PJ PROSA

SESAR Solution PJ.10-01a: Technical Specification (TS/IRS) V2 V3

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PJ10 PROSA

HIGH PRODUCTIVITY CONTROLLER TEAM ORGANISATION

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Abstract

This intermediate Technical Specification (TS) contains the technical requirements of the systems to support the Multi-Sector Planner operating team structure in En-Route at V2 level and eTMA at V3 level.

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1 Executive summary

Introduction

This solution will research in the Multi Sector Planner (MSP) concept: an ATCO team configuration where a Planning Controller (PC), from now named Multi Sector Planner – MSP, supports several Executive Controllers (EC).

The expected benefits of Multi Sector Planner (MSP) concept are increasing capacity and improving ATC efficiency. The concept needs to be supported by efficient planning methods and conflict detection tools which allow the MSP to identify conflicts and coordinate a solution as soon as possible.

The overall executive sectors where the MSP is responsible is named Multi Sector Area (MSA). MSP will continue being responsible of the coordination tasks assigned to external boundaries of the MSA, but he will interact with more than one Executive Controller when there is a coordination need. Traditional inter-sector coordination procedures are maintained, although the internal boundaries will be entirely the responsibility of the MSP and will therefore not require any co-ordination dialogue – the Planner will just set the boundary transfer level (which may be amended by the Executives as necessary). In this configuration, the Planning Controller ensures suitable coordination agreements between sectors and assists in managing the workload of the Executive Controllers, thus ensuring that potentially critical traffic situations and the associated workload are manageable. In the En-Route airspace, the MSP team will support conventional route network and Free Route environment while in the eTMA the MSP team will improve predictability and capacity by potentially reducing tactical interventions.

2 Introduction

In this version of the Technical Specification a set of technical requirements were defined to implement the operational needs defined in the OSED [38]. These requirements were implemented and validated in the V2/V3 prototypes.

Technical requirements have been managed using SE-DMF tool and exported to this document. EATMA technical models have been developed using MEGA tool, models have been attached to this document as images in section 4.1.

This document covers the deliverable D1.1.020.

2.1 Purpose of the document

This document provides the requirements specification, covering functional, non-functional and interface requirements related to SESAR Solution PJ.10-01a.

The SESAR Solution Development Life Cycle aims to structure and perform the work at project level and progressively increase SESAR Solution maturity, with the final objective of delivering a SESAR Solution data-pack for industrialisation and deployment. The Technical specifications (TS/IRS) represent one of the key parts of this SESAR Solution data-pack.

This is the final version of this document.

2.2 Scope

This is the TS/IRS for SESAR Solution PJ.10-01a[1], technical requirement were implemented in the prototypes used in the following validation activities:

- EXE-PJ.10-01a-V2-001-ENAV (V2): it will be performed in En-Route environment validating the CM-0303 with a maturity level V2.
- EXE-PJ.10-01a-V3-001-SKYGUIDE (V3): it will be performed in eTMA environment covering the CM-0304b[2] with V3 maturity level.

This final Technical Specification covers functional and non-functional requirements considering the results from the V2 and V3 validation exercises and constitute the technical reference for the V2 and the V3 Data Pack of the solution.

[1] At the current moment, there are 2 CRs to split this solution: CR-03352 to create PJ.10-01a1 (eTMA environment) and CR-03351 to create PJ.10-01a2 (En-Route environment).

[2] CR-03348 to create and link this OI to PJ.10-01a1 is ongoing.

2.3 Intended readership

This document is intended for the following audience:

- Solution PJ.10-01b: Flight Centred ATC
- Solution PJ.10-01c: Collaborative Control
- Solution PJ.10-02a: Improved Performance In The Provision Of Separation
- Solution PJ.10-02b: Advanced Separation Management
- Solution PJ.10-05: IFR RPAS Integration
- Solution PJ.10-06: Generic' (non-geographical) Controller Validations
- Solution PJ.15-08: Trajectory Prediction Service
- Solution PJ.16-04: Workstation, Controller productivity
- Solution PJ.18-02: Integration of trajectory management processes in planning and execution

It is also of interest of:

- PJ19.02: ATM Operation
- PJ19.03: System & Services
- PJ19.04: Performance Management

2.4 Background

This document, and in general the whole solution, takes benefits from the results reached in SESAR1 (04.07.08, 05.07.03, 05.07.02 and solution #63). The work done in the past shows the advantages gather form a flexible use of sectors specially related to the increasing of planner capability.

The solution will also take into account the implementation of some Multi Sector Planning concept performed by some ANSPs. The experience of LFV, NAVIAIR and DFS having put in operation Multi Sector Planner concept in TMA will be considered as baseline for the solution.

2.5 Structure of the document

This document is structured in these parts:

- Executive summary, which includes a brief description of the scope of the PJ10.01a solution
- Introduction, indicates what already exists and what is new with a brief description of the scope of the document.

- Section 3 addresses the scope of the Technical specification, technical systems, functional block(s), system ports and roles under the scope of this SESAR Solution. Diagrams to give an overview of the functional block(s)'s + context significant interfaces crossing the functional block's boundaries can be included, OIs/Enablers coverage. Changes in the OIs/Ens, Use Cases -- How the technical systems, functional block(s)… will be used (related to operational documents (SPR-INTEROP/OSED). Also are identified the Capability Configurations, Changes needed from the architecture baseline in EATMA to realise the Capabilities (Using Technical Systems, /Functional Blocks, Functions and Roles).

- Section 4: Functions needed to realise the Solution and provides a functional view of how the technical systems, functional block(s), system ports and roles that participate in realising the operational needs. How the relevant resources interact in different (sub)-Operating Environments to achieve the needed Capabilities, How the resources interact, Diagram describing how the systems interact at the infrastructure level, Service(s) used by the SESAR Solution, System context in which the Services are deployed, Technology used to realise the Services, Functional and non-Functional Requirements.

- Section 5: Options (if available) that can be chosen when implementing the solution (e.g. local / central deployment, service alternatives etc.)

- Section 6: Any assumption made that have an impact on the technical specifications described in section 5

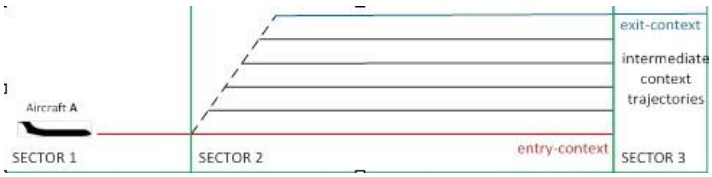
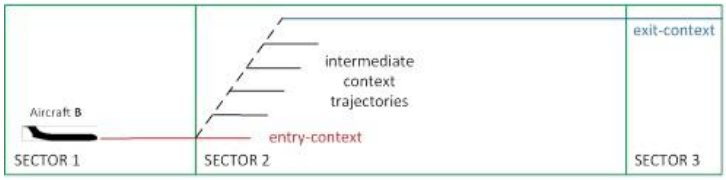
- Section 7: Documents (name, reference, source project) the TS has to comply to or to be used as additional inputs.

- Appendix A: Not applicable for this solution.

- Appendix B: Not applicable for this solution.

2.6 Glossary of terms

Term	Definition	Source of the definition
Active CTO/CTA/RTA	"A CTO or CTA or RTA that is currently taken into account by both, the avionics (e.g. FMS) and the Ground Systems. Note: It is considered to be active from the moment when both the air and the Ground Systems have taken it into account, until the application point of the constraint is over-flown or until it is cancelled in the Air and the Ground systems."	10.04.02-D44-Consolidated Conformance Monitoring System Requirements
Cluster	A set of one or more Encounters that should be treated as a whole when determining their resolution	Solution #27
Conflict	Any situation involving aircraft and hazards in which the applicable separation minima may be compromised. Note: this term relates to potential infringements of separation minima. More specifically, it is used in the context of ATCO	Solution #27

	activities where actions are performed in order to anticipate and resolve conflicts for separation management purposes. This is in contrast to the situations detected and processed by CD/R tools where the terminology used is 'encounters', which relates to the applicable Separation of Interest used by the tool-set, rather than Separation Minima.	
Context Flight	"A flight that may need to be considered by the Planner ATCO when making coordination choices for the Subject Flight, due to the flights' anticipated vertical and lateral profiles. Context Flights are those Environmental Flights that are involved in a Planning Context Encounter with the Subject Flight. Note: Context Flights may not currently be involved in a Planning Encounter based on their current clearance or existing coordinated levels."	10.04.02-D44-Consolidated Conformance Monitoring System Requirements
Context Trajectory	Context Trajectories represent the expected utilisation of airspace by each flight. Context Trajectories are built for the Subject Flight and Environmental Flights. Note: Context Trajectories are similar to Coordination Trajectories. Each Context Trajectory maintains a single level and follows the lateral profile of the Planned Trajectory. Context Trajectories are built at every standard Flight Level from the entry-context level to the exit-context level. The identification of entry-context and exit-context levels is dictated by the information available in the system at the time of the probe. They represent the lowest and highest level at which the flight is anticipated to occupy in the sector. The Origin and Termination points on Context Trajectories depend on whether the flight is the Subject flight or an Environmental flight and on the flight's anticipated vertical profile. Example of Subject Flight Context Trajectories:  Example of Environmental Flight Context Trajectories:  	Context Trajectory
Correlated flight	Flight plan with a planned trajectory correlated with a radar track	10.04.02-D44-Consolidated Conformance Monitoring

		System Requirements
CTA/RTA	"An ATM imposed time constraint on a defined merging point associated with an arrival runway. Note: This constraint is sent by the ground system to the aircraft."	10.04.02-D44-Consolidated Conformance Monitoring System Requirements
CTO	"An ATM imposed time constraint over a point. Note: This constraint is sent by the ground system to the aircraft."	10.04.02-D44-Consolidated Conformance Monitoring System Requirements
Encounter	A situation where an aircraft is predicted to be below the applicable separation of interest with respect to another aircraft, or a designated volume of airspace, classified respectively as “aircraft-to-aircraft” and “aircraft-to-airspace” encounters. Note: Encounters relate to the various detection tools and may work to different look-ahead time horizons with different separation criteria, using different trajectories. Different tool configurations can therefore be expected to yield different encounters. The Separation of Interest thresholds are considered with respect to any applicable uncertainty volumes around the predicted aircraft position(s).	Solution #27
[Entry/Exit] Coordination Trajectory Or [Entry/Exit] Trajectory	"A Trajectory that is derived from the Planned Sequence Trajectory. It follows the lateral profile of the Planned Sequence Trajectory but maintains a specific coordination level relevant to the boundary between two sectors. It represents the expected behaviour of the aircraft according to the entry/exit co-ordination conditions. Entry = A Trajectory that is built at levels associated with the sector entry coordination for the flight. Exit = A Trajectory that is built at levels associated with the sector exit coordination for the flight. Note: The Coordination Trajectory: Supports both lateral and vertical boundary co-ordinations; Can have the origin and end truncated (e.g. at sector boundaries); Is necessary for predicting encounters with flights that are co-ordinated with the sector but not yet in communication with that sector. Because it is only needed for boundary crossing conditions it can have a relatively short prediction horizon; typically up to the point where the flight is assumed by the sector concerned. "	10.04.02-D44-Consolidated Conformance Monitoring System Requirements
Environment Trajectory	The Trajectory of an Environmental Flight	10.04.02-D44-Consolidated Conformance

		Monitoring System Requirements
Environmental Flight	A flight of interest to the Controller which is not the Subject Flight. The Subject Flight will be checked for encounters with all Environmental Flights.	10.04.02-D44-Consolidated Conformance Monitoring System Requirements
Lateral Separation	Separation expressed in terms of horizontal distance and function of angular convergence/divergence between tracks	10 04 01-D78-Conflict Detection and Resolution Requirements Refinement
Minimum Lateral Separation	The lateral separation threshold above which the separation minima are fulfilled	10 04 01-D78-Conflict Detection and Resolution Requirements Refinement
Minimum Vertical Separation	"The vertical separation threshold above which the separation minima are fulfilled Note: Different thresholds are applied above and below the RVSM limit. Any non-RVSM aircraft that is authorized to fly within an RVSM airspace shall be subject to the thresholds that are applied over the RVSM airspace."	10 04 01-D78-Conflict Detection and Resolution Requirements Refinement
NFL, SFL	"The NFL is the cleared level that the aircraft will have when it will arrive in the sector. The NFL is given by the upstream sector. The NFL is equal to the TFL of the upstream sector. The SFL is the second level that permits to determine the interval of flight levels in which the aircraft will arrive in the sector. So when arriving in the sector the aircraft will be between the SFL and the NFL."	10.04.02-D44-Consolidated Conformance Monitoring System Requirements
Planned Trajectory	"The Planned Trajectory represents the stable medium to long term behaviour of the aircraft but may be inaccurate over the short term where tactical instructions that will be issued to achieve the longer term plan are not yet known. It takes into account the planned route and requested vertical profile, strategic ATC constraints, Closed Loop Instructions/Clearances, co-ordination conditions and the current state of the aircraft. Assumptions may be made to close Open Loop Instructions/Clearances issued by tactical controllers. It is calculated within the planning look-ahead timeframe, starting from the Area of Interest of the unit concerned, or the aircraft's current position (whichever is later). It is constrained during all phases of flight by boundary crossing targets (e.g. standing agreements between the Units concerned).	10.04.02-D44-Consolidated Conformance Monitoring System Requirements

	Note: The Planned Trajectory supports the ATC planning operations. It is used primarily to support data distribution within the system and in the determination of the top of descent point. As such, uncertainty does not need to be calculated for this trajectory. It is also used as the starting point for derivation of more specific local ATC trajectories."	
Reduced Vertical Separation Minimum (RVSM)	A reduction to 1000 feet vertical separation between flights, which is used at least in Europe and on the North Atlantic, between FL290 and FL410.	10 04 01-D78-Conflict Detection and Resolution Requirements Refinement
Route	The 2D trajectory of an aircraft, expressed as significant points, ATS routes or geographical points.	EATM Glossary
Sector	A part of airspace controlled by a team of controllers, defined, notably, by its geographical co-ordinates and its assigned radio frequency	EATM Glossary
Separation	Spacing between an aircraft and a hazard.	Solution #27
Separation Criteria	A generic term that covers the Separation Minima and the thresholds used for problem identification.	Solution #27
Separation of Interest	The separation threshold below which the proximity of a pair of aircraft is considered to be of interest to a controller, for the airspace and conditions concerned. Note: At this point, there may be no actual risk that separation minima are infringed. The values chosen for the various controller activities and tools are larger than the separation criteria in order to provide an adequate margin of safety. The controller and the aids used need to have awareness of the applicable separation minima for the airspace concerned. Note: This is a generic term, independent of the planning or tactical layers of separation activity. Particular instances of the Separation of Interest may be applied for each level of separation activity. The actual separation values used will take into account aspects such as the type of clearance issued, the requested navigation precision and the airspace rules. They will also relate to the type of trajectory used at the specific layer of concern. They may vary according to circumstances such as the geometry of the conflicts/encounters and prevailing conditions such as adverse weather	Solution #27
Separation Minima	The minimum displacements between an aircraft and a hazard, which maintain the risk of collision at an acceptable level of safety. Note: ICAO Doc 9689 describes the methodology to be used for the determination of Separation Minima	Solution #27 ICAO Doc 9689
Speculative Trajectory	"A Trajectory that uses flight data other than those currently committed or tentatively selected (during a What-If Probing operation), by the controller.	10.04.02-D44-Consolidated Conformance Monitoring

