaborative NOP**
Description	The Network Operation Plan provides an overview of the ATFCM situation from strategic planning to real time operations with increasing accuracy up to and including the day of operations. The data is accessible online by stakeholders for consultation and update as and when needed, subject to access and security controls.
Scope	The first steps of the interactive Rolling NOP are already implemented through the deployment of the NOP portal. Further information and data are available or planned for deployment to support the Interactive approach to the NOP (e.g. ADR, DDR2) and the access to the NOP data will be more and more available through B2B services.
References	*ESSIP FCM05, IDP WP2.1 and IDP WP 1.1*
Concerned stakeholders	ANSPs, NM, AOP
Geographical applicability (extract from IR PCP)	Network Collaborative Management shall be deployed in the EATMN. In ATC centres in Member States where civil-military operations are not integrated (Austria, Belgium, Czech Republic, France, Ireland, Italy, Portugal, Romania, Slovakia and Spain), Network Collaborative Management shall be deployed to the extent required by Regulation (EC) N°552/2004, point 4 of Part A of Annex II.
Synchronization	The deployment of Network Collaborative Management functionality shall be coordinated due to the potential network performance impact of delayed implementation in a wide geographical scope involving a number of stakeholders. From a technical perspective the deployment of targeted system and procedural changes shall be synchronized to ensure that the performance objectives are met. This synchronization of investments shall involve multiple air navigation service providers and the Network Manager. Furthermore synchronization during the related industrialization phase shall take place (supply industry and standardization bodies in particular).
Guidance material	ESSIP Plan Edition 2013 NOP Portal User's guide NM B2B Reference Manuals

Designator	**FT 4.2.3**
Name	**Interface to NMS AFP**
Sub-AF	**Collaborative NOP**
Description	Improve the collaboration between the NM and ANS providers, airports and airspace users in flight plan filing. ANSPs automatically provide AFP message for: • Missing flight plan • Change of route • Diversion • Change of flight rules or flight type • Change of requested cruising level • Change of aircraft type • Change of aircraft equipment. The APL and ACH messages sent by IFPS and AFP messages are automatically processed in the local ATC system. These messages permit a real time update of the flight plan information.
Scope	Improve flight plan distribution and update to increase consistency of flight plan data amongst all actors involved (NM IFPS/ETFMS, ANSPs and AOs) preventing overloads and to obtain a better use of the available network capacity.
References	*ESSIP FCM03, IDP WP1.1*
Concerned stakeholders	ANSPs, NM, AOP
Geographical applicability (extract from IR PCP)	Network Collaborative Management shall be deployed in the EATMN. In ATC centres in Member States where civil-military operations are not integrated (Austria, Belgium, Czech Republic, France, Ireland, Italy, Portugal, Romania, Slovakia and Spain), Network Collaborative Management shall be deployed to the extent required by Regulation (EC) N°552/2004, point 4 of Part A of Annex II.
Synchronization	The deployment of Network Collaborative Management functionality shall be coordinated due to the potential network performance impact of delayed implementation in a wide geographical scope involving a number of stakeholders. From a technical perspective the deployment of targeted system and procedural changes shall be synchronized to ensure that the performance objectives are met. This synchronization of investments shall involve multiple air navigation service providers and the Network Manager. Furthermore synchronization during the related industrialization phase shall take place (supply industry and

	standardization bodies in particular).
Guidance material	ESSIP Plan Edition 2013, NM IFPS User Manual, ADEXP format in line with ICAO State Letter (AN 13/2.1-08/50) - 25 June 2008, Regulation (EC) N°1033/2006 of 4 July 2006 laying down the requirements on procedures for flight plans in the pre-flight phase for the Single European Sky, as amended by Regulation (EC) N°929/2010.

Designator	**FT 4.4.1**
Name	**FDP System adaptation and EFD (EFTMS flight data message)**
Sub-AF	**Automated support for traffic complexity assessment**
Description	Traffic Complexity Management calculates traffic complexity within predefined airspace volumes by analysing the constituent factors contributing to complexity to facilitate the identification of measures that could be taken to adjust either traffic flows or the airspace sectorization to optimize the efficiency of the ATC/ATM services of En-route/Approach ATC Centres in high traffic density airspace.
Scope	Traffic Complexity Management tools purpose is to support the user in the assessment of air traffic complexity. For NM functionality, ETFMS/IFPS shall be upgraded to deal with a more flexible and dynamic sector configuration to the traffic demand/pattern. ATFCM planning needs to be significantly enhanced at Network and Local levels, including interaction between the two levels. In addition, tools are required for re-routing and to calculate and manage traffic loads and complexity at FMP and central level. ANSPs will be increasingly involved in managing improved coordination across the network using ANSP-derived data. To enable this, the following changes will be needed: • The FDP system shall be adapted to include interfaces to the NOP; • Flight Planning systems shall be updated; ASM/ATFCM tools shall be able to manage different airspace availability and sectors' capacity (including civil/military coordination, RAD adaptation and STAM).
References	*ESSIP FCM03, IDP WP1.1*
Concerned stakeholders	ANSPs, NM, AOP
Geographical applicability (extract from IR PCP)	Network Collaborative Management shall be deployed in the EATMN. In ATC centres in Member States where civil-military operations are not integrated (Austria, Belgium, Czech Republic, France, Ireland, Italy, Portugal, Romania, Slovakia and Spain), Network Collaborative Management shall be deployed to the extent required by Regulation (EC) N°552/2004, point 4 of Part A of Annex II.
Synchronization	The deployment of Network Collaborative Management functionality

	shall be coordinated due to the potential network performance impact of delayed implementation in a wide geographical scope involving a number of stakeholders. From a technical perspective the deployment of targeted system and procedural changes shall be synchronized to ensure that the performance objectives are met. This synchronization of investments shall involve multiple air navigation service providers and the Network Manager. Furthermore synchronization during the related industrialization phase shall take place (supply industry and standardization bodies in particular).
Guidance material	ESSIP Plan Edition 2013 NM Flight Progress Messages Manual

