Aircraft & System Performance and functional requirements

Document information	
Project Title	Airborne Initial 4D Trajectory Management
Project Number	09.01._
Project Manager	AIRBUS
Deliverable Name	Aircraft & System Performance and functional requirements
Deliverable ID	D57
Edition	01.01.00
Template Version	03.00.00
Task contributors	
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Abstract

This document is the "Aircraft & System Performance and Functional Requirements" related to Initial 4D function.
The objective of this document is to:

- Capture the on-board operational needs to perform Initial 4D operations
- Provide on-board operational and functional requirements required to perform Initial 4D operations according to SESAR 1 concept description in P05.06.01.

This document (D57) is an update of D06 (Aircraft & System Performance and functional requirements) integrating the results from last validation exercises (e.g. EXE-05.03-VP-708, EXE-05.03-VP-805) and the last versions of OSED and SPR documents in the frame of SESAR 1. It also encompasses formal traceability with OSED and SPR requirements.
It covers requirements for mainline, regional, rotorcraft and military aircraft operations.
This document is part of Release 5 SESAR Solution 6.

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Document History

Edition	Date	Status	Author	Justification
01.00.00	24/06/2016		[redacted]	New Document
01.01.00	23/09/2016			New issue to take into account SJU comments.

Intellectual Property Rights (foreground)

This deliverable consists of SJU foreground.

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Executive summary

This document is the “Aircraft & System Performance and Functional Requirements” related to Initial 4D function.

The airborne implementation of the aircraft capability to comply with a time constraint issued by the ATC within the required accuracy and reliability is called “Initial 4D function” in this document. It also encompasses the communication capabilities necessary for the 3D trajectory synchronization (air/ground communication process ensuring that ground and airborne systems share the same view of the intended aircraft trajectory) as well as the manoeuvre negotiation and agreement between the ATC and the flight crew.

The concept of operation in which the Initial 4D function has been developed and validated in the frame of P09.01 activities during SESAR 1 is further described based on P05.06.01 results.

When applicable, P09.01 Initial 4D functional requirements are linked to rotorcraft (based on P04.10 Initial 4D concept) and military aircraft (based on P09.03 concept). A section dedicated to military aircraft functional requirements (see 3.1.4) is available and an annex (see appendix A) is dedicated to rotorcraft operational aspects which include operational requirements defined by P04.10 project and not contained in any OSED document.

The applicability to rotorcraft (P04.10 project) may be further refined, due to the fact the P04.10 i4D evaluation results are not conclusive enough to allow drawing clearly the needed conclusions. Further evaluations of the applicability to the rotorcraft users are recommended in order to fully explore the concept.

This document is part of Release 5 SESAR Solution 6.

1 Introduction

1.1 Purpose of the document

The aim of this document is to gather and describe the high level functional requirements for airborne implementation of Initial 4D function, based on operational hypothesis.

The reference document used to build this functional description was the P05.06.01 (Ground & Airborne Capabilities to Implement Sequence) Step 1 OSED [12]. It has been updated (previous version was D06) to take into account 05.06.01 Step 1 OSED [12] and SPR [13] Final which have been updated following last Initial 4D validation exercises.

Some elements have been updated with the last version of OSED, SPR and Interop performed in the frame of 05.06.01 SESAR project.

This document applies to mainline, regional, military aircraft and rotorcraft.

Functional Requirements related to the on-board implementation of Initial 4D function are identified using the following format: REQ-<project number>-TS-<issue>.<number>.

The field <project number> identifies to which type of aircraft the REQ applies:

- 09.01: Mainline, Regional aircraft, also used in the REQ identifier when the requirement is applicable to the other types of aircraft considered in this document: military and/or rotorcraft. The applicability is then identified in the field "<ALLOCATED TO>, <Project>" of each requirement.
- 09.03: Military aircraft, used when the considered requirement is applicable only to military.

The field <issue> identifies in which issue of the document the REQ has been either introduced or modified:

- 0: stands for requirements identified in previous FRD version (D06) with FRD-INITIAL4D-<number> or NEW-INITIAL4D-<number>.
- 1: stands for the requirements modified in this issue (01.01.00) of the FRD (D57).
- 2: stands for the requirements introduced in this issue (01.01.00) of the FRD (D57).

The field <number> identifies each REQ with a unique reference. When the REQ was introduced in the previous version of this document, the REQ number has been kept to ensure its traceability.

In appendix A, complementary operational requirements dedicated to rotorcraft Initial 4D operations are identified using the following format: REQ-04.10-GEN1-i4DT.<number> where the field <number> identifies each REQ with a unique reference.