	Note: Speculative Trajectories are produced for the purpose of What-Else probing. "	System Requirements
State Vector	A vector describing the state of an object in terms of its position co-ordinates, ground speed, course, accelerations and mode-of-flight	EATM Glossary
Subject Flight	A flight that has been explicitly selected by the Controller concerned.	10.04.02-D44-Consolidated Conformance Monitoring System Requirements
System Track	A generic entity representing the surveillance data as transmitted by the surveillance system	EATM Glossary
Tactical Trajectory	"The Tactical Trajectory is calculated within a short look-ahead time (e.g. up to 15 minutes) during tactical ATC operations (sector planning layer). It therefore reflects an accurate view of the predicted flight evolution, starting from the current flight position (generally, as reported by surveillance), with low uncertainty and high precision. It is kept up to date with all clearances, including tactical instructions. During any open tactical manoeuvres it will also be reflecting those temporary conditions. It is usually determined with a fast update rate (e.g. 5 seconds) and with an optimised Uncertainty calculation; to maximise response and minimise the incidence of false warnings. Note: The Tactical Trajectory supports the tactical ATC operations when the flight follows its normal behaviour"	10.04.02-D44-Consolidated Conformance Monitoring System Requirements
[Tactical/Planning] Deviation Trajectory	"The Deviation Trajectory provides the predicted profile of the aircraft based on the observed behaviour, extrapolated from the particular deviation from the current clearance (or deviation from coordination constraint for Planning Deviation Trajectories). Note: Deviation Trajectories are necessary for situations where non-compliance with a flight's expected tactical or coordinated behaviour is observed, with respect to an applicable tolerance threshold. A Planning Deviation Trajectory follows the cleared route of the flight, irrespective of any coordination constraints (as the flight has been observed to be deviating from these constraints). Deviation Trajectories support Tactical/Planner ATC operations when the flight has deviated from its predicted behaviour. The Tactical Deviation Trajectory is useful for a short prediction horizon (e.g. 3-5 minutes). During periods where a Deviation Trajectory is necessary it may also be used by TC/PC CD&R Aid."	10.04.02-D44-Consolidated Conformance Monitoring System Requirements
Tentative Trajectory	"Tentative trajectories are created from another trajectory that is in operational use (Tactical, Planning or otherwise). They reflect tentative what-if flight data selected by the controller. If these	10.04.02-D44-Consolidated Conformance

	conditions are then committed the Tentative trajectory and the associated data will be used to establish the new operational trajectory. If the conditions are discarded then it will also be discarded. Note: Tentative trajectories support What-If probing and are created during this process."	Monitoring System Requirements
Trajectory	"The predicted behaviour of an aircraft. Note: the Trajectory is usually modelled as a set of consecutive segments linking waypoints and/or points computed by the aircraft avionics (e.g. FMS) or by the ground system to build the vertical profile and the lateral transitions. Note: the Trajectory is usually modelled as a set of consecutive segments linking waypoints and/or points computed by the aircraft avionics (e.g. FMS) or by the ground system to build the vertical profile and the lateral transitions."	10.04.02-D44-Consolidated Conformance Monitoring System Requirements
Vertical Separation	Separation expressed in units of vertical distance	10 04 01-D78-Conflict Detection and Resolution Requirements Refinement
What-else Probing	A process where several Speculative Trajectories and associated data arising from What-If Probing are assessed for the impact on the occurrence of predicted Encounters. The Speculative Trajectories utilise flight data other than that currently committed or tentatively selected (during What-If Probing operations) by the controller	Solution #27
What-if Probing	A process where a private copy of a Trajectory that is in operational use and associated data is taken and used as a Tentative Trajectory to check the impact of changes to the flight data on the occurrence of predicted Encounters, without affecting the corresponding data for the actual flight. Note: On completion the what-if data and the Tentative Trajectory may be discarded or used to implement an update to the actual flight data and to construct the necessary clearance	Solution #27

Table 1: Glossary

2.7 Acronyms and Terminology

Term	Definition
2D, 3D, 4D	Two Dimensional, Three Dimensional, Four Dimensional
4D TM	Four dimensional Trajectory Management
4DTRAD	Four Dimensional TRAjectory Data link

A/C	Aircraft
ACC	Area Control Centre
ADAP	Adaptation Database
ADD	Aircraft Derived Data
ADD	Architecture Definition Document
ADEP	Aerodrome of Departure
ADES	Aerodrome of Destination
ADS-B	Automatic Dependent Surveillance-Broadcast
ADS-C	Automatic Dependent Surveillance-Contract
AFL	Actual Flight Level
AGDS	Air-Ground Datalink Services (Functional Block)
AMAN	Arrival MANager
ANSP	Air Navigation Service Provider
AOI	Area of Interest
AOR	Area of Responsibility
APP	Approach
ARES	Airspace Reservation
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
ATS	Air Traffic Services
ATSU	Air Traffic Services Unit
CC	Capability Configuration
CCD	Continuous Climb Departure
CD	Conflict Detection
CDA	Continuous Descent Approach
CDO	Continuous Descent Operations
CD/R	Conflict Detection and Resolution
CD&R	Conflict Detection & Resolution
CFL	Cleared (Current) Flight Level
CHMI	Controller Human Machine Interaction Management (Functional Block)
CNS	Communications, Navigation and Surveillance
CONF	Conflict Mgt (Functional Block)

COP	Coordination Point
COTR	Co-ordination and Transfer
CPDLC	Controller Pilot Data Link Communication
CTA	Control Time of Arrival
CTO	Control Time Over
CWP	Controller Working Position
DAP	Downlink Aircraft Parameter
DER	Departure End of the Runway
DFS	Deutsche Flugsicherung GmbH (German ANSP)
DMAN	Departure MANager
DOD	Detailed Operational Description
DRA	Direct-Route Airspace
EATMA	European ATM Architecture
E-ATMS	European Air Traffic Management System
ENAIRE	Spain ANSP
EC	Executive Controller
EPP	Extended Projected Profile
ER	En Route
ERATO	En Route Air Trafic Organizer
ETA	Estimated Time of Arrival
ETFMS	Enhanced Tactical Flow Management System
eTMA	Extended Terminal Manoeuvring Area
ETO	Estimated Time Over
EUROCAE	EURopean Organization for Civil Aviation Equipment
FAA	Federal Aviation Administration
FASTI	First ATC Support Tools Implementation (programme)
FCA	Flight Centric Area
FDMP	Flight Data Manager Publisher
FDPS	Flight Data Processing System
FIR	Flight Information Region
FIS	Flight Information Service
FL	Flight Level
FMS	Flight Management System
FP	Flight Plan

FRA	Free-Route Airspace
FTS	Fast Time Simulation
GA	General Aviation
GAT	General Air Traffic
HDG	Heading
HMI	Human-Machine Interface
IAS	Indicated Air Speed
IBP	Industry-Based Prototypes
ICAO	International Civil Aviation Organisation
IER	Information Exchange Requirement
IFR	Instrument Flight Rules
INTEROP	Interoperability Requirements
IOP	Interoperability
iRBT	Initial Reference Business Trajectory
IRS	Interface Requirements Specification
ISRM	Information Services Reference Model
ITEC	Interoperability Through European Collaboration
MONA	MONitoring Aids
MSA	Multi Sector Area
MSAW	Minimum Sector Altitude Warning
MSP	Multi Sector Planner
MTCD	Medium-Term Conflict Detection
NAF	NATO Architecture Framework
NATS	National Air Traffic Services (UK ANSP)
NFL	eNtry Flight Level
NoTT	No Tactical Trajectory
NOV	NAF Operational View
NSOV	NAF Service Oriented View
NSV	NAF System View
OAT	Operational Air Traffic
OI	Operational Improvement
OSED	Operational Service and Environment Definition
PC	Planning Controller
PIR	Project Initiation Report

PIRM	Programme Information Reference Model
QoS	Quality of Service
RBT	Reference Business Trajectory
RNP	Required Navigation Performance
RTA	Requested Time of Arrival
RTS	Real Time Simulation
RVSM	Reduced Vertical Separation Minimum
SAR	Safety Assessment Report
SDD	Service Description Document
SDPDS	Surveillance Data Processing and Distribution System
SESAR	Single European Sky ATM Research Programme
SESAR Programme	The programme which defines the Research and Development activities and Projects for the SJU.
SFL	Supplementary Flight Level
SID	Standard Instrument Departure
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency.
SoaML	Service Oriented Architecture Modelling Language
SOI	Separation Of Interest
SPO	Single Person Operation
SPR	Safety and Performance Requirements
SSR	Secondary Surveillance Radar
STAR	STandard instrument ARrival
STCA	Short-Term Conflict Alert
SUR	Surveillance Data Processing and Distribution System
SWIM	System Wide Information Model
TAD	Technical Architecture Description
TC	Tactical Controller
TCT	Tactical Controller Tool
TFL	Transfer Flight Level
TMA	Terminal Manoeuvring Area
TOAC	Time Of Arrival Control
TOC	Top Of Climb

TOD	Top Of Descent
TP	Trajectory Prediction
TP&M	Trajectory Prediction and Management
TRA	Temporary Reserved Airspace
TRL	Technology Readiness Level
TSA	Temporary Segregated Area
UAC	Upper Airspace Control
UIR	Upper Flight Information Region
UML	Unified Modelling Language
VCS	Voice Communication System
VFR	Visual Flight Rules
VSP	Variable System Parameter
V&V	Validation and Verification
WILCO	Will Comply
WP	Work Package
WSDL	Web Services Definition Language
XFL	Exit Flight Level
XSD	XML Schema Definition

Table 2: Acronyms and terminology

3 SESAR Solution Impacts on Architecture

3.1 Target Solution Architecture

3.1.1 SESAR Solution(s) Overview

This Document is the Technical Specification for SESAR Solution PJ.10-01a which addresses the concept of the Multi-Sector Planner operating team structure in an En-Route (PJ.10-01a2 V2 maturity[3]) and eTMA environment (PJ.10-01a1 V3 maturity[4]). In this team structure the Planning Controller (PC), from now named Multi Sector Planner - MSP, supports several Executive Controllers (EC).

The operational concept is detailed by Operational Improvements (OI): CM-0303 "Sector Team Operations Adapted to new Responsibilities in En Route, 1 Planning to several Tactical (Executive) Controllers team structure" and CM-0304b[5] "Sector Team Operations Adapted to New Responsibilities in eTMA, 1 Planning to several Tactical Controllers team structure". The solution[6] will reach different maturity level: V2 for En-Route environment (CM-0303) and V3 for eTMA (CM-0304b[7]). For the different airspaces, eTMA and En-Route, both systems will support the assignment of the Multi Sector Planning function, promoting a more flexible use of sector teams in line with traffic flows characteristics and complexity. Each system will support normal operations closely related to the airspace characteristic with specific Controller Support tools.

For validating this concept, PJ.10-01a (split into PJ.10-01a1 and PJ.10-01a2) TS is the framework where System Requirements will be written.

The following table identifies all the Enablers belonging to the OIs that have been allocated to the SESAR Solution PJ.10-01a in EATMA Dataset 19 (EATMA 12.0) [2]. The ones in **bold format** are mandatory Enablers.

SESAR Solution ID and Title	Functional Blocks/Role impacted by the	Enabler ID (from EATMA)	Enabler Title (from EATMA)	Enabler coverage

[3] At the current moment, CR-03351 to create PJ.10-01a2 (En-Route environment) is ongoing.

[4] At the current moment, CR-03352 to create PJ.10-01a1 (eTMA environment) is ongoing.

[5] CR-03348 to create and link this OI to PJ.10-01a1 is ongoing.

[6] At the current moment, there are 2 CRs to split this solution: CR-03352 to create PJ.10-01a1 (eTMA environment with OI CM-0304b) and CR-03351 to create PJ.10-01a2 (En-Route environment with OI CM-0303).

[7] CR-03348 to create and link this OI to PJ.10-01a1 is ongoing.

	SESAR Solution (from EATMA)			
PJ.10-01a1 High Productivity Controller Team Organisation in eTMA	Controller Human Machine Interaction Management ER/APP Coordination and Transfer Operational Supervision ER/APP ATC	**ER APP ATC 96**	**ATC System Support to Permit a Single Planner Role Associated to Multiple Tactical Roles**	Fully
	ATC Sector Planning Controller Multi Sector Planner	**HUM-006**	**New staffing configuration/ Multi Sector Planner in TMA/eTMA**	Fully
PJ.10-01a2 High Productivity Controller Team Organisation in En-Route	Controller Human Machine Interaction Management ER/APP Coordination and Transfer Operational Supervision ER/APP ATC	**<New enabler>**	**ATC System Support to Permit a Single Planner Role Associated to Multiple Tactical Roles**	Fully
	ATC Sector Planning Controller Multi Sector Planner	**HUM-018**	**New staffing configuration/ Multi Sector Planning in En-Route**	Fully

Table 3: SESAR Solution PJ.10-01a Scope and related Functional Blocks/roles & Enablers

Roles

The main roles impacted by this solution (PJ.10-01a1 and PJ.10-01a2) are:

- Multi Sector Planner: Responsible for a multi-sector area (MSA) comprising of two or more of the present control sectors. It performs planner tasks such as planning and coordination of

traffic entering and/or exiting the MSA, resolve boundary problems by re-coordination and propose planned conflict solution to Executive Controller.

- ATC Sector Executive Controller: It has the responsibility for the traffic management within its sector: provide separation between controlled aircrafts, monitor adherence to clearance, communicate with pilots by means of R/T or data link, etc…

Functional Blocks

The main functional blocks impacted by this solution (PJ.10-01a1 and PJ.10-01a2) are:

- Coordination and Transfer: Responsible of performing the electronic coordination with the adjacent sector.
- Controller Human Machine Interaction Management ER/APP: Provides ATCOs with a graphical user interface and with the means to interact with the En-Route / Approach ATC system.
- Operational Supervision ER/APP ATC: Manage conventional or MSP sectorization allocation.

Also, A/G Voice Communication is used in this solution (PJ.10-01a1) to allow MSP monitoring the frequencies of several sectors that compose the Multi-sector Area.

Technical Systems and System Ports

Technical system affected by this solution (PJ.10-01a1 and PJ.10-01a2) is the “En-Route / Approach ATC”, it communicates with other systems using the following system ports:

- “ATS_COORD_GND at ER ACC_CC” and “ATS_COORD_GND at APP ACC_CC” to send/receive OLDI/FMTP coordination data.