7.4.4. Family 2 - Mature PCP elements

Designator	**FT 4.2.4**
Name	**AOP/NOP Information sharing**
Sub-AF	**Collaborative NOP**
Description	The collaborative NOP is fully integrated in ATM stakeholders' planning processes and working methods, including airport operations planning (AOPs). The NOP is used by the Network Manager Function during all phases for monitoring and assessing network performance and following-up stakeholders' actions and compliance with agreements. The NOP provides a rolling picture of the network situation that can be useful for stakeholders to prepare their plans and their inputs to the network CDM processes (e.g. negotiation of airspace configurations). The NOP contains a broad spectrum of information which is structured in such a way as to ensure traceability between required operational network performance, stakeholders' courses of action and agreements, and the root causes of deviations from (and/or revisions to) the plan. The information is updated in real-time, and refined throughout the planning cycle up to and including execution. The quality of NOP information (e.g. accuracy, consistency, completeness) is monitored. There are layers of security for accessing the NOP so that only those who have an operational need to access particular information are able to do so.
Scope	The NOP aims to develop and validate an on-line performance monitoring function integrated into collaborative network planning. This objective is motivated by the need to better predict if the ATM network will perform as required, to continuously monitor if it is performing as planned. In operating at the European ATM Network level, the performance monitoring capability focuses on early detection and mitigation of regional issues through a collaborative stakeholders' (NM, ANSPs, Airports, Airspace Users, and Military) process.
References	PCP AF4 sub- functionality
Concerned stakeholders	NM, ANSP, AU
Geographical applicability	Network Collaborative Management shall be deployed in the EATMN. In ATC centres in Member States where civil-military operations are not integrated (Austria, Belgium, Czech Republic, France, Ireland, Italy, Portugal, Romania, Slovakia and Spain), Network Collaborative

	Management shall be deployed to the extent required by EC Regulation (EC) N°552/2004, point 4 of Part A of Annex II.
Synchronization	The deployment of Network Collaborative Management functionality shall be coordinated due to the potential network performance impact of delayed implementation in a wide geographical scope involving a number of stakeholders. From a technical perspective the deployment of targeted system and procedural changes shall be synchronized to ensure that the performance objectives are met. This synchronization of investments shall involve multiple air navigation service providers and the Network Manager. Furthermore synchronization during the related industrialization phase shall take place (supply industry and standardization bodies in particular).
Guidance material	ESSIP Plan Edition 2013 NOP Portal User's guide NM B2B Reference Manuals

Designator	**FT 4.4.2**
Name	**Initial Local Traffic Complexity tools**
Sub-AF	**Automated Support for Traffic Complexity Assessment**
Description	Automated tools continuously monitor sector demand and evaluate traffic complexity by applying predefined parameters (or guidelines). Forecast complexity, coupled with demand, enables ATFCM to take timely action to adjust capacity or demand profiles through various means, in collaboration with ATC and Airspace Users.
Scope	Network Collaborative Management improves the European ATM network performance, notably capacity and flight efficiency through exchange, modification and management of trajectory information. Flow Management shall move to a Cooperative Traffic Management (CTM) environment, optimizing the delivery of traffic into sectors and airports and the need for Air Traffic Flow and Capacity Management (ATFCM) measures. Automated Support for Traffic Complexity Assessment represents one of the sub-functionalities associated to the Network Collaborative Management.
References	PCP AF4 sub-functionality
Concerned stakeholders	NM, ANSP
Geographical applicability	Network Collaborative Management shall be deployed in the EATMN. In ATC centres in Member States where civil-military operations are not integrated (Austria, Belgium, Czech Republic, France, Ireland, Italy, Portugal, Romania, Slovakia and Spain), Network Collaborative Management shall be deployed to the extent required by Regulation (EC) N°552/2004, point 4 of Part A of Annex II.
Synchronization	The deployment of Network Collaborative Management functionality shall be coordinated due to the potential network performance impact of delayed implementation in a wide geographical scope involving a number of stakeholders. From a technical perspective the deployment of targeted system and procedural changes shall be synchronized to ensure that the performance objectives are met. This synchronization of investments shall involve multiple air navigation service providers and the Network Manager. Furthermore synchronization during the related industrialization phase shall take place (supply industry and standardization bodies in particular).
Guidance material	SESAR 13.2.3 Enhanced DCB

7.4.5. Interdependencies with other sub-functionalities and/or implementation projects

Network management systems shall make use of AMAN as specified in AF1.

Where available and applicable, AOP system shall make use of DMAN as specified in AF2.

Network management systems shall support Flexible use of airspace and free routing as specified in AF3. Information exchange requirements shall use SWIM as specified in AF5 once available. Downlink trajectory information as specified in AF6, where available, shall be integrated into the NOP.