Requirements on the airborne implementation of Initial 4D are identified by the use of "shall" or "should":

- "Shall" indicates mandatory requirements
- "Should" indicates optional requirements i.e. these requirements may not be implemented but if they are implemented, they have to be implemented as described in the operational requirement.

1.2 Intended readership

The intended audience is:

- 09.03 project
- 09.05 project
- 09.49 project
- 04.10 project
- 04.02 project
- 05.06.01 project
- 05.02 project

- 05.03 project
- OFA03.02.01
- OFA04.01.02
- ENB03.01.01 TMF
- B4.3 project

1.3 Inputs from other projects

This document takes into account the following documents issued in the context of SESAR projects:

- 05.06.01 Step 1 OSED – Final [12] (please note that the final version of 05.06.01 OSED is included in 05.06.01 SPR [13])
- 05.06.01 Step 1 – Fully Validated SPR [13]
- 05.06.01 Step 1 – Fully Validated INTEROP [14]

This document is performing a formal traceability with the requirements provided in the here above mentioned OSED and SPR for requirements which are applicable to this airborne functional specification. Requirements which are relevant to operational procedures are not traced because they are not applicable to functional definition. Indeed, the traceability with the following requirements has not been performed since they are related to the airborne or air/ground procedures and not to system functional requirements:

- REQ-05.06.01-Step 1SPR IT3-SAF1.0006
- REQ-05.06.01-Step 1SPR IT3-SAF1.0010
- REQ-05.06.01-Step 1SPR IT3-SAF1.0024
- REQ-05.06.01-Step 1SPR IT3-SAF1.0080
- REQ-05.06.01-Step 1SPR IT3-SAF1.0102
- REQ-05.06.01-Step 1SPR IT3-SAF1.0117
- REQ-05.06.01-Step 1SPR IT3-SAF1.0123
- REQ-05.06.01-OSED-SG01.0500

In the frame of P09.01 activities and the development of Initial 4D function, no work has been conducted on the security. In this condition, traceability with the following requirements is not performed in this document:

- REQ-05.06.01-Step 1SPR IT3-SEC1.0003
- REQ-05.06.01-Step 1SPR IT3-SEC1.0004

SESAR prototypes implementing the Initial 4D function developed in the frame of P09.01 SESAR 1 activities are not compliant with the requirement REQ-05.06.01-Step 1SPR IT3-SAF1.0114.

1.4 Structure of the document

The document is structured as follow:

- **Chapter 1 – Introduction** provides general information about the document (purpose, functional block overview, and intended audience) and editorial information (glossary of terms, acronyms, etc…).
- **Chapter 2 – General Functional block Description** describes the functional context and decomposition.
- **Chapter 3 – Requirements** provides functional requirements on the Initial 4D airborne function.

- **Chapter 4 – Assumptions** describes the suppositions taken into consideration to complete the possible lack of operational requirements.
- **Chapter 5 – References** lists all the reference documents.

1.5 Requirements Definitions – General Guidance

The requirements provided in Section 3 are broken down to:

- Functional Requirements, including Performance Requirements
- Operational Requirements for rotorcraft
- Safety Requirements

1.6 Functional block Purpose

N/A

1.7 Functional block Overview

The functional requirements are structured according the consolidated functional airborne architecture defined within the SESAR P09.49 project [15].

The following functional blocks are impacted by Initial 4D functions:

- Aircraft Navigation
- Aircraft Communication
- Displays/Controls (HMI)

1.8 Glossary of terms

In order to clarify some terms used in this document, some definitions are provided in this section.

Term	Definition
4D Trajectory	A set of consecutive segments linking published waypoints and/or pseudo waypoints computed by air or ground tools (Flight Operations Centre system, aircraft Flight Management System, ground Trajectory Predictor) to build the lateral transitions and the vertical profiles. Each point is defined by a longitude, latitude, a level and a time. Source: [SESAR lexicon].
ADS-C	Automatic Dependent Surveillance-Contract – A means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under what conditions ADS-C reports would be initiated, and what data would be contained in the reports. Source: [SESAR lexicon].
AMAN	Arrival Managed – A planning system to improve arrival flows at one or more airports by calculating the optimised approach / landing sequence and Target Landing Times (TLDT) and, where needed, times for specific fixes for each flight, taking multiple constraints and preferences into account. Source: [SESAR lexicon].
ASAS	Airborne Separation Assistance System – An aircraft system that enables the flight crew to maintain separation of their aircraft from one or more aircraft, and provides flight information concerning surrounding traffic. Source: [SESAR lexicon].
ASAS S&M	ASAS Sequencing & Merging – An ASAS application that enables flight cre to maintain their position in a sequence previously determined by a controller or