V2 Activities and Functions

The following table contains the relation between the Activities and the Functions involved in the solution PJ.10-01a2:

Activity	Function
Abrogate Coordination (PJ.10-01a)	Abrogate Coordination (PJ.10-01a) Display Abrogate Coordination (PJ.10-01a) Input Abrogate Coordination (PJ.10-01a) Process Abrogate Coordination (PJ.10-01a) Send Abrogate Coordination (PJ.10-01a)
Assess entry conditions and desired/planned profile through AoR/AoI	Check Planned Potential Conflicts (PJ.10-01a)

Assess planned/desired profile for problems	Check Planned Potential Conflicts (PJ.10-01a)
Assume control of flight	Assume Flight (PJ.10-01a) Input Assume Flight (PJ.10-01a)
Display coordination response to controller	Display Entry Coordination Acceptance (PJ.10-01a)
Highlight Flight Data to Executive Controller (PJ.10-01a)	Display Highlight Flight Data (PJ.10-01a) Highlight Flight Data (PJ.10-01a) Input Highlight Flight Data (PJ.10-01a)
Instruct flight to contact next unit	Input Send Flight to Next Unit (PJ.10-01a) Instruct flight to contact next unit (PJ.10-01a)
Monitor clearance implementation	Display Conformance State (PJ.10-01a) Monitor Clearance Implementation (PJ.10-01a)
Probe New Entry Coordination Conditions (PJ.10-01a)	Assess Result (PJ.10-01a) Display Probed Conflict (PJ.10-01a) Display Probed Conflict (PJ.10-01b) Input Probe New Entry Coordination Conditions (PJ.10-01a) Search for New Entry Coordination Condition to Solve Conflict (PJ.10-01a)
Probe Tactical Instruction (PJ.10-01a)	Assess Result (PJ.10-01a) Display Probed Conflict (PJ.10-01a) Input Probe Tactical Instruction (PJ.10-01a) Probe Tactical Instruction (PJ.10-01a)

Request New Entry Coordination (PJ.10-01a)	Display Entry Coordination (PJ.10-01a) Input Request New Entry Coordination (PJ.10-01a) Process Entry Coordination Request (PJ.10-01a) Request New Entry Coordination (PJ.10-01a) Send Entry Coordination Request (PJ.10-01a)
Select clearance to respect agreed constraints or coordinations	Coordinate with Executive Controllers (PJ.10-01a) Input Clearance (PJ.10-01a) Provide Tactical Instruction (PJ.10-01a) Select Clearance to Respect Agreed constraint or Coordination (PJ.10-01a)

Table 4: Relation between Activities and Functions in PJ.10-01a2 (V2)

V3 Activities and Functions

The following table contains the relation between the Activities and the Functions involved in the solution PJ.10-01a2:

Activity	Function
Acknowledge Handover from MSP to Conventional Sectors (PJ.10-01a)	Acknowledge Sectorization Allocation (PJ.10-01a) Display New Sectorization Allocation (PJ.10-01a) Input Acknowledge Sectorization Allocation (PJ.10-01a) Process Sectorization Allocation Acknowledgement (PJ.10-01a)
Agree entry coordination	Display Highlight Flight Data (PJ.10-01a) Input Entry Coordination Request Acceptance (PJ.10-01a) Process Entry Coordination Request Acceptance (PJ.10-01a) Send Entry Coordination Request Acceptance (PJ.10-01a)
Agree Exit Coordination (PJ.10-01a)	Display Exit Coordination Acceptance (PJ.10-01a) Input Exit Coordination Request Acceptance (PJ.10-01a) Process Exit Coordination Request Acceptance (PJ.10-01a) Send Exit Coordination Request Acceptance (PJ.10-01a)
Assess AMAN planning	Assess AMAN Sequence (PJ.10-01a) Display Arrival Sequence (PJ.10-01a)

Assess entry conditions and desired/planned profile through AoR/AoI	Check Planned Potential Conflicts (PJ.10-01a)
Assess Offered Exit Coordination (PJ.10-01a)	Check Planned Potential Conflicts (PJ.10-01a)
Assess planned/desired profile for problems within AoR/AoI	Assess Result (PJ.10-01a) Check Planned Potential Conflicts (PJ.10-01a) Display Planned Conflicts (PJ.10-01a) Display Probed Conflict (PJ.10-01a)
Change Internal MSA Coordination Conditions (PJ.10-01a)	Change Internal MSA Coordination Conditions (PJ.10-01a) Display New Internal MSA Coordination Conditions (PJ.10-01a) Input New Internal MSA Coordination Conditions (PJ.10-01a)
Display coordination response to controller	Display Entry Coordination Acceptance (PJ.10-01a)
Instruct flight to contact next unit	Input Send Flight to Next Unit (PJ.10-01a) Instruct flight to contact next unit (PJ.10-01a)
Make coordination offer to downstream sector	Display Exit Coordination (PJ.10-01a) Input Request New Exit Coordination (PJ.10-01a) Process Exit Coordination Request (PJ.10-01a) Request New Exit Coordination (PJ.10-01a) Send Exit Coordination Request (PJ.10-01a)"
Plan/Update Arrival Sequence	Assess AMAN Sequence (PJ.10-01a) Acknowledge Aircraft in AMAN (PJ.10-01a)"

Prepare Handover from MSP to Conventional Sectors (PJ.10-01a)	Coordinate Handover from MSP to Conventional Sectors (PJ.10-01a) Display New Sectorization Allocation (PJ.10-01a) Input Sectorization Allocation (PJ.10-01a) Prepare Handover from MSP to Conventional Sectors (PJ.10-01a) Process Sectorization Allocation (PJ.10-01a)
Request New Entry Coordination (PJ.10-01a)	Display Entry Coordination (PJ.10-01a) Input Request New Entry Coordination (PJ.10-01a) Process Entry Coordination Request (PJ.10-01a) Request New Entry Coordination (PJ.10-01a) Send Entry Coordination Request (PJ.10-01a)
Select clearance to respect agreed constraints or coordinations	Coordinate with Executive Controllers (PJ.10-01a) Input Clearance (PJ.10-01a) Provide Tactical Instruction (PJ.10-01a) Select Clearance to Respect Agreed constraint or Coordination (PJ.10-01a)

Table 5: Relation between Activities and Functions in PJ.10-01a1 (V3)

3.1.1.1 Deviations with respect to the SESAR Solution(s) definition

This section identifies the deviations between the current existing Enablers allocated to the solution and the variations occurred during the TS writing. A new enabler is needed to cover the technical changes required by PJ.10-01a2 (V2 En-Route) solution. Also, current enabler ER APP ATC 96 needs to be modified to apply only to eTMA environment (PJ.10-01a1 V3).

Enabler ID	Enabler Title	Enabler Description	Reason
<new>	ATC System Support to Permit a Single Planner Role Associated to Multiple Tactical Roles	The en-route ATM system functions are enhanced to allow a single planner role to be associated to multiple sector tactical roles. Access to flight data, controller tools and safety nets is adapted according to the allocation of the planner and tactical roles. The controller HMI is adapted to the allocated role.	New enabler to cover En-Route (V2) technical requirements, to be linked to CM-303 in solution PJ.10-01a2. CR-03641 to create this enabler is ongoing.

ER APP ATC 96	ATC System Support to Permit a Single Planner Role Associated to Multiple Tactical Roles	The eTMA ATM system functions are enhanced to allow a single planner role to be associated to multiple sector tactical roles. Access to flight data, controller tools and safety nets is adapted according to the allocation of the planner and tactical roles. The controller HMI is adapted to the allocated role.	Modify current enabler to cover eTMA (V3) technical requirements, to be linked to CM-0304b in solution PJ.10-01a1. CR-03640 to modify this enabler is ongoing.

Table 6: List of Enablers not covered by the SESAR Solution

The following deviations have been also identified in this solution. Although they are not directly related to enablers, they have been listed in this section because of their importance.

Deviation Description	Change Request to fix it
Split solution PJ.10-01a into two: • PJ.10-01a1 to cover eTMA environment (V3 maturity). • PJ.10-01a2 to cover En-Route environment (V2 maturity), will be linked to CM-0303	CR-03352 to create PJ.10-01a1 CR-03351 to create PJ.10-01a2
Create CM-0304b (eTMA) as split from CM-0304 and link to PJ.10-01a1	CR-03348
Update CM-0304 to TMA, set maturity “in operation” and remove from PJ.10-01a	CR-03345

Table 7: List of deviations in the SESAR Solution

3.1.1.2 Relevant Use Cases

4 Relevant use cases are identified in the OSED [38] in section 3.3.3.

3.1.1.2.1 En-Route Use Cases (V2 maturity)

Relevant use case is identified in the OSED [38] in section 3.3.3.1.1.

3.1.1.2.1.1 Coordination of a flight through a Multi-Sector area for strategic resolution of potential traffic conflicts

Having a potential conflict between an incoming aircraft and an aircraft inside, MSP coordinates a new route for the entry flight to avoid the potential conflict. If coordination is not successful then a new route is provided to the aircraft inside the Multi-Sector Area.

The following roles are involved in this use case:

Roles	Description
Multi Sector Planner	Detect potential conflicts caused by incoming aircrafts within the MSA and search for a resolution by means of managing new entry coordination conditions and/or propose a tactical action to the Executive Controller.
ATC Sector Executive Controller	Monitor aircrafts separation and adherence to clearance. It gives instructions to respect coordination agreements and/or tactical instructions proposed by Multi Sector Planner.
ATC Sector Planning Controller (Upstream Sector)	Assess new coordination proposal from the downstream sector and accept or reject it. Highlight to EC new coordination conditions to fulfil.

Table 8: List of Roles involved in "En-Route Coordination of a flight through a Multi-Sector area for strategic resolution of potential traffic conflicts"

The following functional blocks are involved in this use case:

Functional Block	Description
Controller Human Machine Interaction Management ER/APP	Has the functions to display planned conflict details, conformance alerts, coordination agreed data and highlight flight data. It has also all functions related with the input of data from the ATCO to the En-Route / Approach ATC system.
Coordination and Transfer	Responsible of performing the electronic coordination with the adjacent sector. It can send/receive a new coordination data request. In addition, it can abrogate a proposed coordination.

Table 9: List of Functional Blocks involved in "En-Route Coordination of a flight through a Multi-Sector area for strategic resolution of potential traffic conflicts"

The whole use case is mainly focused in the technical systems En-Route / Approach ATC (MSA and upstream sector), it uses the following system ports:

- "ATS_COORD_GND at ER ACC_CC" to send/receive OLDI/FMTP coordination data.
- "ATC_VOICE_GND at ER ACC_CC" is used for R/T to communicate with flight deck.

3.1.1.2.2 eTMA Use cases (V3 maturity)

3 relevant use cases are identified in the OSED [38] in section 3.3.3.2.

3.1.1.2.2.1 Coordination and sequencing of two flights landing within a Multi-Sector Area with horizontal Internal Boundaries

The following roles are involved in this use case:

Roles	Description
Multi Sector Planner	Assess the AMAN sequence and confirms the sequence on inbound flights. Manage new coordination conditions requests from sectors outside the MSA. Checks planned potential conflicts.
ATC Sector Executive Controller	It gives instructions to respect coordination agreements and/or tactical instructions proposed by Multi Sector Planner.

Table 10: List of Roles involved in "Coordination and sequencing of two flights landing within a Multi-Sector Area with horizontal Internal Boundaries"

The following functional blocks are involved in this use case:

Functional Block	Description
Arrival Management	Has the functionality to interact with the AMAN sequence.
Controller Human Machine Interaction Management ER/APP	Has the functions to display AMAN sequence, coordination requests, coordination acceptance and highlight flight data. It has also functions related with the input of data about acknowledgment of AMAN sequence, coordination request, acceptance of coordination requests and clearances.
Coordination and Transfer	Responsible of performing the electronic coordination with the approach unit ACC. It can send/receive new coordination data requests and/or coordination requests acceptance.

Table 11: List of Functional Blocks involved in "Coordination and sequencing of two flights landing within a Multi-Sector Area with horizontal Internal Boundaries"

The whole use case is mainly focused in the technical systems En-Route / Approach ATC (eTMA and approach unit ACC), it uses the following system ports:

- "ATS_COORD_GND at APP ACC_CC" to send/receive OLDI/FMTP coordination data.
- "ATC_VOICE_GND at APP ACC_CC" is used for R/T to communicate with flight deck.

3.1.1.2.2.2 Coordination of a flight departing within a Multi-Sector Area crossing horizontal internal sector Boundaries

The following roles are involved in this use case:

Roles	Description
Multi Sector Planner	Request new coordination conditions to adjacent sectors. Change internal MSA coordination conditions. Checks planned potential conflicts.
ATC Sector Executive Controller	It gives instructions to respect coordination agreements and/or tactical instructions proposed by Multi Sector Planner.

Table 12: List of Roles involved in "Coordination of a flight departing within a Multi-Sector Area crossing horizontal Internal sector Boundaries"

The following functional blocks are involved in this use case:

Functional Block	Description
Controller Human Machine Interaction Management ER/APP	Has the functions to display coordination requests and their results. It has also functions related with the input of data about coordination requests, coordination acceptance, setting new internal MSA coordination constraints and clearances.
Coordination and Transfer	Responsible of performing the electronic coordination with the departure ATS ACC and En-Route ATS ACC. It can send/receive new coordination data requests and/or coordination requests acceptance.

Table 13: List of Functional Blocks involved in "Coordination of a flight departing within a Multi-Sector Area crossing horizontal Internal sector Boundaries"

The whole use case is mainly focused in the technical systems En-Route / Approach ATC (departure ATS ACC and En-Route ATS), it uses the following system ports:

- "ATS_COORD_GND at APP ACC_CC" to send/receive OLDI/FMTP coordination data.

3.1.1.2.2.3 eTMA Transition from 1 MSP / 2 ECs --> 2 PCs / 2 ECs

The following roles are involved in this use case:

Roles	Description

Multi Sector Planner	Carry out the handover from MSP operation mode to conventional sectors: input new sectorization, coordinate with involved ATCOs and acknowledge new sectorization.
ATC Sector Executive Controller	Acknowledge new sectorization information.
ATC Sector Planning Controller	Coordinate with Multi Sector Planner and acknowledge new sectorization.

Table 14: List of Roles involved in "eTMA Transition from 1 MSP / 2 ECs --> 2 PCs / 2 ECs"

The following functional blocks are involved in this use case:

Functional Block	Description
Controller Human Machine Interaction Management ER/APP	Has the functions to display new sectorization allocation. It has also functions related with the input of data about new sectorization allocation and acknowledgment of it.
Operational Supervision ER/APP ATC	Internal functions related with the management of the sectorization.

Table 15: List of Functional Blocks involved in "eTMA Transition from 1 MSP / 2 ECs --> 2 PCs / 2 ECs"

The whole use case is mainly focused in the technical systems En-Route / Approach ATC, no communication with others technical systems are performed.

3.1.1.3 Applicable standards and regulations

Regulations

There is no specific topic in the field of the regulatory framework to be considered within the SESAR Solution PJ.10-01a, beyond the applicable regulations currently existing.

Standards

There is no specific topic in the field of the standardization framework to be considered within the SESAR Solution PJ.10-01a, beyond the applicable standards currently existing.