7.4.6. Timeline

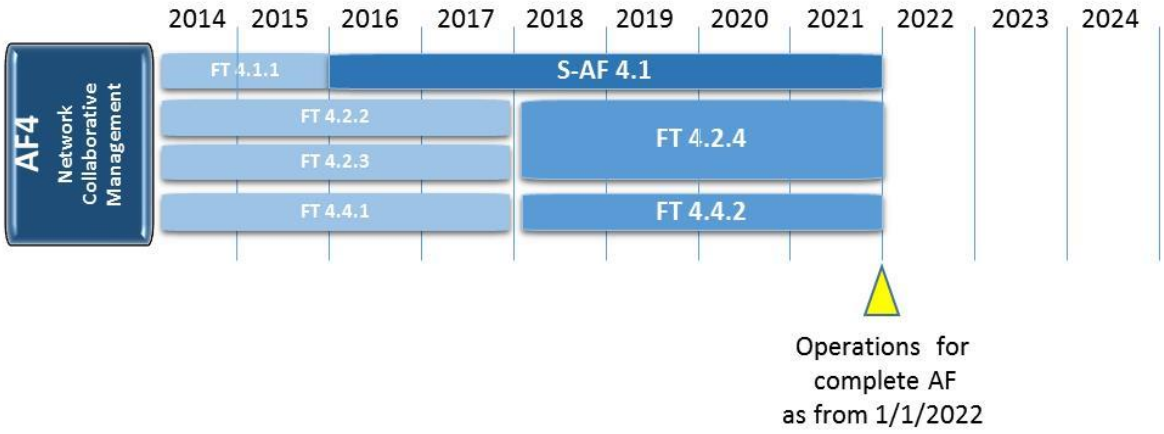

Figure 10: Indicative timeline for AF4's Fast-Tracks

The dates identified in this simplified Gantt chart result mainly from the analysis of ESSIP and IDSG IDP monitoring activity, and will be further assessed upon availability of all (local) implementation projects.

7.4.7. Preliminary economic appraisal

The overall cost for AF#4 (up to end of 2016) is estimated at 163.1 Million €.

7.5. AF#5 - Initial System Wide Information Management

7.5.1. ATM Functionality and Sub-functionalities

Name	AF5: Initial System Wide Information Management
Description	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.
Sub-ATM Functionalities	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
Target date for Sub-AF	Operations of the complete AF as from 1 January 2025 (no distinction between sub AF)
Geographical scope	iSWIM functionality shall be deployed in the EATMN as indicated in the table in section 5.2 of Regulation (EU 716/2014). In centres in the Member States that have non-integrated civil/military service provision (1), iSWIM functionality shall be deployed to the extent required by Regulation (EC) N°552/2004, point 4 of Part A of Annex II.

7.5.2. List of fast tracks

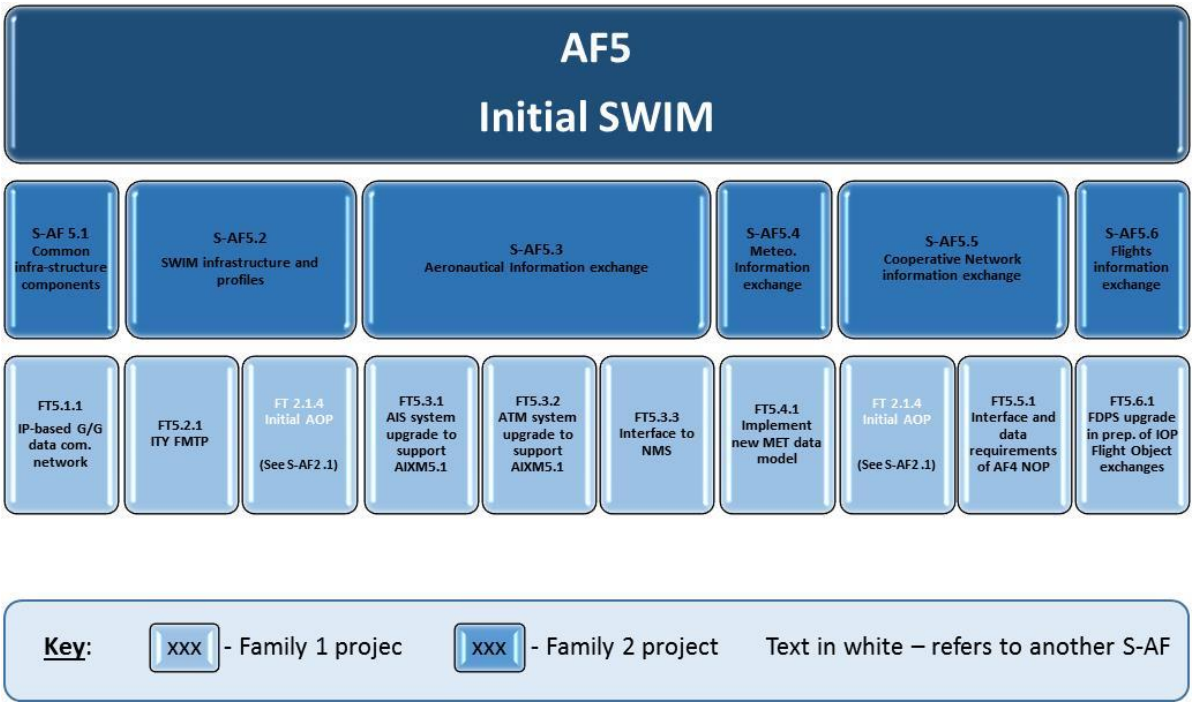

Figure 11: Structure ATM functionality AF#5 "Initial SWIM"

The diagram above and the tables below describe the fast tracks that are definitely ready for deployment. However, this is fast-moving field where agreements and clarifications of specifications could enable deployment earlier than expected.