Term	Definition
	to merge their routes onto a single, predefined, route. Source: [SESAR lexicon].
CTA	Controlled Time of Arrival – An ATM imposed time constraint on a defined metering point associated to an arrival runway, to be achieved within the required accuracy by the use of the avionics [SESAR lexicon]. Source: [SESAR lexicon].
CTO	Controlled Time Over – An ATM imposed time constraint over a point (way point or defined by lat/long coordinates) to be achieved within the required accuracy by the use of the avionics. Source: [SESAR Lexicon].
EPP data	Extended Projected Profile data - Specifies the aircraft predicted trajectory up to 128 waypoints including for each waypoint, Latitude, Longitude and when available, Fix, Level, ETA, Airspeed, Vertical type(s), Lateral type(s), Level constraint, Time constraint, Speed constraint. When available, provides the relevant data for the trajectory as Current gross mass and EPP trajectory intent status. It indicates the data and time these values were computed [SESAR lexicon].
ETA	Estimated Time of Arrival - The time computed by the FMS for the flight arriving at a point related to the destination airport. Source: [SESAR lexicon].
ETA min/max	The earliest/latest ETA at a waypoint, provided the aircraft flies the 4D Trajectory at its max/min allowable speed, wind/temp error is also taken into account, in order to guarantee that any CTA defined within associated ETA min/max interval will be satisfied with high probability. Source: [SESAR lexicon].
RTA	Required Time of Arrival – The aircraft FMS (Flight Management System) RTA function / The aircraft function to follow a CTA. Source: [SESAR lexicon].
Trajectory	The description of movement of an aircraft both in the air and on the ground including position, time, and at least via calculation, speed and acceleration. Source: [SESAR lexicon].

1.9 Acronyms and Terminology

Term	Definition
4D-TRAD	Four dimension Trajectory
A/C	Aircraft
ACARS	Aircraft Communications Addressing and Reporting System
ADD	Architecture Definition Document
ADS-C	Automatic Dependent Surveillance - Contract
AMAN	Arrival Manager
ANSP	Air Navigation Service Provider
ARINC	Aeronautical Radio Inc.

Term	Definition
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATM	Air Traffic Management
ATM	Air Traffic Management
ATN	Aeronautical Telecommunication Network
ATSU	Air Traffic Service Unit ***Note**: This acronym can have two significations depending on the context:* - *The aircraft system in charge of managing the datalink communications with the ATC* - *The ground station*
CPDLC	Controller Pilot DataLink Communications
CTA	Controlled Time of Arrival
CTO	Controlled Time Over
DCDU	Datalink Control and Display Unit
DLIC	Datalink Initiation Capability Service
DOD	Detailed Operational Description
E-ATMS	European Air Traffic Management System
E-TMA	Extended Terminal Manoeuvring Area
EPP	Extended Projected Profile
FAF	Final Approach Fix
FANS	Future Air Navigation System
FCU	Flight Control Unit
FMS	Flight Management System
FOC	Flight Operation Centre sytem
FPLN	Flight plan
HHMM	Hours Minutes
HHMMSS	Hours Minutes Seconds
HMI	Human Machine Interface
I4D	Initial Four Dimensions
IAF	Initial Approach Fix
IRS	Interface Requirements Specification
INTEROP	Interoperability Requirements
MET	Meteorological
MCDU	Multi-purpose Control and Display Unit
MF	Metering Fix
MMO	Maximum Normal Operating Mach Number

Term	Definition
MTCD	Medium Term Conflict Detection
MUAC	Maastricht Upper Area Control Centre
NORACON	NORth European and Austrian CONsortium
OFA	Operational Focus Area
OSED	Operational Service and Environment Definition
RTA	Required Time of Arrival
RTCA	Radio Technical Commission for Aeronautics
SESAR	Single European Sky ATM Research Programme
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency.
SESAR Programme	The programme which defines the Research and Development activities and Projects for the SJU.
SPR	Safety and Performance Requirements
STAR	Standard Arrival Route
STCA	Short Term Conflict Alert
TAD	Technical Architecture Description
TCAS	Traffic Collision Avoidance Systems
TCM	Traffic Complexity Manager
TMA	Terminal Manoeuvring Area
TOA	Time Of Arrival
TOAC	Time of Arrival Control
ToD	Top of Descent
TP	Trajectory Prediction
TRA	Temporary Reserved Airspace
TS	Technical Specification
TSA	Temporary Segregated Airspace
UTC	Coordinated Universal Time
VLS	Lowest Selectable Speed
VMO	Maximum Operating Speed

2 General Functional block Description

2.1 Context

The Initial 4D function (i4D) provides ATM sector with the capability to monitor aircraft predictions of its trajectory in 4D (i.e. space and time) and to issue time constraint, covering the first part of the Trajectory Based Operations (TBO) concept. In the concept developed in the frame of SESAR 1 project P09.01, Initial 4D function contributes to Arrival Management as it allows ATC to issue a time constraint in descent to any equipped aircraft if deemed relevant to organize the arrival sequence.