3.1.2 Capability Configurations required for the SESAR Solution

SESAR Solution ID and Title	Capability Configurations (CCs) (from EATMA)	Sub-Operating Environment(s) where the CCs operate	Capabilities (from EATMA)	Nodes (from EATMA)	Stakeholders (from EATMA)
PJ.10-01a High Productivity Controller Team Organisation	ER ACC	En-Route	Clearance/Instruction Management Coordination and Transfer Separation Management Trajectory Conformance Monitoring;	En-Route/Approach ATS	Air Navigation Service Provider
	APP ACC	TMA	Airspace Reservation Management Arrival Sequencing Clearance/Instruction Management Coordination and Transfer Separation Management Trajectory Conformance Monitoring;	En-Route/Approach ATS	Air Navigation Service Provider
	Civil Aircraft	En-Route TMA	Clearance/Instruction Management;	Flight Deck	Airspace users

Table 16: List of Capability Configuration required for the SESAR Solution

3.2 Changes imposed by the SESAR Solution on the baseline Architecture

3.2.1 V2 Changes

Enabler ID (from EATMA)	Enabler Title (from EATMA)	Changes
ER APP ATC 96	ATC System Support to Permit a Single Planner Role Associated to Multiple Tactical Roles	"Display Planned Conflicts" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to allow to display potential conflicts within the MSA (taking into account what-if of new entry coordination data or tactical instruction). "Input Probe New Entry Coordination Conditions" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to allow to input a what-if of new entry coordination data taking into account the whole MSA area. "Input Probe Tactical Instruction" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to allow to input a what-if of new entry tactical instruction taking into account the whole MSA area. "Input Request New Entry Coordination" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to allow to input a new entry coordination proposal taking into account that the sector boundary is the MSA. "Display Abrogate Coordination" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to allow to display that a coordination proposal was rejected by the adjacent sector to the MSA. "Input Highlight Flight Data" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to allow an ATCO to highlight data. "Display Highlight Flight Data" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to display flight data highlighted. "Send Entry Coordination Request" Function in "Coordination and Transfer" Functional Block shall be modified to allow to send electronic coordinations using OLDI standard and FMTP protocol. "Process Entry Coordination Request" Function in "Coordination and Transfer" Functional Block shall be modified to allow to receive electronic coordinations using OLDI standard and FMTP protocol "Send Abrogate Coordination" Function in "Coordination and Transfer" Functional Block shall be modified to allow to send a rejection to a coordination proposal using OLDI standard and FMTP protocol. "Send Abrogate Coordination" Function in "Coordination and Transfer" Functional Block shall be modified to allow to

		receive a rejection to a coordination proposal using OLDI standard and FMTP protocol.

Table 17: List of changes due to the SESAR Solution (V2 changes)

3.2.2 V3 Changes

Enabler ID (from EATMA)	Enabler Title (from EATMA)	Changes
ER APP ATC 96	ATC System Support to Permit a Single Planner Role Associated to Multiple Tactical Roles	"Display Entry Coordination" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to display the details of a new entry coordination request. "Display Entry Coordination Acceptance" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to display the result of an entry coordination request. "Display Exit Coordination" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to display the details of a new exit coordination request. "Display Exit Coordination Acceptance" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to display the result of an exit coordination request. "Display Highlight Flight Data" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to display flight data highlighted. "Display New Internal MSA Coordination Conditions" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to display new coordination conditions in the internal sector boundaries that make up the MSA. "Display New Sectorization Allocation" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to display sectorization allocation proposal (MSA or conventional sectors). "Input Acknowledge Sectorization Allocation" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to allow to input the acknowledgment of a new sectorization allocation proposal (MSA or conventional sectors). "Input Entry Coordination Request Acceptance" Function in "Controller Human Machine Interaction Management ER/APP"

		Functional Block shall be modified to allow to input the acceptance of an entry coordination request. "Input Exit Coordination Request Acceptance" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to allow to input the acceptance of an exit coordination request. "Input New Internal MSA Coordination Conditions" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to allow to input new coordination conditions in the internal sector boundaries that make up the MSA. "Input Request New Entry Coordination" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to allow to input a new entry coordination proposal taking into account that the sector boundary is the MSA. "Input Request New Exit Coordination" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to allow to input a new exit coordination proposal taking into account that the sector boundary is the MSA. "Input Sectorization Allocation" Function in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be modified to allow to input a new sectorization allocation proposal (MSA or conventional sectors). "Send Entry Coordination Request" Function in "Coordination and Transfer" Functional Block shall be modified to allow to send electronic coordinations using OLDI standard and FMTP protocol. "Send Entry Coordination Request Acceptance" Function in "Coordination and Transfer" Functional Block shall be modified to allow to send electronic coordinations aceptance using OLDI standard and FMTP protocol. "Send Exit Coordination Request" Function in "Coordination and Transfer" Functional Block shall be modified to allow to send electronic coordinations using OLDI standard and FMTP protocol. "Process Entry Coordination Request" Function in "Coordination and Transfer" Functional Block shall be modified to allow to receive electronic coordinations using OLDI standard and FMTP protocol. "Process Entry Coordination Request Acceptance" Function in "Coordination and Transfer" Functional Block shall be modified to allow to receive electronic coordinations acceptance using OLDI standard and FMTP protocol.

		"Process Exit Coordination Request" Function in "Coordination and Transfer" Functional Block shall be modified to allow to receive electronic coordinations using OLDI standard and FMTP protocol. "Process Exit Coordination Request Acceptance" Function in "Coordination and Transfer" Functional Block shall be modified to allow to receive electronic coordinations acceptance using OLDI standard and FMTP protocol. "Process Sectorization Allocation" Function in "Operational Supervision ER/APP ATC" Functional Block shall be modified to process internally sectorization allocation. "Process Sectorization Allocation Acknowledgment" Function in "Operational Supervision ER/APP ATC" Functional Block shall be modified to process internally sectorization allocation acknowledgement.

Table 18: List of changes due to the SESAR Solution (V3 changes)

4 Technical Specifications

4.1 Functional architecture overview

This Technical Specification is mainly focused in the following functional blocks:

- Controller Human Machine Interaction Management ER/APP
- Coordination and Transfer

V2 Functions and Functional Blocks/Roles

The following table contains the relation between Functions and Functional Blocks/Systems/Role used in this solution in the En-Route (V2) functional diagrams:

Function	Functional Block	Role	System
Assume Flight (PJ.10-01a); Instruct flight to contact next unit (PJ.10-01a); Monitor Clearance Implementation (PJ.10-01a); Provide Tactical Instruction (PJ.10-01a); Select Clearance to Respect Agreed constraint or Coordination (PJ.10-01a);		ATC Sector Executive Controller (PJ.10-01a)	
Display Abrogate Coordination (PJ.10-01a); Display Conformance State (PJ.10-01a); Display Entry Coordination (PJ.10-01a); Display Highlight Flight Data (PJ.10-01a); Display Planned Conflicts (PJ.10-01a); Display Probed Conflict (PJ.10-01a);	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)		

Input Assume Flight (PJ.10-01a); Input Clearance (PJ.10-01a); Input Highlight Flight Data (PJ.10-01a); Input Probe New Entry Coordination Conditions (PJ.10-01a); Input Probe Tactical Instruction (PJ.10-01a); Input Request New Entry Coordination (PJ.10-01a); Input Send Flight to Next Unit (PJ.10-01a); Input Abrogate Coordination (PJ.10-01a);			
Process Abrogate Coordination (PJ.10-01a); Process Entry Coordination Request (PJ.10-01a); Send Abrogate Coordination (PJ.10-01a); Send Entry Coordination Request (PJ.10-01a);	Coordination and Transfer (PJ.10-01a)		
Assess Result (PJ.10-01a); Check Planned Potential Conflicts (PJ.10-01a); Highlight Flight Data (PJ.10-01a); Probe Tactical Instruction (PJ.10-01a); Request New Entry Coordination (PJ.10-01a); Search for New Entry Coordination Condition to Solve Conflict (PJ.10-01a);		Multi Sector Planner (PJ.10-01a)	
Instruct flight to contact next unit (PJ.10-01a);		ATC Sector Executive Controller (PJ.10-01a)	

Select Clearance to Respect Agreed constraint or Coordination (PJ.10-01a);			
Abrogate Coordination (PJ.10-01a); Check Planned Potential Conflicts (PJ.10-01a); Highlight Flight Data (PJ.10-01a);		ATC Sector Planning Controller (PJ.10-01a)	

Table 19: Relation between Function and Functional Blocks/Systems/Role in V2 diagrams

V3 Functions and Functional Blocks/Roles

The following table contains the relation between Functions and Functional Blocks/Systems/Role used in this solution in the eTMA (V3) functional diagrams:

Function	Functional Block	Role	System
eTMA - Coordination and sequencing of two flights landing within a Multi-Sector Area			
Acknowledge Aircraft in AMAN (PJ.10-01a); Display Arrival Sequence (PJ.10-01a); Display Entry Coordination Acceptance (PJ.10-01a); Display Entry Coordination (PJ.10-01a); Display Highlight Flight Data (PJ.10-01a); Input Clearance (PJ.10-01a); Input Entry Coordination Request Acceptance (PJ.10-01a); Input Request New Entry Coordination (PJ.10-01a); Input Send Flight to Next Unit (PJ.10-01a);	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)		
Process Entry Coordination Request Acceptance (PJ.10-01a);	Coordination and Transfer (PJ.10-01a)		

Process Entry Coordination Request (PJ.10-01a); Send Entry Coordination Request (PJ.10-01a); Send Entry Coordination Request Acceptance (PJ.10-01a);			
Arrival Management;	Arrival Management		
Instruct flight to contact next unit (PJ.10-01a); Provide Tactical Instruction (PJ.10-01a); Provide Tactical Instruction (PJ.10-01a);		ATC Sector Executive Controller (PJ.10-01a)	
Assess AMAN Sequence (PJ.10-01a); Check Planned Potential Conflicts (PJ.10-01a); Check Planned Potential Conflicts (PJ.10-01a); Coordinate with Executive Controllers (PJ.10-01a);		Multi Sector Planner (PJ.10-01a)	
eTMA - Coordination of a flight departing within a Multi-Sector Area crossing horizontal Internal Boundaries			
Provide Tactical Instruction (PJ.10-01a);		ATC Sector Executive Controller (PJ.10-01a)	
Display Entry Coordination Acceptance (PJ.10-01a); Display Exit Coordination Acceptance (PJ.10-01a); Display Exit Coordination (PJ.10-01a); Display New Internal MSA Coordination Conditions (PJ.10-01a); Input Clearance (PJ.10-01a); Input New Internal MSA Coordination Conditions (PJ.10-01a); Input Request New Entry Coordination (PJ.10-01a);	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)		

Input Request New Exit Coordination (PJ.10-01a); Input Entry Coordination Request Acceptance (PJ.10-01a); Input Exit Coordination Request Acceptance (PJ.10-01a);			
Process Entry Coordination Request Acceptance (PJ.10-01a); Process Entry Coordination Request (PJ.10-01a); Process Exit Coordination Request Acceptance (PJ.10-01a); Process Exit Coordination Request (PJ.10-01a); Send Entry Coordination Request (PJ.10-01a); Send Exit Coordination Request (PJ.10-01a); Send Entry Coordination Request Acceptance (PJ.10-01a); Send Exit Coordination Request Acceptance (PJ.10-01a);	Coordination and Transfer (PJ.10-01a)		
Check Planned Potential Conflicts (PJ.10-01a);		ATC Sector Planning Controller (PJ.10-01a)	
Change Internal MSA Coordination Conditions (PJ.10-01a); Check Planned Potential Conflicts (PJ.10-01a); Check Planned Potential Conflicts (PJ.10-01a); Request New Entry Coordination (PJ.10-01a); Request New Exit Coordination (PJ.10-01a);		Multi Sector Planner (PJ.10-01a)	
eTMA -Transition from 1 MSP / 2 ECs --> 2 PCs / 2 ECs			

Acknowledge Sectorization Allocation (PJ.10-01a);		ATC Sector Executive Controller (PJ.10-01a)	
Acknowledge Sectorization Allocation (PJ.10-01a); Coordinate Handover from MSP to Conventional Sectors (PJ.10-01a);		ATC Sector Planning Controller (PJ.10-01a)	
Display New Sectorization Allocation (PJ.10-01a); Input Acknowledge Sectorization Allocation (PJ.10-01a); Input Sectorization Allocation (PJ.10-01a);	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)		
Acknowledge Sectorization Allocation (PJ.10-01a); Coordinate Handover from MSP to Conventional Sectors (PJ.10-01a); Prepare Handover from MSP to Conventional Sectors (PJ.10-01a);		Multi Sector Planner (PJ.10-01a)	
Process Sectorization Allocation (PJ.10-01a); Process Sectorization Allocation (PJ.10-01a);	Operational Supervision ER/APP ATC (PJ.10-01a)		

Table 20: Relation between Function and Functional Blocks/Systems/Role in V3 diagrams

4.1.1 Resource Connectivity Model

4.1.1.1 Resource Connectivity Model for En-Route (V2 maturity)

This view describes the Resource Connectivity in En-Route for Solution PJ.10-01a.

It includes the realization of Use Cases:

- En Route - Coordination of a flight through a Multi-Sector area for strategic resolution of potential traffic conflicts

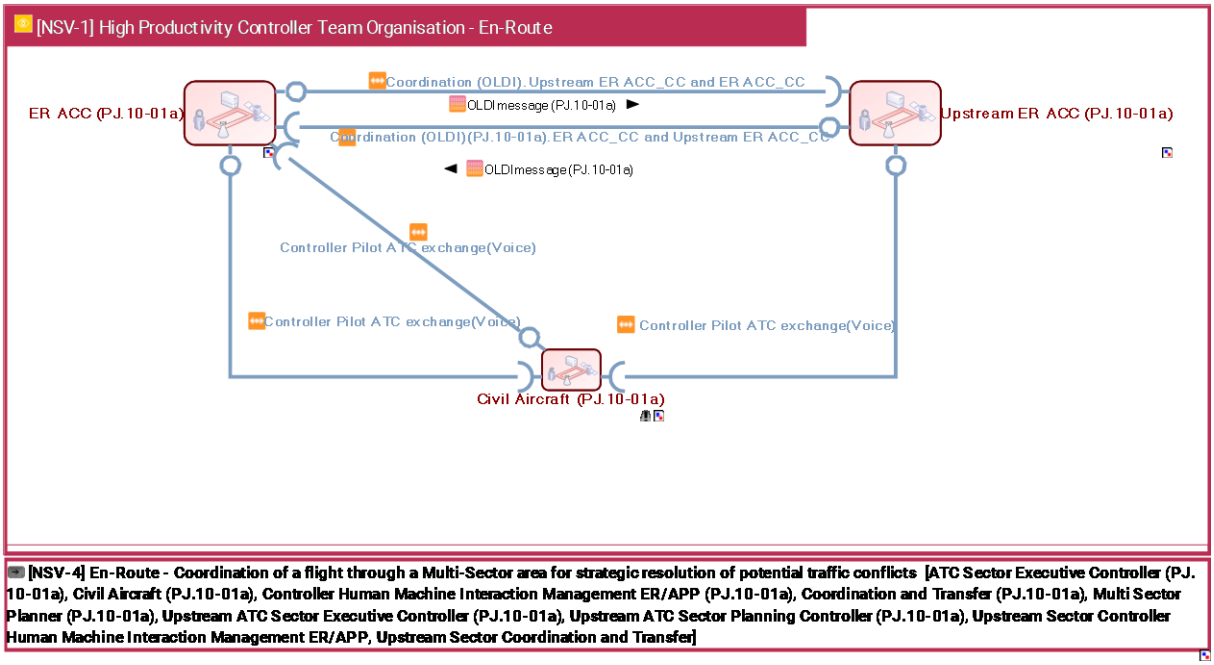


Figure 1: Resource Connectivity Model for En-Route

4.1.1.2 Resource Connectivity Model for eTMA (V3 maturity)

This view describes the Resource Connectivity for eTMA in Solution PJ.10-01a

It includes the realization of Use Cases:

- eTMA - Coordination and sequencing of two flights landing within a Multi-Sector Area

- eTMA - Coordination of a flight departing withing a Multi-Sector Area crossing horizontal Internal Boundaries

- eTMA -Transition from 1 MSP / 2 ECs --> 2 PCs / 2 ECs

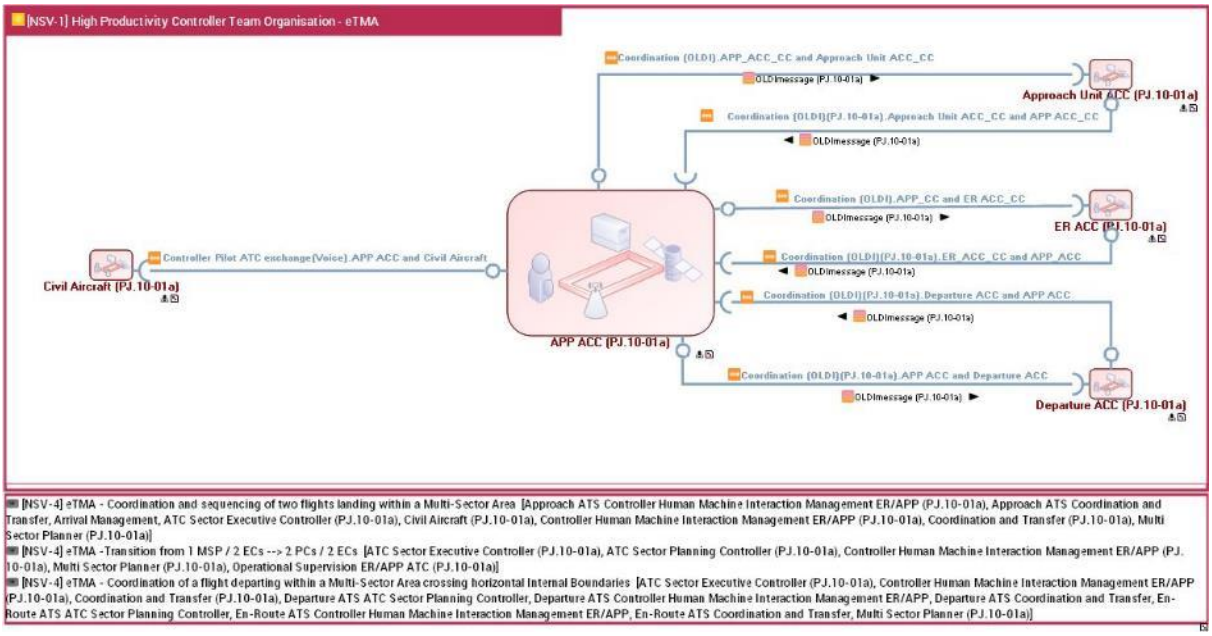


Figure 2: Resource Connectivity Model for eTMA

4.1.2 Resource Orchestration view

4.1.2.1 Resource Orchestration view for En-Route (V2 maturity)

The following Function Context Diagrams show the sequence of Functions among Functional Blocks/Roles.

4.1.2.1.1 Coordination of a flight through a Multi-Sector area for strategic resolution of potential traffic conflicts

This diagram describes the use case "En-Route - Coordination of a flight through a Multi-Sector Area for strategic resolution of potential traffic conflicts".

Having a potential conflict between an incoming aircraft and an aircraft inside, MSP coordinates a new route for the entry flight to avoid the potential conflict. If coordination is not successful then a new route is provided to the aircraft inside the Multi-Sector Area.

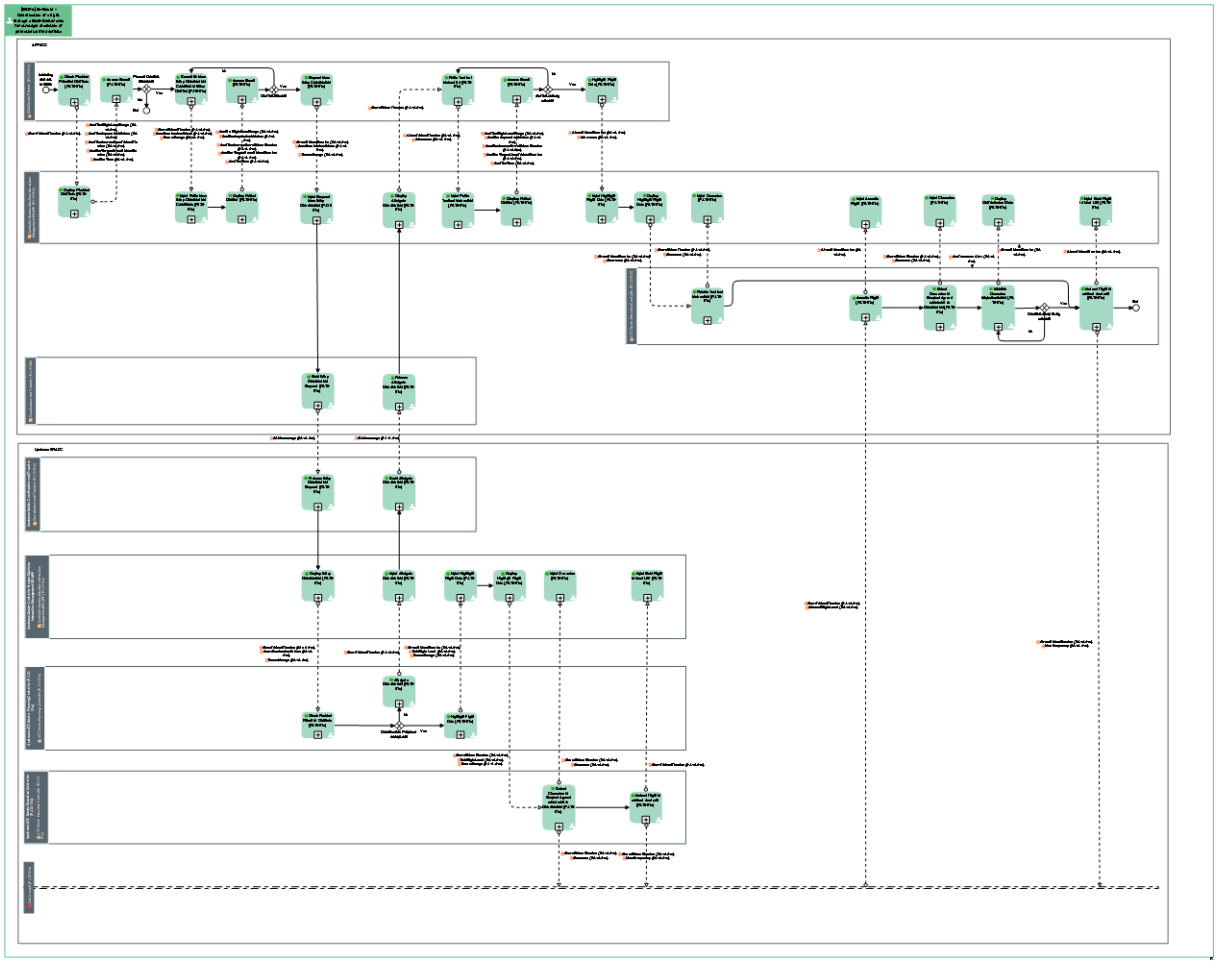


Figure 3: En-Route - Coordination of a flight through a Multi-Sector area for strategic resolution of potential traffic conflicts Resource Orchestration Model

Function	Description
Abrogate Coordination (PJ.10-01a)	Following the agreement of a set of coordination data, the controller team abrogates the coordination via the HMI.
Assess Result (PJ.10-01a)	ATCO evaluates the result of a previous function.
Assume Flight (PJ.10-01a)	Executive Controller assumes control of the flight and may now issue ATC clearances and instructions to the flight.
Check Planned Potential Conflicts (PJ.10-01a)	Checks if for an aircraft there could be a potential conflict based on its planned trajectory and its coordination agreed data (EntryFlightLevel, ExitFlightLevel, etc...).

Display Abrogate Coordination (PJ.10-01a)	Display coordination abrogation to MultiSector Planner.
Display Conformance State (PJ.10-01a)	Display (or undisplay) the different conformance monitoring alerts (vertical, horizontal, etc...)
Display Entry Coordination (PJ.10-01a)	Display entry coordination proposal
Display Highlight Flight Data (PJ.10-01a)	Highlights specific flight data to inform Executive Controller
Display Planned Conflicts (PJ.10-01a)	Display (or undisplay) the planned conflicts detected
Display Probed Conflict (PJ.10-01a)	Display the planned conflicts detected with a what-if subject/environment flight plan.
Highlight Flight Data (PJ.10-01a)	Highlights specific flight data to inform Executive Controller
Input Abrogate Coordination (PJ.10-01a)	Planning Controller inputs abrogation of the coordination via the HMI.
Input Assume Flight (PJ.10-01a)	Executive Controller inputs "assume flight" into the CWP
Input Clearance (PJ.10-01a)	Executive Controller inputs clearance into the CWP
Input Highlight Flight Data (PJ.10-01a)	Input highlight information to be displayed to Executive Controller.
Input Probe New Entry Coordination Conditions (PJ.10-01a)	MultiSector Planner probes (what-if) a new entry coordination conditions (entry flight level or new route) to assess the impact of it without affecting the actual flight. After evaluating the impact, ATCO may confirm/implement or cancel.
Input Probe Tactical Instruction (PJ.10-01a)	ATCO inputs to the HMI a probe (what-if) of a new clearance (clear flight level, open heading, etc.) to assess the impact of it without affecting the actual flight. After evaluating the impact, ATCO may confirm/implement or cancel.
Input Request New Entry Coordination (PJ.10-01a)	Input into the CWP the entry coordination data

Input Send Flight to Next Unit (PJ.10-01a)	Executive Controller inputs into the CWP that this flight has been handed over.
Instruct flight to contact next unit (PJ.10-01a)	The executive controller in the Transferring ATSU uses a CPDLC message (or alternatively a verbal instruction via voice communications) to instruct the aircraft to change communication frequency to the Accepting ATSU''s frequency.
Monitor Clearance Implementation (PJ.10-01a)	Executive Controller, assisted by a conformance monitoring tool, monitor the progress of the aircraft with respect to the given clearance to ensure that the problem is solved.
Probe Tactical Instruction (PJ.10-01a)	ATCO probes (what-if) a new clearance (clear flight level, open heading, etc.) to assess the impact of it without affecting the actual flight. After evaluating the impact, ATCO may confirm/implement or cancel.
Process Abrogate Coordination (PJ.10-01a)	Process coordination proposal abrogation.
Process Entry Coordination Request (PJ.10-01a)	Process an electronic coordination request
Provide Tactical Instruction (PJ.10-01a)	Executive Controller give instruction to aircraft and input it into the HMI
Request New Entry Coordination (PJ.10-01a)	MultiSector Planner requests new input coordination conditions
Search for New Entry Coordination Condition to Solve Conflict (PJ.10-01a)	MultiSector Planner probes (what-if) new entry coordination conditions to assess if it would solve the conflict.
Select Clearance to Respect Agreed constraint or Coordination (PJ.10-01a)	Executive Controller inputs clearance to fulfill constraint or coordination agreement.
Send Abrogate Coordination (PJ.10-01a)	Send coordination proposal abrogation.
Send Entry Coordination Request (PJ.10-01a)	Send an electronic coordination request

4.1.2.2 Resource Orchestration view for eTMA (V3 maturity)

4.1.2.2.1 eTMA - Coordination and sequencing of two flights landing within a Multi-Sector Area

This diagram describes the use case "eTMA - Coordination and sequencing of two flights landing within a Multi-Sector Area with horizontal internal boundaries".

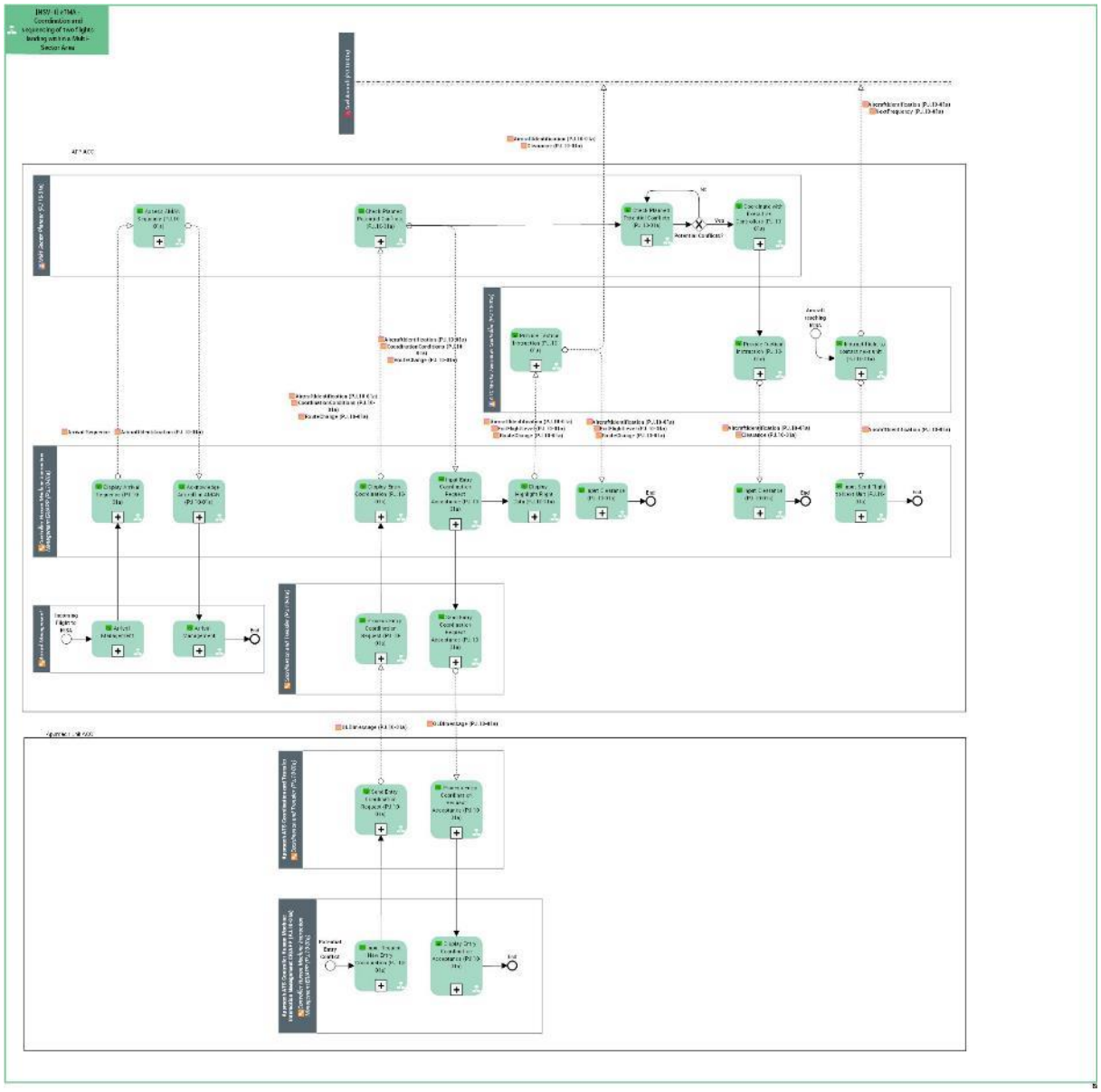


Figure 4: eTMA - Coordination and sequencing of two flights landing within a Multi-Sector Area