7.5.3. Family 1 - Pre-requisites and facilitators, including IDP elements

Designator	**FT 5.1.1**
Name	**IP-based G/G data communications network**
Sub-AF	**Common Infrastructure Components**
Description	Ensure an agreed level of Ground-Ground interconnectivity between member states ATSUs and stakeholders as required to facilitate information exchange
Scope	G/G connectivity shall: • Be via PENS wherever possible; • Facilitate exchange of ATM Information between relevant stakeholders ;
References	ESSIP COM 09, IDP WP5.1
Concerned stakeholders	ANSPs Airports NM
Geographical applicability	iSWIM functionality shall be deployed in the EATMN as indicated in the table in section 5.2 of Regulation (EU 716/2014). In centres in the Member States that have non-integrated civil/military service provision (1), iSWIM functionality shall be deployed to the extent required by Regulation (EC) N°552/2004, point 4 of Part A of Annex II.
Synchronization	Synchronization is required before start of iSWIM implementation.
Guidance material	References in ESSIP COM09

Designator	**FT 5.2.1**
Name	**ITY FMTP**
Sub-AF	**SWIM Infrastructure and Profiles**
Description	Use of FMTP for ATM messaging over legacy standards
Scope	ANSPs shall conform to the ITY FMTP regulation for external connectivity prior to commencement of SWIM services.
References	ESSIP ITY-FMTP
Concerned stakeholders	ANSPs
Geographical applicability	iSWIM functionality shall be deployed in the EATMN as indicated in the table in section 5.2 of Regulation (EU 716/2014). In centres in the Member States that have non-integrated civil/military service provision (1), iSWIM functionality shall be deployed to the extent required by Regulation (EC) N°552/2004, point 4 of Part A of Annex II.
Synchronization	Synchronization is needed bilaterally initially, with full synchronization before commencement of SWIM services.
Guidance material	As stated in ESSIP ITY-FMTP

Designator	**FT 5.3.1**
Name	**AIS System Upgrade to support AIXM 5.1**
Sub-AF	**Aeronautical Information Exchange**
Description	Upgrade of AIS to provide data and services into SWIM
Scope	ANSPs' aeronautical data systems shall: • Adopt a service-oriented approach to provision of data • Provide information to SWIM network by standard XML schema as per AIXM 5.1
References	ESSIP FCM05
Concerned stakeholders	ANSPs
Geographical applicability	iSWIM functionality shall be deployed in the EATMN as indicated in the table in section 5.2 of Regulation (EU 716/2014). In centres in the Member States that have non-integrated civil/military service provision (1), iSWIM functionality shall be deployed to the extent required by Regulation (EC) N°552/2004, point 4 of Part A of Annex II.
Synchronization	Synchronization is needed before full implementation of S-AF 3.3
Guidance material	As in ESSIP FCM05 AIXM 5.1

Designator	**FT 5.3.2**
Name	**ATM System Upgrade to support AIXM 5.1**
Sub-AF	**Aeronautical Information Exchange**
Description	Upgrade of ATM Systems to provide data and services into SWIM and make use of SWIM services for data
Scope	ANSPs' ATM systems shall: • Adopt a service-oriented approach to provision of data • Provide information to SWIM network by standard XML schema as per AIXM 5.1 • Utilise SWIM for data in preference to point-to-point interfaces where possible • Be compliant with the applicable version of the AIRM and ISRM.
References	ESSIP FCM05
Concerned stakeholders	ANSPs
Geographical applicability	iSWIM functionality shall be deployed in the EATMN as indicated in the table in section 5.2 of Regulation (EU 716/2014). In centres in the Member States that have non-integrated civil/military service provision (1), iSWIM functionality shall be deployed to the extent required by Regulation (EC) N°552/2004, point 4 of Part A of Annex II.
Synchronization	No ex-ante synchronization requirements, to be further assessed at the level of Local Implementation Projects
Guidance material	As in ESSIP FCM05 AIXM 5.1

Designator	**FT 5.3.3**
Name	**Interface to NMS**
Sub-AF	**Aeronautical Information Exchange**
Description	Integrate the local/regional automated ASM support systems migrated to AIXM 5.1 B2B with the NM system.
Scope	ANSPs' ASM support systems shall communicate with the Network Manager's system.
References	ESSIP FCM05
Concerned stakeholders	ANSPs
Geographical applicability	iSWIM functionality shall be deployed in the EATMN as indicated in the table in section 5.2 of Regulation (EU 716/2014). In centres in the Member States that have non-integrated civil/military service provision (1), iSWIM functionality shall be deployed to the extent required by Regulation (EC) N°552/2004, point 4 of Part A of Annex II.
Synchronization	Although individual ANSPs may be connected at different times, the benefits are gained once a critical mass of ANSPs are interacting with the Network Manager.
Guidance material	As in ESSIP FCM05 AIXM 5.1