This airborne document is dealing with the CTA concept as applied with Initial 4D aircraft while CTA concept, as described in P05.06.01 OSED [12], is more widely defined as a time constraint potentially issued to an aircraft with different capabilities (Initial 4D or Basic CTA).

This airborne capability aims at supporting several evolutions in the traffic management method explored in the frame of SESAR research projects, such as CTA (Controlled Time of Arrival) which consists in issuing a time constraint in descent while the aircraft is still in cruise (at least 5 to 10 minutes from Top of Descent). The aircraft can then manage its own speed to the constrained waypoint. The on-board function, allowing the crew to comply with the CTA issued by the ground is called RTA (Required Time of Arrival). Thus, in this document, the same time constraint can be either called CTA (when considered from the ground point of view) or RTA (when considered from the airborne side).

When using Controlled Time of Arrival, ATC shall perform trajectory synchronization when appropriate as a prerequisite for analyzing estimated times and up-linking a time constraint if possible.

3D trajectory (lateral and vertical flight plan) synchronization is performed during the execution phase through datalink exchanges between the Airspace User (AU) and the ATC in contact. The 4D trajectory consisting in a lateral route, altitude/speed constraints and estimated times of route waypoints sequencing is then updated by the FMS. If relevant, ATC can request the AU to meet a time constraint over a waypoint of the trajectory, within the reliable time window provided by the aircraft.

In order to issue the time constraint, a ground/ground coordination might be necessary between the ATC in contact (in En-Route airspace), the Arrival Manager (in the TMA airspace) who is in charge of organizing the arrival sequence at the destination airport and with any downstream ATC sector that will be overflew by the aircraft.

After the negotiation process, the AU agrees to fly the trajectory and the ATC agrees to facilitate the trajectory (subject to separation provision).

During the execution of the optimized trajectory, conformance to the agreed 4D trajectory is monitored by both the flight crew and the ATC. The predicted 4D trajectory is continuously computed on board and downlinked to the ATC based on ADS-C contract request by the ATC.

Here-below is a typical Initial 4D scenario which presents how ATC and flight crew interact during Initial 4D operations:

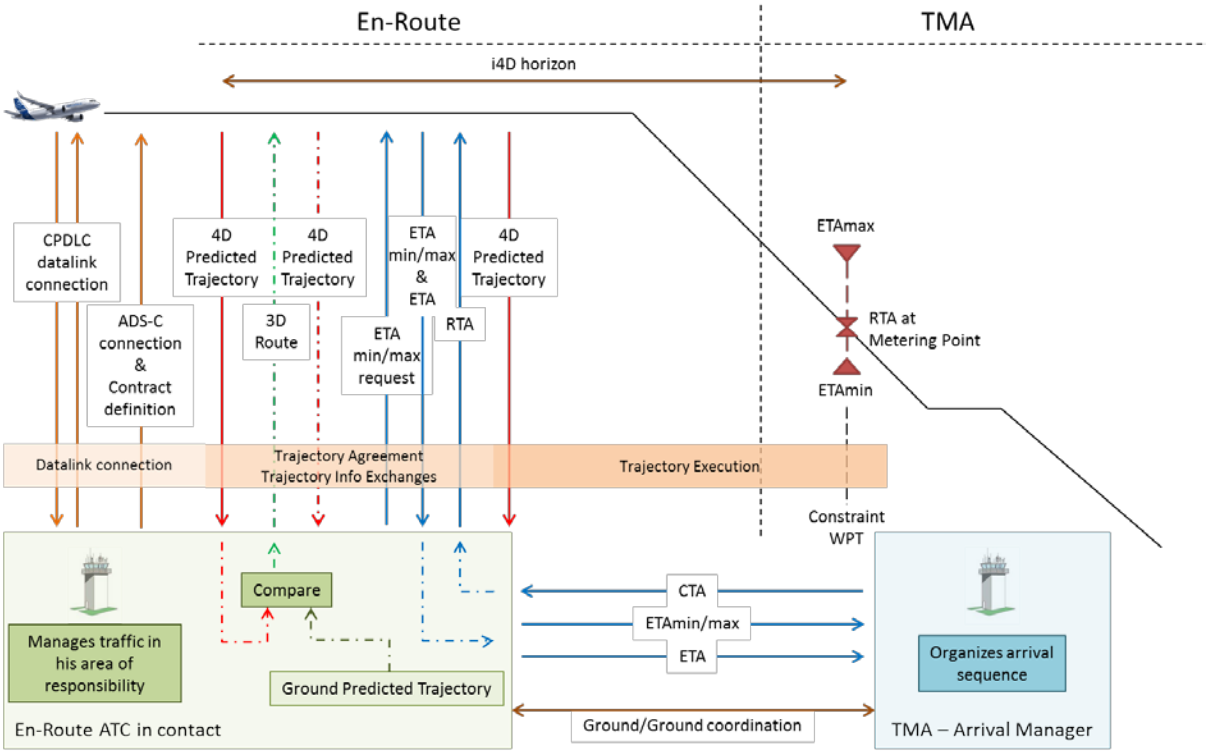


Figure 1: Initial 4D operation typical scenario[1]

The "Initial 4D horizon" is further detailed in applicable standardization document (DO-236C Change 1 [9]) as follow:

- In cruise the expected accuracy of +/-30s applies to a flight duration to the time constraint of 90 minutes or less,
- In descent the expected accuracy of +/-10s applies to a flight duration to the time constraint of 40 minutes or less.

2.2 Functional block Modes and States

N/A

2.3 Major Functional block Capabilities

N/A

2.4 User Characteristics

N/A

2.5 Operational Scenarios

Initial 4D operational scenario is described in the following steps:

1. The ATC centers can initiate an ADS-C connection with the aircraft. Upon the first ADS-C connection, the crew is informed and should be aware that the airborne computed trajectory might be downlinked to the ATC (either for an i4D operation or for any other application using the aircraft 4D trajectory).

[1] Note that in this figure ground/ground coordination to exchange aircraft data is illustrated, but the AMAN ATC can initiate an ADS-C connection directly with the aircraft (limited to 5 simultaneous connection on the airborne side).

Wind and temperature data: weather forecast shall be inserted in the aircraft in order to ensure accuracy of RTA and 4D trajectory. If deemed necessary by the crew, the wind and temperature data can be updated through FOC or entered manually by the flight crew during the flight.

Note:
The FMS meteorological model has been enhanced to guarantee the time constraint reliability in the specified interval.

Up to date wind and temperature data (10 levels of wind and temperature data along the descent) are necessary to perform an i4D operation with the required level of accuracy. It is crew responsibility to maintain wind and temperature FMS data up to date in order to provide ATC with reliable trajectory information.

2. Once a CPDLC datalink connection has been established between the aircraft and the ATC in contact, the crew and the controller can communicate through CPDLC messages.

   Note:
   Unlike ADS-C contract, only one CPDLC connection is possible at a time between the aircraft and its ATC in contact.

3. ATC establishes an ADS-C contract with the aircraft and requests the downlink of an EPP (Extended Projected Profile) report (demand, periodic or event) as defined in EUROCAE ED-228 [8] document.

   Notes:
   The ADS-C application is designed to provide automatic reports from an aircraft to an ATC ground system. The ATC specifies ADS-C contract type (on demand, periodic, or triggered by an event) he needs to establish with the aircraft.

   The Extended Projected Profile (EPP) provides to the ground the 4D trajectory (3D route + Estimated Time of Arrival for all the waypoints included in the EPP) and other information (flight modes, speed scheduled,...).
   The EPP report is based on the predictions computed by the FMS:
   - *It includes some general data not associated to waypoints*
   - *It includes a list of up to 128 points of significance for the construction of the lateral and vertical trajectory.*
   - *The points are reported in the order the A/C will sequence them.*
   - *Only the points ahead of the A/C are reported*
   - *Waypoints are not only F-PLN waypoints, also other relevant points computed by the FMS.*

   An EPP report may contain a maximum number of 128 waypoints.

4. If the current trajectory of the aircraft is not consistent with the trajectory expected by the ground or planned by the ground for it, ATC may elect to either accept the FMS trajectory or ATC may uplink a required route to the aircraft. The uplinked route may also contain speed/vertical elements.

5. Flight crew complies with the uplinked 3D route clearance and updates the ACTIVE flight plan accordingly.
   The flight crew acknowledges the 3D route uplink message with a "WILCO" answer. An automatic downlink of 4D trajectory via ADS-C “EPP report” is triggered automatically after the flight plan update (on event ADS-C EPP report) or upon reception of an ATC request (on-demand ADS-C EPP report).

   Note:
   The flight crew may respond to the 3D clearance by “STANDBY” before sending “WILCO” in order to have more time to analyze the 3D route clearance.