Function	Description

Acknowledge Aircraft in AMAN (PJ.10-01a)	Aircraft is acknowledged in the AMAN.
Arrival Management	The Arrival Management functional block is responsible for determining an optimal arrival sequence at designated aerodromes, providing associated advisories such as time to lose/gain at the metering point and compute a Controlled Time of Arrival based on downlinked ETA min/max to be assessed by ATCOs. The sequence and advisories are distributed to the Controller Working Positions and to external clients. The AMAN also allows the controller to manually alter the arrival sequence. AMAN also provides a subset of the arrival sequences restricted to the part of the approach where TBS (Time Based Separation) procedures are in operation. The required time separation between successive aircraft is calculated and converted to an effective distance which is provided in the sequence to support display and monitoring. In step 1 the AMAN may interact with a DMAN in Master/Slave configuration in order to manage a runway in mixed mode operations. The AMAN is the Master and manages patterns indicating the way to mix arrivals and departures, and the corresponding distances between 2 arrivals surrounding one or several departures. The AMAN also forwards to CHMI the departure sequences received from the DMAN. Note that AMAN is clearly described here from a logical function perspective, assuming that all the depicted input dataflows are perfectly suitable, especially for trajectory data which is a critical input for producing efficient and realistic sequences.
Assess AMAN Sequence (PJ.10-01a)	MultiSector Planner assesses the AMAN sequence and confirms the AMAN sequence of inbound flows by acknowledging the aircraft in the AMAN.
Check Planned Potential Conflicts (PJ.10-01a)	Checks if for an aircraft there could be a potential conflict based on its planned trajectory and its coordination agreed data (EntryFlightLevel, ExitFlightLevel, etc...).
Coordinate with Executive Controllers (PJ.10-01a)	Multi Sector Planner Controller coordinates with his/her Executive Controllers how to solve a potential conflict.
Display Arrival Sequence (PJ.10-01a)	Display the arrival sequence.
Display Entry Coordination (PJ.10-01a)	Display entry coordination proposal
Display Entry	Display entry coordination result

Coordination Acceptance (PJ.10-01a)	
Display Highlight Flight Data (PJ.10-01a)	Highlights specific flight data to inform Executive Controller
Input Clearance (PJ.10-01a)	Executive Controller inputs clearance into the CWP
Input Entry Coordination Request Acceptance (PJ.10-01a)	Coordination request acceptance is input into the system.
Input Request New Entry Coordination (PJ.10-01a)	Input into the CWP the entry coordination data
Input Send Flight to Next Unit (PJ.10-01a)	Executive Controller inputs into the CWP that this flight has been handed over.
Instruct flight to contact next unit (PJ.10-01a)	The executive controller in the Transferring ATSU uses a CPDLC message (or alternatively a verbal instruction via voice communications) to instruct the aircraft to change communication frequency to the Accepting ATSU''s frequency.
Process Entry Coordination Request (PJ.10-01a)	Process an electronic coordination request
Process Entry Coordination Request Acceptance (PJ.10-01a)	Process an electronic coordination request acceptance.
Provide Tactical Instruction (PJ.10-01a)	Executive Controller give instruction to aircraft and input it into the HMI
Send Entry Coordination Request (PJ.10-01a)	Send an electronic coordination request
Send Entry Coordination Request Acceptance (PJ.10-01a)	Send an electronic coordination request acceptance to the requesting sector.

4.1.2.2.2 eTMA - Coordination of a flight departing withing a Multi-Sector Area crossing horizontal Internal Boundaries

This diagram describes the use case "eTMA - Coordination of a flight departing withing a Multi-Sector Area crossing horizontal Internal Boundaries".

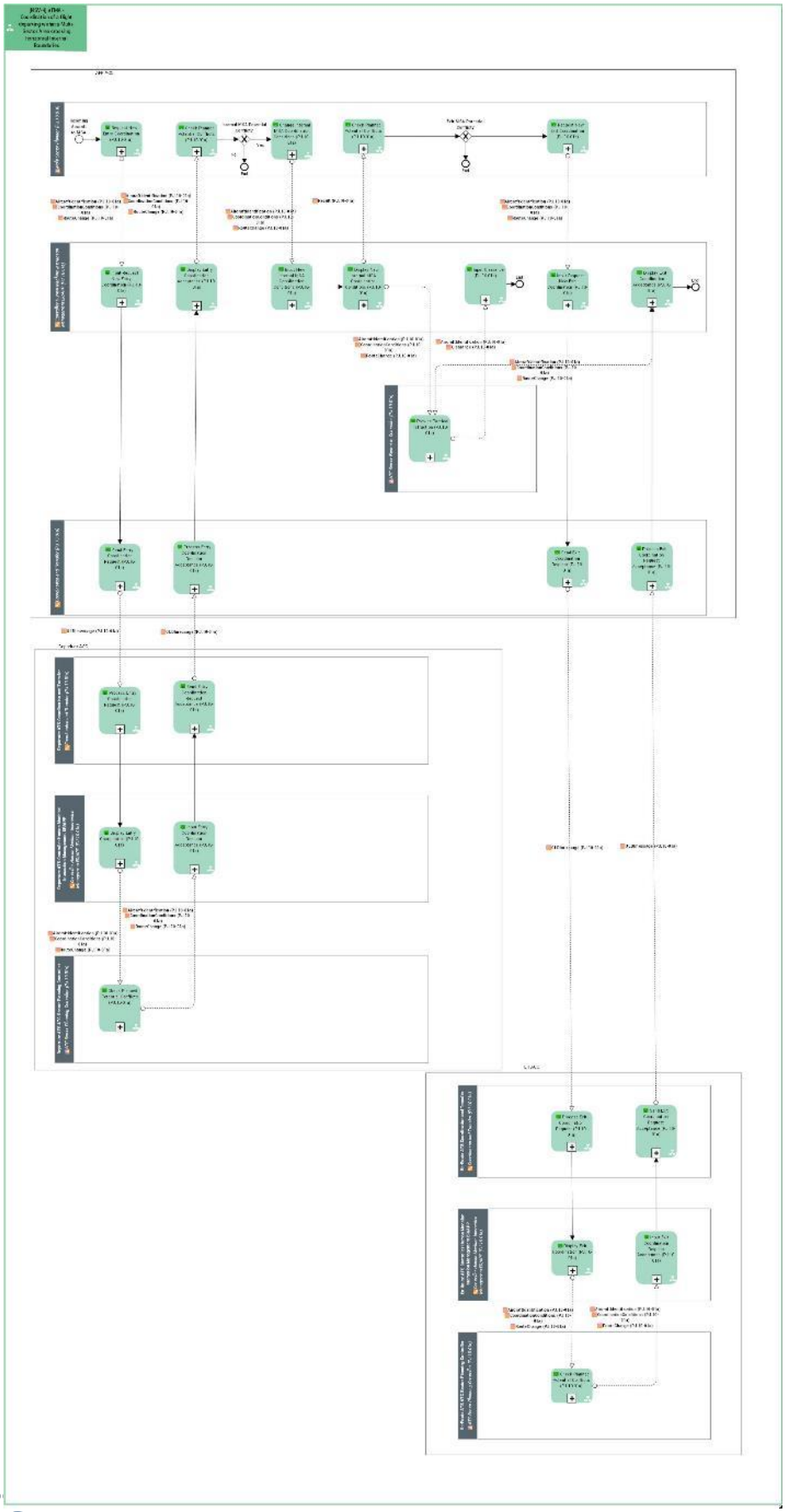


Figure 5: eTMA - Coordination of a flight departing withing a Multi-Sector Area crossing horizontal Internal Boundaries

Function	Description
Change Internal MSA Coordination Conditions (PJ.10-01a)	In a Multi Sector Planner environment, Multi Sector Planner change internal coordination conditions (i.e. internal exit flight level) between two executive sectors under the Multi Sector Area.
Check Planned Potential Conflicts (PJ.10-01a)	Checks if for an aircraft there could be a potential conflict based on its planned trajectory and its coordination agreed data (EntryFlightLevel , ExitFlightLevel, etc...).
Display Entry Coordination (PJ.10-01a)	Display entry coordination proposal
Display Entry Coordination Acceptance (PJ.10-01a)	Display entry coordination result
Display Exit Coordination (PJ.10-01a)	Display entry coordination proposal
Display Exit Coordination Acceptance (PJ.10-01a)	Display entry coordination result
Display New Internal MSA Coordination Conditions (PJ.10-01a)	In a Multi Sector Area, new internal coordination conditions (i.e. internal exit flight level) between two executive sectors are displayed to the involved Executive Controllers.
Input Clearance (PJ.10-01a)	Executive Controller inputs clearance into the CWP
Input Entry Coordination Request Acceptance (PJ.10-01a)	Coordination request acceptance is input into the system.
Input Exit Coordination Request Acceptance (PJ.10-01a)	Coordination request acceptance is input into the system.
Input New Internal MSA Coordination Conditions (PJ.10-01a)	In a Multi Sector Area new internal coordination conditions (i.e. internal exit flight level) between two executive sectors are input.

Input Request New Entry Coordination (PJ.10-01a)	Input into the CWP the entry coordination data
Input Request New Exit Coordination (PJ.10-01a)	Input into the CWP the exit coordination data
Process Entry Coordination Request (PJ.10-01a)	Process an electronic coordination request
Process Entry Coordination Request Acceptance (PJ.10-01a)	Process an electronic coordination request acceptance.
Process Exit Coordination Request (PJ.10-01a)	Process an electronic coordination request
Process Exit Coordination Request Acceptance (PJ.10-01a)	Process an electronic coordination request acceptance.
Provide Tactical Instruction (PJ.10-01a)	Executive Controller give instruction to aircraft and input it into the HMI
Request New Entry Coordination (PJ.10-01a)	MultiSector Planner requests new input coordination conditions
Request New Exit Coordination (PJ.10-01a)	MultiSector Planner requests new exit coordination conditions
Send Entry Coordination Request (PJ.10-01a)	Send an electronic coordination request
Send Entry Coordination Request Acceptance (PJ.10-01a)	Send an electronic coordination request acceptance to the requesting sector.
Send Exit Coordination Request (PJ.10-01a)	Send an electronic coordination request
Send Exit Coordination Request Acceptance (PJ.10-01a)	Send an electronic coordination request acceptance to the requesting sector.

4.1.2.2.3 eTMA -Transition from 1 MSP / 2 ECs --> 2 PCs / 2 ECs

This diagram describes the use case "eTMA - eTMA Transition from 1 MSP / 2 ECs --> 2 PCs / 2 ECs".

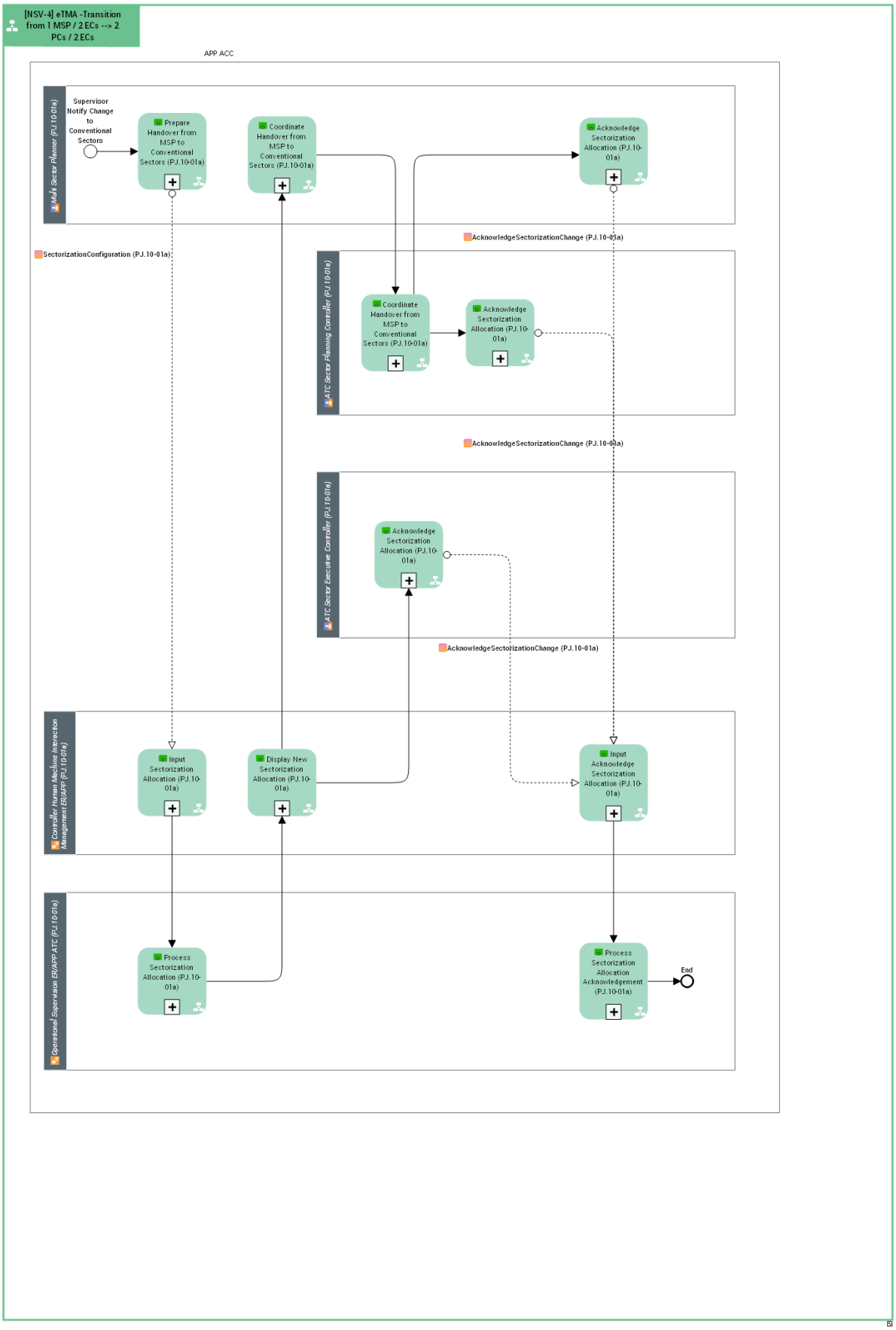

[NSV-4] eTMA -Transition from 1 MSP / 2 ECs --> 2 PCs / 2 ECs
APP ACC
Multi Sector Planner (PJ.10-01a)
Supervisor Notify Change to Conventional Sectors
Prepare Handover from MSP to Conventional Sectors (PJ.10-01a)
Coordinate Handover from MSP to Conventional Sectors (PJ.10-01a)
Acknowledge Sectorization Allocation (PJ.10-01a)
SectorizationConfiguration (PJ.10-01a)
AcknowledgeSectorizationChange (PJ.10-01a)
ATC Sector Planning Controller (PJ.10-01a)
Coordinate Handover from MSP to Conventional Sectors (PJ.10-01a)
Acknowledge Sectorization Allocation (PJ.10-01a)
AcknowledgeSectorizationChange (PJ.10-01a)
ATC Sector Executive Controller (PJ.10-01a)
Acknowledge Sectorization Allocation (PJ.10-01a)
AcknowledgeSectorizationChange (PJ.10-01a)
Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
Input Sectorization Allocation (PJ.10-01a)
Display New Sectorization Allocation (PJ.10-01a)
Input Acknowledge Sectorization Allocation (PJ.10-01a)
Operational Supervision ER/APP ATC (PJ.10-01a)
Process Sectorization Allocation (PJ.10-01a)
Process Sectorization Allocation Acknowledgement (PJ.10-01a)
End