Designator	**FT 5.4.1**
Name	**Implement New MET Data Model**
Sub-AF	**Meteo Information Exchange**
Description	Upgrade Meteo service to provide reliable actual and forecast Meteo data, wherever required across the ATM network, in WXXM format.
Scope	Meteo data shall: • Be distributed as a set of defined services, standard across all ATM stakeholders, conforming to WXXM; • Be available through SWIM to all necessary stakeholders • Conform to relevant ADQ 2 regulation ;
References	ESSIP ITY-ADQ
Concerned stakeholders	Met service providers.
Geographical applicability	iSWIM functionality shall be deployed in the EATMN as indicated in the table in section 5.2 of Regulation (EU 716/2014). In centres in the Member States that have non-integrated civil/military service provision (1), iSWIM functionality shall be deployed to the extent required by Regulation (EC) N°552/2004, point 4 of Part A of Annex II.
Synchronization	Although individual ANSPs may be connected at different times, the benefits are gained once a critical mass of ANSPs are using WXXM format.
Guidance material	As in ESSIP ITY-ADQ AIXM 5.1

Designator	**FT 5.5.1**
Name	**Interface and data Requirements of AF4 NOP**
Sub-AF	**Cooperative Network Information Exchange**
Description	NM Information will be freely exchanged by Operational stakeholders by means of defined cooperative network information services, using the yellow SWIM TI Profile.
Scope	Operational stakeholders shall implement services which support the exchange of the following cooperative network information using the yellow SWIM TI Profile: • Maximum airport capacity based on current and near term weather conditions • Synchronization of Network Operations Plan and all Airport Operations Plans • Regulations • Slots • Short term ATFCM measures • ATFCM congestion points • Restrictions • Airspace structure, availability and utilization • Network and En-Route Approach Operation Plans
References	
Concerned stakeholders	ANSPs Airports NM
Geographical applicability	iSWIM functionality shall be deployed in the EATMN as indicated in the table in section 5.2 of Regulation (EU 716/2014). In centres in the Member States that have non-integrated civil/military service provision (1), iSWIM functionality shall be deployed to the extent required by Regulation (EC) N°552/2004, point 4 of Part A of Annex II.
Synchronization	The deployment of Initial System Wide Information Management functionality shall be coordinated due to the potential network performance impact of delayed implementation in a wide geographical scope involving a number of stakeholders. From a technical perspective the deployment of targeted system and service delivery changes shall be synchronized to ensure that the performance objectives are met. This synchronization shall enable changes targeted within ATM functionalities referred to in Sub-AF 1 to 4 as well as future common projects. Synchronization shall involve all ATM ground stakeholders (civil/military air navigation service providers, airspace users — for AOC systems, airport operators, MET Service Providers and the Network Manager. Furthermore, synchronization during the related industrialization phase shall take

	place, in particular among supply industry and standardization bodies.
Guidance material	References TBD

Designator	**FT 5.6.1**
Name	**FDPS Upgrade preparing for IOP Flight Object Exchanges**
Sub-AF	**Flight Information Exchange**
Description	Flight information shall be exchanged during the pre-tactical and tactical phases by ATC systems and Network Manager, using SWIM standard services of the blue and yellow SWIM TI Profiles.
Scope	Operational stakeholders shall implement services which support the exchange of the following flight information as indicated in the table below using the blue SWIM TI Profile: • Various operations on a flight object: Acknowledge reception, Acknowledge agreement to FO, End subscription of a FO distribution, Subscribe to FO distribution, Modify FO constraints, Modify route, Set arrival runway, Update coordination related information, Modify SSR code, Set STAR, Skip ATSU in coordination dialogue • Share Flight Object information. Flight Object includes the flight script composed of the ATC constraints and the 4D trajectory • Operational stakeholders shall implement the following services for exchange of flight information using the yellow SWIM TI Profile: • Validate flight plan and routes • Flight plans, 4D trajectory, flight performance data, flight status • Flights lists and detailed flight data • Flight update message related (departure information)
References	Not applicable
Concerned stakeholders	ANSPs
Geographical applicability	iSWIM functionality shall be deployed in the EATMN as indicated in the table in section 5.2 of Regulation (EU 716/2014). In centres in the Member States that have non-integrated civ/mil service provision (1), iSWIM functionality shall be deployed to the extent required by Regulation (EC) N°552/2004, point 4 of Part A of Annex II.
Synchronization	Peer-to-peer synchronization is needed.
Guidance material	References TBD

7.5.4. Family 2 - Mature PCP elements

Family 2 elements for System Wide Information Management (SWIM) services are still to be proposed and agreed. These will satisfy the requirements of section 5.1 of the Regulation (EU 716/2014).