6. If the arrival airport is equipped with an Arrival Manager using time constraints to tune and organize the sequence of the arrival flights, a CTA (Controlled Time of Arrival) may be issued to the aircraft. To issue this CTA, in the case of Initial 4D aircraft, the Arrival Manager has at his disposal the following information on the waypoint of interest:
    - The ETAmin/max interval, transmitted by the aircraft through an ADS-C on demand downlink “ETAmin/max report”,
    - The ETA (Estimated Time of Arrival), transmitted by the aircraft through an ADS-C EPP report including the waypoint of interest, from the active flight plan.

    Note:
    The "ETAmin/max interval" is displayed to the crew on the RTA page, associated to flight plan waypoints, and is considered as the "RTA reliable interval" and thus both wordings might be used in this document. The RTA interval reliability is guaranteed only within the limit of the Initial 4D horizon defined in the DO-236C Change 1 [9] and detailed in section 2.1.

7. ATC in contact uplinks to the aircraft the CTA constraint (with its associated required accuracy) on waypoint of interest based on the AMAN (Arrival MANager) calculations.

8. After assessing the RTA feasibility, the flight crew acknowledges the CTA constraint uplink message with either a "WILCO" or “UNABLE” answer. If pilots accepted the CTA (i.e. send “WILCO” by datalink), they insert the RTA constraint and its required accuracy into the FMS. Otherwise, after being informed of the RTA rejection by the crew (i.e. “UNABLE” received by the controller in contact), the controller can either reinitiate the CTA negotiation process or cancel the operation and manage the aircraft with other tools (e.g. TTL/TTG).

    If the ATC has established the corresponding ADS-C contract “EPP Report” with the aircraft, the updated trajectory is downlinked to the ground.

9. The 4D trajectory is then flown in managed guidance mode (usually the aircraft is already in managed guidance mode when the RTA is activated). ATC could evaluate conformance to the agreed 4D trajectory using ADS-C “EPP report”. Airborne systems provide an automatic time conformance monitoring function that informs the pilot through a cockpit message and the ground system through the downlink of an ADS-C EPP report including the RTA status (missed/made). When the pilot is aware of this non-conformance, he must warn the ATC by voice.

    Notes:
    Maintaining separation minima’s when flying the 4D trajectory is a responsibility of ATC and this task is not delegated to the aircraft.

    A conformance monitoring tool, based on ADS-C EPP reports processing could be available to the controller to detect any deviation from the agreed 4D trajectory.

When the time constrained waypoint is sequenced, Initial 4D operations are terminated.

2.6 Functional

2.6.1 Functional decomposition

Initial 4D function is related to both navigation and communication enhancements allowing the aircraft to operate in future ATM 4D operations (in support of Initial 4D ATM operational concept - horizon 2018-2020).

From an operational point of view, the Initial 4D function supports the following:

- 3D route synchronization and time constraint (on a single waypoint at a time) agreement: Pilot/Controller agreement (via CPDLC) on the 4D trajectory to be flown (lateral route and any associated constraints (altitude/speed/time)).

- 4D trajectory execution: the on-board system is able to fly the negotiated 4D trajectory with sufficient accuracy (especially regarding RTA).
- 4D trajectory monitoring: crew has the capability to monitor the 4D trajectory including a time constraint.
- 4D trajectory downlink (via ADS-C): the on-board system is able to automatically send to the ground the 4D trajectory based on the contract established with the ATC center.
- Wind and temperature data: Datalink capability for updating wind and temperature data via FOC

From an A/C capabilities point of view, in addition to its basic 3D navigation capabilities, Initial 4D requires:

NAVIGATION:

- Time Prediction (flight planning: computation of accurate and reliable time estimates)
- Guidance
- Time Guidance Monitoring
- Reliable RTA interval computation

COMMUNICATION:

- Controller-Pilot Datalink Communication (CPDLC)
- Prediction Reporting (ADS-C)
- Datalink (FOC) capability to uplink wind and temperature data

HMI

2.6.2 Functional analysis

This section describes briefly the functions performed by Initial 4D functions.

2.6.2.1 Time Prediction

A basic RTA function is already available on some aircraft types.. However, the Initial 4D concept requires some improvements in the basic RTA function in order to ensure the required level of time reliability and accuracy, not available in current FMS standards:

- *Introduction of an accuracy function* which allows defining a required accuracy on an RTA in the flight plan, either before or after the RTA has been defined. Only two values can be chosen into the FMS, either manually or through the load functionality: +/-10s and +/-30s. A default value will be set automatically by the FMS to +/- 30s.
- *Enhanced RTA algorithm*, such that when inserted into the FMS within ETAmin/max interval, the RTA will be satisfied, considering its required accuracy in 95% of the cases. The FMS takes enough margins on predicted speed profile taking into account several sources of errors, the most relevant one being the wind/temperature error, based on an improved weather model which includes 10 levels of wind and temperature data. The FMS RTA algorithm will respect any altitude and speed restrictions for RTA speed computation. It also provides pilots with the possibility to modify the maximum allowable speed.
- *RTA page HMI* such as the Reliable RTA interval, RTA and ETA values are displayed on the RTA page. The FMS displays and allows to manually modify the “RTA Required Accuracy” parameter in the RTA page.