Figure 6: eTMA -Transition from 1 MSP / 2 ECs --> 2 PCs / 2 ECs

Function	Description
Acknowledge Sectorization Allocation (PJ.10-01a)	ATCO acknowledges the new sectorization allocation.
Coordinate Handover from MSP to Conventional Sectors (PJ.10-01a)	MultiSector Planner coordinates the hand-over from MultiSector Area to convetional sectors with his/her Executive Controllers.
Display New Sectorization Allocation (PJ.10-01a)	Display a sectorization allocation to be acknowledged by ATCOs involved.
Input Acknowledge Sectorization Allocation (PJ.10-01a)	HMI to input sectorization allocation acknowledgement.
Input Sectorization Allocation (PJ.10-01a)	HMI to input new sectorization allocation.
Prepare Handover from MSP to Conventional Sectors (PJ.10-01a)	MultiSector Planner prepares the hand-over from MultiSector Area to convetional sectors, coordinate this change with his/her Executive Controllers.
Process Sectorization Allocation (PJ.10-01a)	New sectorization allocation is processed, it will take effect as soon as it is acknowledged by every ATCO involved.
Process Sectorization Allocation Acknowledgement (PJ.10-01a)	Pending new sectorization allocation is acknowledged.

4.1.3 Infrastructure connectivity model

4.1.3.1 Infrastructure connectivity model for En-Route (V2 maturity)

The following Infrastructure Connectivity Diagrams describe how the technical infrastructure physically connects the different Technical Systems in order to realize the logical Resource Interactions in En-Route environment.

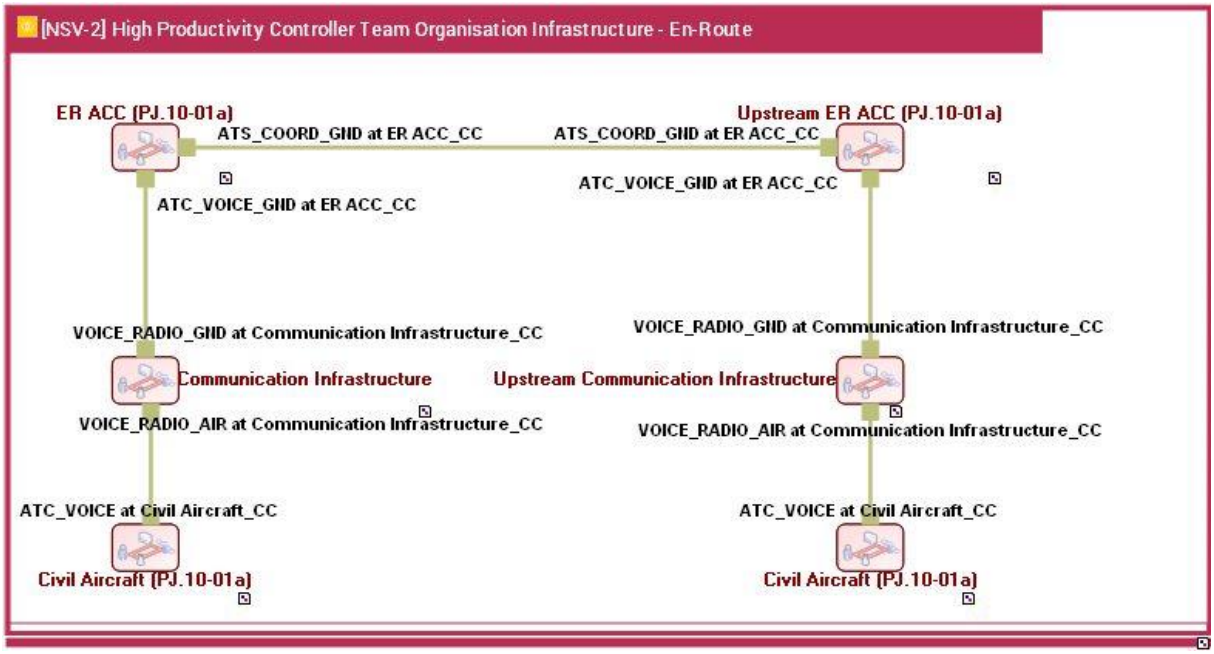


Figure 7: Infrastructure connectivity model for En-Route

4.1.3.2 Infrastructure connectivity model for eTMA (V3 maturity)

The following Infrastructure Connectivity Diagrams describe how the technical infrastructure physically connects the different Technical Systems in order to realize the logical Resource Interactions in eTMA environment.

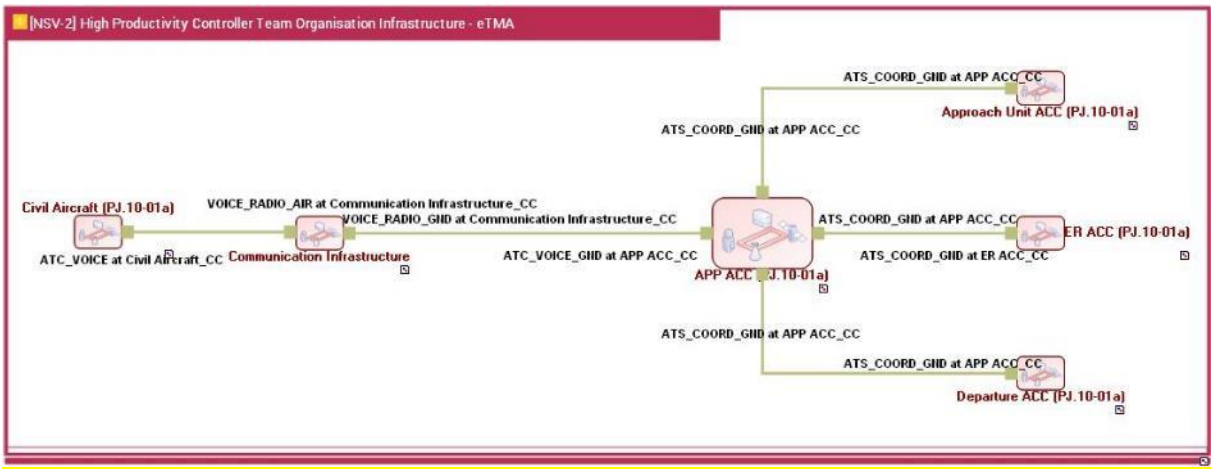


Figure 8: Infrastructure connectivity model for eTMA

4.1.4 Service view

4.1.4.1 Service description

Not applicable in this solution as legacy communication technologies (Voice, OLDI) has been used.

4.1.4.2 Service Provisioning

Not applicable in this solution.

4.1.4.3 Service Realization

Not applicable in this solution.

4.2 Functional and non-Functional Requirements

The main purpose of these requirements is to define the system that support this solution. Technical requirements have been derived from the operational requirements defined in the OSED Part I [38]. A requirement labelled as "<validated>" means that the requirement is verified and involved in a validation exercise that achieved V3, for these validated requirements, the rationale indicates the related validation exercise.

All technical requirements are available in the SE-DMF tool in the solution folder and have been exported to this document.

4.2.1 V2 Requirements

[REQ]

Identifier	REQ-10.01a2-TS-MSP.002
Title	Highlight of callsign at the MSP CWP
Requirement	The MSP working position shall allow highlighting the callsign of a specific flight upon receiving an ident from aircraft.
Status	<in progress>
Rationale	The indication on a specific flight will facilitate the MSP tasks, as the recognition of flights will be quicker.
Category	<Functional> , <HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0002
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0012
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0013

<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0029
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
<ALLOCATED_TO>	<Role>	Multi Sector Planner (PJ.10-01a)
<ALLOCATED_TO>	<Function>	Display Highlight Flight Data (PJ.10-01a) Highlight Flight Data (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	New ER Enabler (CR-03641 in progress)

[REQ]

Identifier	REQ-10.01a2-TS-MSP.003
Title	Identification of callsign of calling aircraft
Requirement	The CWP HMI for the MSP shall allow identifying an aircraft in communication on a specific frequency.
Status	<in progress>
Rationale	This identification is done today by the controller, the automation of this task will facilitate the MSP task as he/she might need to listen to several frequencies at the same time. Executive Controllers might also benefit from this functionality, as it should not require a specific implementation for MSP CWPs. Note that this requirement is currently assigned to the CWP but could be implemented as a function of another system such a voice recognition system or a direction finder. This requirement is related with Automatic Speech Recognition addressed in PJ.16-04
Category	<Functional> , <HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0013
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0029

<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
<ALLOCATED_TO>	<Function>	Display Highlight Flight Data (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	New ER Enabler (CR-03641 in progress)

[REQ]

Identifier	REQ-10.01a2-TS-MSP.014
Title	Simultaneous display of several sectors
Requirement	The CWP HMI for the MSP shall allow displaying the information relevant for several Executive Controllers simultaneously, including flight plan data, surveillance information and support tools (PC-Aid /TC-Aid, CMON).
Status	<in progress>
Rationale	The MSP shall consider the traffic situation of the sector under his/her responsibility. Support tools are needed with the same capabilities as for a Single Sector Planner to guarantee that the traffic is managed efficiently.
Category	<HMI> , <Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0006
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP01.0009
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<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0046
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0030
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
<ALLOCATED_TO>	<Function>	Display Highlight Flight Data (PJ.10-01a)

		Display Probed Conflict (PJ.10-01a) Display Conformance State (PJ.10-01a) Display Abrogate Coordination (PJ.10-01a) Display Planned Conflicts (PJ.10-01a) Display Entry Coordination (PJ.10-01a) Display New Internal MSA Coordination Conditions (PJ.10-01a) Display Arrival Sequence (PJ.10-01a) Display Exit Coordination (PJ.10-01a) Display Exit Coordination Acceptance (PJ.10-01a) Display Entry Coordination Acceptance (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	New ER Enabler (CR-03641 in progress)

[REQ]

Identifier	REQ-10.01a2-TS-MSP.015
Title	Differentiation of HMI elements for different Executive Sectors
Requirement	For some specific items, the CWP of the MSP shall be capable of displaying the data addressed to each of the Executive Sectors under his/her responsibility with a different appearance (e.g. with different colours or preferably sector indications).
Status	<in progress>
Rationale	The MSP might need to differentiate which of the Executive Controllers is informed of a specific flight plan event, such a conflict, and will be responsible to solve it.
Category	<HMI> , <Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0021
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0026

<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0027
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
<ALLOCATED_TO>	<Function>	Display Highlight Flight Data (PJ.10-01a) Display Conformance State (PJ.10-01a) Display Entry Coordination (PJ.10-01a) Display Abrogate Coordination (PJ.10-01a) Display Planned Conflicts (PJ.10-01a) Display Probed Conflict (PJ.10-01a) Display New Internal MSA Coordination Conditions (PJ.10-01a) Display Arrival Sequence (PJ.10-01a) Display Entry Coordination Acceptance (PJ.10-01a) Display Exit Coordination Acceptance (PJ.10-01a) Display Exit Coordination (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	New ER Enabler (CR-03641 in progress)

[REQ]

Identifier	REQ-10.01a2-TS-MSP.016
Title	Coordination dialogue between MSP and EC
Requirement	The CWP HMI shall allow the MSP to establish an electronic coordination dialogue with any of the Executive Controllers in the MSA.
Status	<in progress>
Rationale	Electronic means are needed to facilitate the coordination between three or more ATCOs, which might not work in contiguous locations.
Category	<Functional> , <HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier

<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0015
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<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0017
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0020
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0022
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0021
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0023
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0042
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0043
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0044
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0045
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
<ALLOCATED_TO>	<Function>	Input Highlight Flight Data (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	New ER Enabler (CR-03641 in progress)

[REQ]

Identifier	REQ-10.01a2-TS-MSP.017
Title	MSP access rights
Requirement	The CWP HMI of the MSP shall provide the access rights to interact with the flight plans relevant for all the Sectors in the MSA.
Status	<in progress>
Rationale	The HMI shall allow the MSP to replace the individual PCs responsible for each individual sector.
Category	<HMI> , <Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0010
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
<ALLOCATED_TO>	<Function>	Input Send Flight to Next Unit (PJ.10-01a) Input Probe New Entry Coordination Conditions (PJ.10-01a) Input Clearance (PJ.10-01a) Input Request New Entry Coordination (PJ.10-01a) Input Abrogate Coordination (PJ.10-01a) Input Exit Coordination Request Acceptance (PJ.10-01a) Input New Internal MSA Coordination Conditions (PJ.10-01a) Acknowledge Aircraft in AMAN (PJ.10-01a) Input Request New Exit Coordination (PJ.10-01a) Input Entry Coordination Request Acceptance (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	New ER Enabler (CR-03641 in progress)

[REQ]

Identifier	REQ-10.01a2-TS-MSP.018
Title	CWP configuration
Requirement	The CWP shall allow supervisors to configure different roles PC, EC and MSP and to assign them sectors (En Route).
Status	<in progress>
Rationale	The CWP shall allow supervisors to configure the control room in the most suitable way choosing roles and assigning En Route sectors.
Category	<Functional> , <HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0024
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0007
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0028
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0025
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0031
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0026
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0032
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0034
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0038
<ALLOCATED_TO>	<Functional block>	Operational Supervision ER/APP ATC (PJ.10-01a) Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
<ALLOCATED_TO>	<Function>	Input Sectorization Allocation (PJ.10-01a) Process Sectorization Allocation (PJ.10-01a) Display New Sectorization Allocation (PJ.10-01a) Input Acknowledge Sectorization Allocation (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	New ER Enabler (CR-03641 in progress)

[REQ]

Identifier	REQ-10.01a2-TS-MSP.009
Title	Selective Flight Plan filters
Requirement	The CWP of the MSP should be able to provide the capability to filter the flight plan data that are relevant to one of the Executive Controllers in the MSA.
Status	<in progress>
Rationale	The MSP might need to briefly check the data seen by one of the Executive Controllers in the MSA for a better understanding of the traffic situation in his/her sector.