7.5.5. Interdependencies with other sub-functionalities and/or implementation projects

Data exchange between ATS units shall be implemented using System Wide Information Management (SWIM) services where these services are mature to carry the necessary information. Incoming dependencies from other AFs may therefore drive SWIM deployment priorities. Those identified in the PCP so far are:

- SWIM services enable the AMAN functionality as described in AF1, A-FUA as described in AF3, Network Collaborative Management functionality as described in AF4 and flight data processing systems to flight data processing systems exchange of down-linked trajectory information between ATS units required by Initial Trajectory Information Sharing functionality referred to in AF6
- The implementation of SWIM infrastructure and services referred to in AF5 facilitates the information exchange for all mentioned ATM functionalities

7.5.6. Timeline

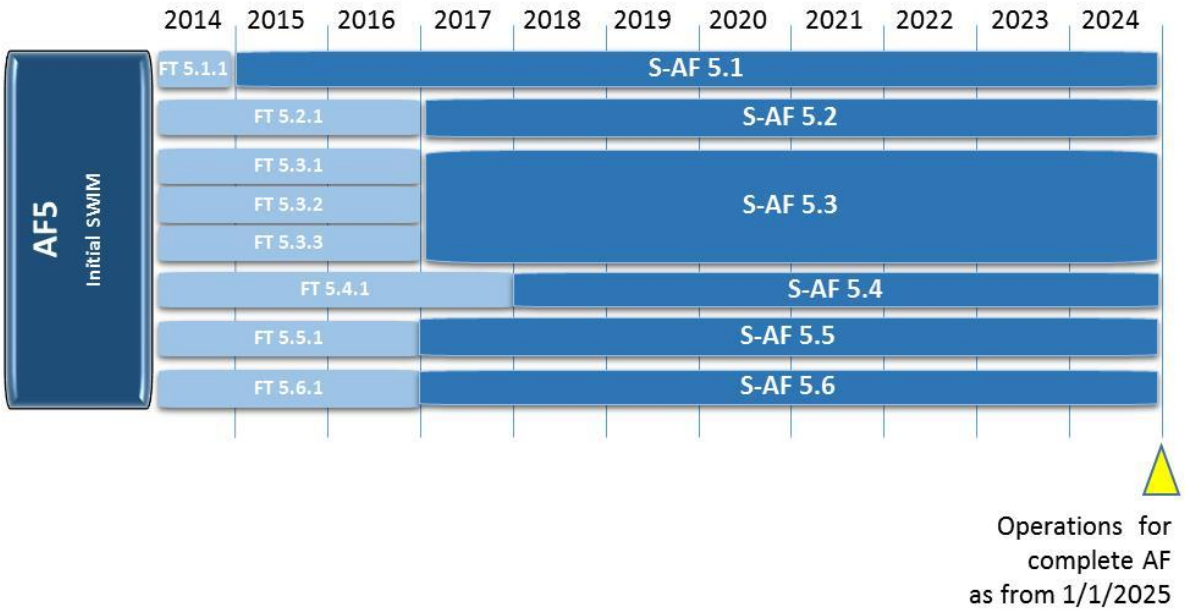

Figure 12: Indicative timeline for AF5's Fast-Tracks

The dates identified in this simplified Gantt chart result mainly from the analysis of ESSIP and IDSG IDP monitoring activity, and will be further assessed upon availability of all (local) implementation projects.

7.5.7. Preliminary economic appraisal

There are currently no Family 2 elements in AF5 so the CBA for PCP IR gives no information. Based on the apportionment between AFs in that CBA, family 1 elements for AF#5 might cost of the order of €51.7M.

7.6. AF#6 - Initial Trajectory Information Sharing

7.6.1. ATM Functionality and Sub-functionalities

Name	**AF6: Initial trajectory information sharing**
Description	Initial Trajectory Information Sharing (i4D) consists of the improved use of target times and trajectory information, including where available the use of on-board 4D trajectory data by the ground ATC system and Network Manager Systems, implying fewer tactical interventions and improved de-confliction situation.
Sub-ATM Functionalities	**S-AF6.1: Initial trajectory information sharing**
Target date for Sub-AF	ATS providers and the Network Manager shall ensure that they enable Initial Trajectory Information Sharing as from 1 January 2025. At least 20% of the aircraft operating within the airspace of European Civil Aviation Conference (ECAC) countries in the ICAO EUR region corresponding to at least 45% of flights operating in those countries are equipped with the capability to downlink aircraft trajectory using ADS-C EPP as from 1 January 2026.
Geographical scope	Initial Trajectory Information Sharing shall be deployed in all ATS units providing air traffic services within the airspace for which the Member States are responsible in the ICAO EUR region.