2.6.2.2 Guidance

If the aircraft is in managed mode and an RTA is active, the Guidance Function consists, on top of basically guiding the aircraft along its 3D flight plan, in guiding the aircraft according to the predicted speed profile computed by the FMS to cross the specified waypoint at the specified time.

2.6.2.3 Time Guidance Monitoring

During Initial 4D operations, the conformance to the 4D trajectory is monitored by the crew and possibly by ATC (through ADS-C report, if the ground is equipped with a conformance monitoring tool). According to the defined procedures, flight crew is requested to inform ATC by voice in case RTA becomes predicted unachievable. In order to allow the crew to monitor the aircraft conformance to the time constraint, several information and alert messages have been enhanced.

- *RTA awareness*
  While an aircraft is flying to an RTA, it adjusts its speed to cross the specified waypoint at the specified time. Once the RTA is inserted, feedback is required to ensure flight crew awareness of the aircraft specific speed management.

- *RTA achievable/unachievable status*
  The FMS computes whether the RTA is predicted achievable in accordance with the required RTA accuracy. An RTA may be either “predicted achievable” or “predicted unachievable” before sequencing the RTA waypoint. As soon as the RTA becomes predicted unachievable, the crew is informed through specific alert message. If it has been specified in the ADS-C contract, a report can be automatically sent to the ATC with the RTA status.

2.6.2.4 Reliable RTA interval computation

In order to support the time constraint agreement operation between flight crew and ATC, the FMS computes reliable minimum and maximum crossing time values (ETAmin/ETAmax) for any waypoint (on which a RTA can be defined), which are the reliable ETA assuming the aircraft flies respectively at its maximum/minimum allowed speed taking into account some margins.

The pilots will use the reliable RTA interval to assess whether or not the time constraint uplinked by the ATC is acceptable.

The FMS computes:

- The reliable ETAmin by using the maximum allowable RTA speed schedule
- The reliable ETAmax by using the minimum allowable RTA speed schedule

The FMS has to ensure that an RTA defined within reliable RTA interval will be met on a 95% probability basis. Thus it computes the RTA reliable interval taking into account wind and temperature uncertainties and any altitude and speed restrictions inserted in the flight plan. The RTA reliable interval displayed to the crew is thus taking into account some margins.

2.6.2.5 Controller-Pilot Datalink Communication (CPDLC)

In the context of Initial 4D, the CPDLC application is used by the controller to send dedicated clearances.

A minimum set of uplink messages (UMs), selected from the complete list of messages implemented by the FANS function, has been defined in order to perform Initial 4D operations. These messages allow the ATC to uplink time, altitude and speed constraints as well as route clearance.

The crew will be able to answer the ATC instructions with downlink messages (DMs) through a dedicated interface: the DCDU (Datalink Control and Display Unit). The flight crew may select the appropriate answer on the DCDU and as soon as they confirm the choice by pressing the SEND key, the appropriate DM will be downlinked to the ATC as response to the previous uplink.

In order to facilitate the CPDLC management by the crew, a “LOAD” functionality from the ATSU to the relevant FMS page has been developed in the frame of the FANS function. Some of the Initial 4D uplink messages are loadable into the FMS’s flight plan. A dedicated key exists on the DCDU to inform the flight crew that the message is loadable and perform the corresponding action. This functionality aims to avoid the human errors which may arise if the crew had to manually insert the potentially complex instruction into the FMS. However, validating and activating the data loaded into the FMS remains the pilots’ responsibility after having performed the appropriate assessment.

2.6.2.6 Prediction Reporting (ADS-C)

In the context of Initial 4D operation, the ADS-C application supports downlinking several reports to the ATC.