Category	<Functional> , <HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0008
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
<ALLOCATED_TO>	<Function>	Display Entry Coordination Acceptance (PJ.10-01a) Display Exit Coordination (PJ.10-01a) Display Exit Coordination Acceptance (PJ.10-01a) Display Conformance State (PJ.10-01a) Display Abrogate Coordination (PJ.10-01a) Display Entry Coordination (PJ.10-01a) Display Planned Conflicts (PJ.10-01a) Display Arrival Sequence (PJ.10-01a) Display New Internal MSA Coordination Conditions (PJ.10-01a) Display Highlight Flight Data (PJ.10-01a) Display Probed Conflict (PJ.10-01a) Highlight Flight Data (PJ.10-01a) Probe Tactical Instruction (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	New ER Enabler (CR-03641 in progress)

[REQ]

Identifier	REQ-10.01a2-TS-MSP.019
Title	Encounter Filtering
Requirement	The CWP shall display encounters information and responsibility from CD/R according to each configured role.
Status	<in progress>

Rationale	The CWP shall only display the encounters data to relevant actor and give clear information about the responsibility to solve them.
Category	<Functional> , <HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0003
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0011
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0040
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0027
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0041
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
<ALLOCATED_TO>	<Function>	Display Probed Conflict (PJ.10-01a) Highlight Flight Data (PJ.10-01a) Display Planned Conflicts (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	New ER Enabler (CR-03641 in progress)

[REQ]

Identifier	REQ-10.01a2-TS-MSP.011
Title	MSP workload computation
Requirement	The system shall provide workload information of the MSP team.
Status	<in progress>
Rationale	Supervisor needs to monitor the workload of the MSP team members. In case of workload getting high, supervisor will revert to EC/PC team structure.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0033
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0035
<ALLOCATED_TO>	<Functional block>	Local Air Traffic Complexity Management
<ALLOCATED_TO>	<Function>	Local Air Traffic Complexity Management
<ALLOCATED_TO>	<Enabler>	New ER Enabler (CR-03641 in progress)

4.2.2 V3 Requirements

[REQ]

Identifier	REQ-10.01a1-TS-MSP.001
Title	Frequency selection for MSP
Requirement	The VCS shall provide the means for the MSP to select the frequencies of several sectors from the Multi-sector Area.
Status	<validated>
Rationale	The communications on these frequencies are relevant for the MSP to keep situation awareness. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-PJ.10-01a-V3-001-SKYGUIDE
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0001
<ALLOCATED_TO>	<Functional block>	A/G Voice Communication

<ALLOCATED_TO>	<Enabler>	ER APP ATC 96_ATC System Support to Permit a Single Planner Role Associated to Multiple Tactical Roles

[REQ]

Identifier	REQ-10.01a1-TS-MSP.004
Title	Simultaneous display of several sectors
Requirement	The CWP HMI for the MSP shall allow displaying the information relevant for several Executive Controllers simultaneously, including flight plan data, surveillance information and support tools (PC-Aid /TC-Aid, CMON).
Status	<validated>
Rationale	The MSP shall consider the traffic situation of the sector under his/her responsibility. Support tools are needed with the same capabilities as for a Single Sector Planner to guarantee that the traffic is managed efficiently. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-PJ.10-01a-V3-001-SKYGUIDE
Category	<HMI> , <Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0006
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP01.0009
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<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0011
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0026
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0030
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0046

<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
<ALLOCATED_TO>	<Function>	Display Entry Coordination (PJ.10-01a) Display Entry Coordination Acceptance (PJ.10-01a) Display Conformance State (PJ.10-01a) Display Abrogate Coordination (PJ.10-01a) Display Exit Coordination Acceptance (PJ.10-01a) Display Exit Coordination (PJ.10-01a) Display Highlight Flight Data (PJ.10-01a) Display Planned Conflicts (PJ.10-01a) Display Probed Conflict (PJ.10-01a) Display Arrival Sequence (PJ.10-01a) Display New Internal MSA Coordination Conditions (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 96_ATC System Support to Permit a Single Planner Role Associated to Multiple Tactical Roles

[REQ]

Identifier	REQ-10.01a1-TS-MSP.005
Title	Differentiation of HMI elements for different Executive Sectors
Requirement	For some specific items, the CWP of the MSP shall be capable of displaying the data addressed to each of the Executive Sectors under his/her responsibility with a different appearance (e.g. with different colours or preferably sector indications).
Status	<validated>
Rationale	The MSP might need to differentiate which of the Executive Controllers is informed of a specific flight plan event, such a conflict, and will be responsible to solve it. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-PJ.10-01a-V3-001-SKYGUIDE

Category	<HMI> , <Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0021
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0026
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0027
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
<ALLOCATED_TO>	<Function>	Display Highlight Flight Data (PJ.10-01a) Display New Internal MSA Coordination Conditions (PJ.10-01a) Display Planned Conflicts (PJ.10-01a) Display Exit Coordination Acceptance (PJ.10-01a) Display Probed Conflict (PJ.10-01a) Display Exit Coordination (PJ.10-01a) Display Conformance State (PJ.10-01a) Display Entry Coordination (PJ.10-01a) Display Abrogate Coordination (PJ.10-01a) Display Entry Coordination Acceptance (PJ.10-01a) Display Arrival Sequence (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 96_ATC System Support to Permit a Single Planner Role Associated to Multiple Tactical Roles

[REQ]

Identifier	REQ-10.01a1-TS-MSP.006
Title	Coordination dialogue between MSP and EC
Requirement	The CWP HMI shall allow the MSP to establish an electronic coordination dialogue with any of the Executive Controllers in the MSA.

Status	<validated>
Rationale	Electronic means are needed to facilitate the coordination between three or more ATCOs, which might not work in contiguous locations. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-PJ.10-01a-V3-001-SKYGUIDE
Category	<HMI> , <Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0004
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0015
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0016
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0017
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0018
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<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0021
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0022
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0023
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<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0043
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<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0045
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
<ALLOCATED_TO>	<Function>	Input Highlight Flight Data (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 96_ATC System Support to Permit a Single Planner Role Associated to Multiple Tactical Roles

[REQ]

Identifier	REQ-10.01a1-TS-MSP.007
Title	MSP access rights
Requirement	The CWP HMI of the MSP shall provide the access rights to interact with the flight plans relevant for all the Sectors in the MSA.
Status	<validated>
Rationale	The HMI shall allow the MSP to replace the individual PCs responsible for each individual sector. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-PJ.10-01a-V3-001-SKYGUIDE
Category	<Functional> , <HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0010
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
<ALLOCATED_TO>	<Function>	Input New Internal MSA Coordination Conditions (PJ.10-01a) Input Request New Entry Coordination (PJ.10-01a) Input Clearance (PJ.10-01a) Input Entry Coordination Request Acceptance (PJ.10-01a) Input Exit Coordination Request Acceptance (PJ.10-01a) Input Request New Exit Coordination (PJ.10-01a) Acknowledge Aircraft in AMAN (PJ.10-01a) Input Send Flight to Next Unit (PJ.10-01a)

		Input Abrogate Coordination (PJ.10-01a) Input Probe New Entry Coordination Conditions (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 96_ATC System Support to Permit a Single Planner Role Associated to Multiple Tactical Roles

[REQ]

Identifier	REQ-10.01a1-TS-MSP.008
Title	CWP configuration
Requirement	The CWP shall allow supervisors to configure different roles PC, EC and MSP and to assign them sectors (eTMA).
Status	<validated>
Rationale	The CWP shall allow supervisors to configure the control room in the most suitable way choosing roles and assigning eTMA sectors. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-PJ.10-01a-V3-001-SKYGUIDE
Category	<Functional> , <HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0007
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0026
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0032
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0028
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0031
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0025
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0024

<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0034
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0038
<ALLOCATED_TO>	<Functional block>	Operational Supervision ER/APP ATC (PJ.10-01a) Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
<ALLOCATED_TO>	<Function>	Process Sectorization Allocation (PJ.10-01a) Input Sectorization Allocation (PJ.10-01a) Display New Sectorization Allocation (PJ.10-01a) Input Acknowledge Sectorization Allocation (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 96_ATC System Support to Permit a Single Planner Role Associated to Multiple Tactical Roles

[REQ]

Identifier	REQ-10.01a1-TS-MSP.010
Title	Encounter Filtering
Requirement	The CWP shall display encounters information and responsibility from CD/R according to each configured role.
Status	<validated>
Rationale	The CWP shall only display the encounters data to relevant actor and give clear information about the responsibility to solve them. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-PJ.10-01a-V3-001-SKYGUIDE
Category	<Functional> , <HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier

<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0003
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0011
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0027
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0040
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0041
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-01a) Display Probed Conflict (PJ.10-01a) Highlight Flight Data (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 96_ATC System Support to Permit a Single Planner Role Associated to Multiple Tactical Roles

[REQ]

Identifier	REQ-10.01a1-TS-MSP.012
Title	Conflict Detection Tool identification support of MSA internal boundary issues
Requirement	The Conflict Detection Tool shall support the MSP in identifying boundary issues internal to the MSA
Status	<validated>
Rationale	See section 4.3.3 of the Safety Assessment Report. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-PJ.10-01a-V3-001-SKYGUIDE
Category	<Safety> , <Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a

<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0003
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-01a)
<ALLOCATED_TO>	<Function>	Display Probed Conflict (PJ.10-01a) Display Planned Conflicts (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 96_ATC System Support to Permit a Single Planner Role Associated to Multiple Tactical Roles

[REQ]

Identifier	REQ-10.01a1-TS-MSP.013
Title	Coordination tool to support MSPs proposition and negotiation input
Requirement	Electronic coordination (screen to screen) shall support the members of the MSP team with the proposition and negotiation of entry/exit point and/or flight level of individual flights in order to prevent conflict at planning level.
Status	<validated>
Rationale	See section 4.3.3 of the Safety Assessment Report. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-PJ.10-01a-V3-001-SKYGUIDE
Category	<Safety> , <Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	PJ.10-01a
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0015
<SATISFIES>	< ATMS Requirement>	REQ-10-01a-SPRINTEROP-MSP02.0016
<ALLOCATED_TO>	<Functional block>	Coordination and Transfer (PJ.10-01a) Controller Human Machine Interaction Management ER/APP (PJ.10-01a)

<ALLOCATED_TO>	<Function>	Display Abrogate Coordination (PJ.10-01a) Display Entry Coordination (PJ.10-01a) Display Entry Coordination Acceptance (PJ.10-01a) Display Exit Coordination (PJ.10-01a) Display New Internal MSA Coordination Conditions (PJ.10-01a) Display Exit Coordination Acceptance (PJ.10-01a) Input Abrogate Coordination (PJ.10-01a) Input Exit Coordination Request Acceptance (PJ.10-01a) Input Entry Coordination Request Acceptance (PJ.10-01a) Input New Internal MSA Coordination Conditions (PJ.10-01a) Input Probe New Entry Coordination Conditions (PJ.10-01a) Input Request New Entry Coordination (PJ.10-01a) Process Abrogate Coordination (PJ.10-01a) Input Request New Exit Coordination (PJ.10-01a) Process Entry Coordination Request (PJ.10-01a) Process Entry Coordination Request Acceptance (PJ.10-01a) Send Entry Coordination Request (PJ.10-01a) Send Abrogate Coordination (PJ.10-01a) Process Exit Coordination Request (PJ.10-01a) Send Entry Coordination Request Acceptance (PJ.10-01a) Process Exit Coordination Request Acceptance (PJ.10-01a) Send Exit Coordination Request (PJ.10-01a) Send Exit Coordination Request Acceptance (PJ.10-01a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 96_ATC System Support to Permit a Single Planner Role Associated to Multiple Tactical Roles

5 Implementation Options

N.A.

6 Assumptions

N.A.

7 References and Applicable Documents

7.1 Applicable Documents

Content Integration

[1] PJ19 D5.1 deliverable (EATMA Guidance Material Version 9.0)

[2] EATMA Community pages

[3] SESAR ATM Lexicon

Content Development

[4] SESAR2020 Concept of Operations Edition 2017 dated Nov 17

System and Service Development

[5] 08.01.01 D52: SWIM Foundation v2

[6] 08.01.01 D49: SWIM Compliance Criteria

[7] 08.01.03 D47: AIRM v4.1.0

[8] 08.03.10 D45: ISRM Foundation v00.08.00

[9] B.04.03 D102 SESAR Working Method on Services

[10]B.04.03 D128 ADD SESAR1

[11]B.04.05 Common Service Foundation Method

Performance Management

[12] PJ19 D4.1 Performance framework (2017) dated Oct 17

[13] PJ19 D4.5 Validation targets (2018)

[14]B.05 D86 Guidance on KPIs and Data Collection support to SESAR 2020 transition.

[15]16.06.06-D68 Part 1 –SESAR Cost Benefit Analysis – Integrated Model

[16]16.06.06-D51-SESAR_1 Business Case Consolidated_Deliverable-00.01.00 and CBA

[17]Method to assess cost of European ATM improvements and technologies, EUROCONTROL (2014)

[18]ATM Cost Breakdown Structure_ed02_2014

[19]Standard Inputs for EUROCONTROL Cost Benefit Analyses

[20]16.06.06_D26-08 ATM CBA Quality Checklist

[21]16.06.06_D26_04_Guidelines_for_Producing_Benefit_and_Impact_Mechanisms

Validation

[22]03.00 D16 WP3 Engineering methodology

[23]Transition VALS SESAR 2020 - Consolidated deliverable with contribution from Operational Federating Projects

[24]European Operational Concept Validation Methodology (E-OCVM) - 3.0 [February 2010]

System Engineering

[25] SESAR 2020 Requirements and Validation Guidelines

Safety

[26]SESAR, Safety Reference Material, Edition 4.0, April 2016

[27]SESAR, Guidance to Apply the Safety Reference Material, Edition 3.0, April 2016

[28]SESAR, Final Guidance Material to Execute Proof of Concept, Ed00.04.00, August 2015

[29]SESAR, Resilience Engineering Guidance, May 2016

Human Performance

[30]16.06.05 D 27 HP Reference Material D27

[31]16.04.02 D04 e-HP Repository - Release note

Environment Assessment

[32]SESAR, Environment Reference Material, alias, “Environmental impact assessment as part of the global SESAR validation”, Project 16.06.03, Deliverable D26, 2014.

[33]ICAO CAEP – “Guidance on Environmental Assessment of Proposed Air Traffic Management Operational Changes” document, Doc 10031.

Security

[34]16.06.02 D103 SESAR Security Ref Material Level

[35]16.06.02 D137 Minimum Set of Security Controls (MSSCs).

[36]16.06.02 D131 Security Database Application (CTRL_S)

7.2 Reference Documents

[37]ED-78A GUIDELINES FOR APPROVAL OF THE PROVISION AND USE OF AIR TRAFFIC SERVICES SUPPORTED BY DATA COMMUNICATIONS.

[38] D1.1.010 - PJ.10-01a - SPR INTEROP OSED - Part I - V2-V3 Ed 00.01.10

[39] 10.04.01-D78-Conflict Detection and Resolution Requirements Refinement - R5

[40] 10.04.02-D44-Consolidated Conformance Monitoring System Requirements

[41] D1.1.050 - SESAR 2020 PJ.10-01a - VALR V2-V3 ED 00.01.07

Appendix A Service Description Document (SDD)

N.A.

Appendix B Service Technical Design Document (STDD)

N.A.

-END OF DOCUMENT-