7.6.2. List of fast tracks

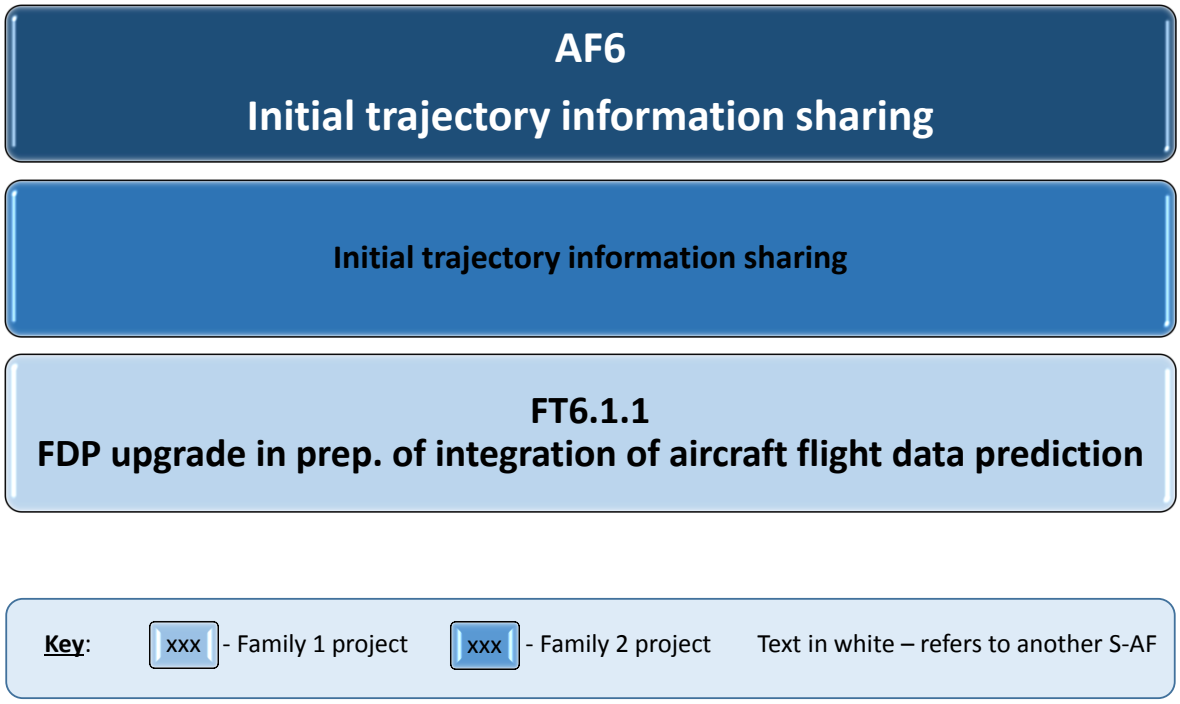

Figure 13: Structure ATM functionality AF#6 "Initial trajectory information sharing"

7.6.3. Family 1 - Pre-requisites and facilitators, including IDP elements

Designator	**FT 6.1.1**
Name	**FDP upgrade in preparation of integration of aircraft flight data prediction (available only when ADS-C EPP service will be deployed at the relevant ATSU)**
Sub-AF	**Initial trajectory information sharing**
Description	"Adapt FDP to process the air derived flight data provided through ADS-C EPP service. This includes potential interface with the data-link system (to access to the aircraft flight data) and the adaptation of the Trajectory Prediction sub system to integrate such additional information. It could also include the integration of the ADS-C EPP contract and the associated CPDLC messages."
Scope	**Ground System:** The following are main system improvements for ground FDP systems • Inclusion of aircraft FMS 4D trajectory within FDP Trajectory Prediction. • ADS-C contracts management (demand/event/periodic.) • Manage CPDLC messages. • HMI in CWP must also be adjusted accordingly.
References	*ATN B2 standards*
Concerned stakeholders	*ANSPs,*
Geographical applicability	Implementation projects will deliver "FDP upgrade" as a prerequisite of Initial trajectory information sharing at any of the ATS units providing air traffic services within the airspace for which the Member States are responsible in the ICAO EUR region
Synchronization	The integration of such functionality within FDP as proposed must be considered as an opportunity (associated with the FDP evolution strategies of the ANSPs) rather than a synchronised objective because it remains a preparatory activity.
Interdependencies	Availability of a data link capability is a prerequisite for AF6 including both ATN B1 (required through DLS IR) and the subsequent ATN B2.Exchange of trajectories between ATC centres requires implementation of FF ICE, Flight Objects and SWIM.

7.6.4. Family 2 - Pure PCP elements

- N/A

7.6.5. Interdependencies with other sub-functionalities and/or implementation projects and high level timeline

- Availability of a data link capability is a prerequisite for AF6 including both ATN B1 (required through DLS IR) and the subsequent ATN B2.
- Exchange of trajectories between ATC centres requires implementation of FF ICE, Flight Objects and SWIM. iSWIM shall enable FDP to FDP exchange of down-linked trajectory information between ATS units.
- Where available downlink trajectory information shall be integrated into the NOP support TTO/TTA.

7.6.6. Timeline

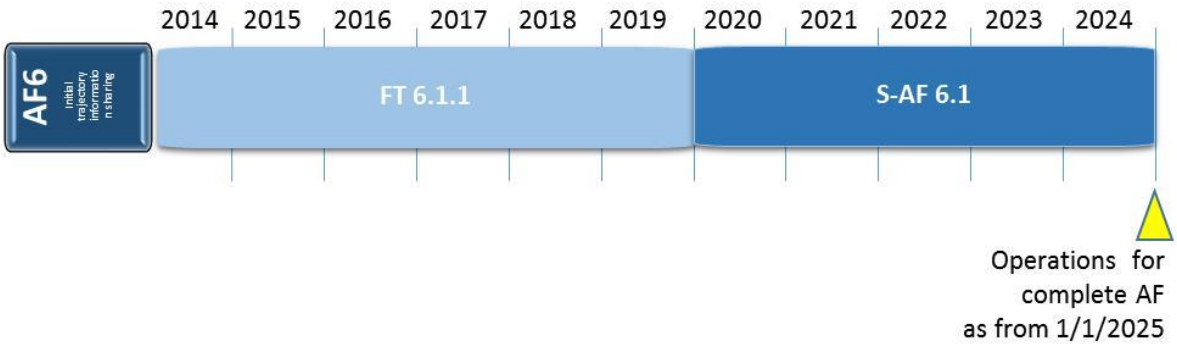

Figure 14: Indicative timeline for AF6's Fast-Tracks

The dates identified in this simplified Gantt chart result mainly from the analysis of ESSIP and IDSG IDP monitoring activity, and will be further assessed upon availability of all (local) implementation projects.

7.6.7. Preliminary economic appraisal

The overall cost of AF # 6, amounting at 0.42 billion € (0.84 billion € undiscounted) [till the target implementation date 2026], would be borne by ANSPs (0.178 billion €), AUs (0.236 billion €) and NM (0.055 billion €).

8. List of Acronyms

Acronyms	Meaning
ACC	Area Control Centre
A-CDM	Airport Collaborative Decision Making
ACH	ATC flight plan change message
ADR	Airspace Data Repository
ADS-C	Automatic Dependent Surveillance-Contract
AF	ATM functionality
AFP	ATC Flight plan Proposal
A-FUA	Advanced Flexible Use of Airspace
A-SMGCS	Advanced Surface Movement Guidance and Control System
AIRM	Aeronautical Information Reference Model
AIS	Aeronautical Information Service
AIXM	Aeronautical Information eXchange Model
AMAN	Arrival Manager
ANSP	Air navigation service provider
AO	Airline Operator
AOC	Airline Operations centre
AOP	Airport operator
APCH	Approach
APL	ATC flight plan message
APV	Approach Procedure with Vertical guidance
ASM	Airspace Management
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATFCM	Air Traffic Flow and Capacity Management
ATFM	Air Traffic Flow Management
ATM	Air traffic management
ATN	Air Traffic Network

Acronyms	Meaning
ATS	Air Traffic Service
ATSU	Air Traffic Service Unit
AU	Airspace user
B2B	Business-to-Business
CBA	Cost benefit analysis
CDM	Collaborative Decision Making
CEF	Connecting Europe Facility
CFMU	Central Flow Management Unit
CHMI	CFMU Human Machine Interface
CIAM	Collaboration Interface for Airspace Managers
CIV	Civil
COP	Coordination Point
CPDLC	Controller-Pilot Data Link Communications
CTM	Cooperative Traffic Management
CTO/CTA	Controlled Time Over/Controlled Time of Arrival
DCT	Direct Routing
DDR	Demand Data Repository
DLS IR	Data-Link Service Implementing Rule
DM	Deployment Manager
DMAN	Departure Management
DME	Distance Measuring Equipment
DP	Deployment Programme
D-TAXI	Data link Taxi Support
EAD	European Aeronautical Database
EASA	European Aviation Safety Agency
EC	European Commission
ECAC	European Civil Aviation Conference
EAD	European AIS Database
EFD	ETFMS Flight Data

Acronyms	Meaning
EPP	Extended Projected Profile
ERNIP	European Route Network Improvement Plan
ESARR	Eurocontrol Safety Regulatory Requirement
ESSIP	European Single Sky Implementation
ETFMS	Enhanced Tactical Flow Management System
ETSI	European Telecommunications Standards Institute
EUR	(ICAO) European (region)
EUROCAE	European Organisation for Civil Aviation Equipment
FAA	Federal Aviation Authority
FAB	Functional Airspace Block
FDP	Flight Data Processing
FDPS	Flight Data Processing System
FIN	Finance (e.g. Sub-Group)
FCM	Flow and capacity Management
FMP	Flow Management Position
FMS	Flight Model Simulator
FMS	Flight Management System
FMTP	Flight Message Transfer Protocol
FO	Flight Object
FOC	Flight Operations Centre
FPA	Framework partnership Agreement
FRA	Free Rout Airspace
FT	Fast Track Implementation project
FUA	Flexible Use of Airspace
GNSS	Global Navigation Satellite System
i4D	Initial Trajectory Information Sharing
4DTRAJ	4D Trajectory
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization

Acronyms	Meaning
IDP	Interim Deployment Programme
IDSG	Interim Deployment Steering group
IDSG-ET	Interim Deployment Steering group – expert team
IFPS	Initial Flight Plan Processing System
INEA	Innovation and Networks Executive Agency
IOP	Interoperability
IP	Internet Protocol
IR	Implementing Rule
ISRM	Information Service Reference Model
iSWIM	Initial system wide information management
MIL	military
MONA	Monitoring Aid
MP	Master Plan
MTCD	Medium-term Conflict Detection
NSA	National Supervisory Agency
NM	Network Manager
NMF	Network Management Function
NMS	Network Management System
NOP	Network Operations Plan
OLDI	On-line Data Interchange
PBN	Performance based navigation
PCP	Pilot Common Project
PDP	Preliminary Deployment programme
PANS	Procedures for Air Navigation Services
PENS	Pan European Network System
PKI	Public Key infrastructure
RF	Radius to Fix
RNP	Required navigation performance
S-AF	ATM Sub-functionality

Acronyms	Meaning
SBAS	Satellite–Based Augmentation System
SESAR	Single European Sky ATM Research
SID	Standard Instrument Departure
SJU	SESAR Joint Undertaking
SG	Sub-Group
SLoA	Stakeholder Lines of Action
SSR	Secondary Surveillance Radar
STCA	Short-term Conflict Alert
STAR	Standard Arrival Route
SWIM	System-Wide Information Management
TBO	Time Based Operation
TI	Technical Infrastructure
TMA	Terminal manoeuvring area
TTG	Time To Gain
TTL	Time To Lose
TTOT	Target Take Off Time
TSAT	Target Start-up Approval Time
VOR	VHF Omnidirectional Radio Beacon
WXXM	Weather Information Exchange Model
XML	Extensible Mark-up Language