There are three types of ADS-C reports:

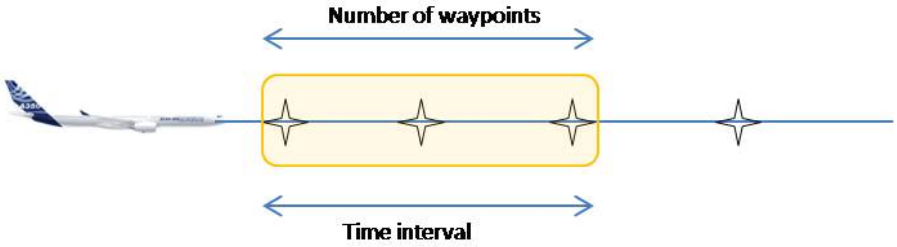
- On demand report: provide the capability for a ground system to request a single ADS-C report from an aircraft and to specify which information the system should include in the report (as defined in the corresponding standard (ref [8])).
- Periodic report: provide the capability for a ground system to request a periodic ADS-C report from an aircraft and specify which information the system should include in the report (as defined in the corresponding standard (ref [8])) and the rate at which the information is required.
- On event report: allow the ground system to request the avionics to send ADS-C reports when a specified event occurs. The ATC defines the type of events to be monitored.

Each ADS-C report is made of several groups of data, either mandatory or optional.

The initial 4D function supports the following groups:

- Basic group – mandatory
- EPP group – optional
- TOA Range group (ETAmin/max) – optional
- RTA Status group – optional

When setting an ADS-C contract for the EPP group, an “EPP reporting window” is defined by the ATC. Data related to the waypoints (up to 128) included into this window will be downlinked. The reporting window can be defined by a time interval or a number of waypoints.



In order to send an EPP report to the ATC, the FMS will compute on a regular basis the predicted 4D Trajectory, which is the description of what the aircraft is predicted to fly, and send it to the ATSU.

If an “On event” contract is active, the ATSU will assess if the conditions to downlink an EPP report are met by the 4D Trajectory and select the required data depending on the defined parameter. If “On demand” or “Periodic” contracts are active, the ATSU will send the last data provided by the FMS every time the triggering conditions are met.

The ATC can set a “Periodic” or “On demand” ETAmin/max report with the aircraft. The FMS will compute and send to the ATSU the ETAmin/max with the 4D trajectory on each waypoint of the flight plan at which an RTA can be issued.

Every time the ATSU receives an ETAmin/max report request from an ATC center, it downlinks the ETAmin/max report, independently from an EPP report. If a report has to be downlinked to the ATC, the ATSU will select the ETAmin/max at the specified waypoint (only one).

2.6.2.7 Datalink (FOC) capability to uplink wind and temperature data

Initial 4D function guarantees that the systems will be able to deliver the aircraft at any waypoint in en-route or descent at a given time, provided it is selected from appropriate reliable RTA interval +/- 10s or +/- 30s with a probability of 95%. Thus, the errors linked to the wind and temperature data had to

be mitigated and an enhanced wind/temp model is used on board to handle the wind and temperature data:

The Initial 4D function minimizes the discrepancies between FMS-defined wind/temp profile (based on forecast wind and temperature data) and actual wind/temp profile by refining FMS descent wind and temperature modelling.

The FMS takes into account:

- Up to 10 forecast descent winds in active flight plan in order to compute the corresponding descent wind profile.
- Up to 10 forecast descent temperatures in active flight plan in order to compute the corresponding descent temperature profile.

Forecast wind and temperatures are entered using the FMS capability to request enhanced Wind/temp data through FOC.

It is the crew responsibility to ensure that the Wind/temp data used by the FMS to compute the predicted 4D trajectory are as up to date as possible, in order to ensure an accurate predicted 4D trajectory.

2.7 Service View

N/A

3 Functional block Functional and non-Functional Requirements

3.1 Initial 4D Functional Requirements

You will find here below the functional requirements linked to the Initial 4D function for civil aircraft (mainline and regional), military aircraft and rotorcraft. These requirements are lined to the 05.06.01 OSED and SPR document [13] and, in addition, an appendix A is dedicated to rotorcraft operational requirements not contained in any OSED or SPR documents and raised during P04.10 project activities.

The validation of the requirements (defined here below considered as “validated”) corresponds to the following Technology Readiness Levels (TRLs):

- TRL3 ‘Analytical and experimental critical function and/or characteristic proof of concept’ for requirements linked to 04.10 project.
- TRL4 ‘Component/subsystem validation in laboratory environment’ for requirements linked to 09.03 project.
- TRL6 ‘System/subsystem model or prototyping demonstration in a relevant end-to-end environment (ground or space)’ for requirements linked to 09.01 project.

Moreover, some requirements are considered as validated in the frame of 09.01, 09.03 and/or 04.10 projects; however, additional activities should be considered in order to validate the official release of datalink standardisation document [8].

3.1.1 Navigation Requirements

3.1.1.1 RTA function

[REQ]

Identifier	REQ-09.01-TS-0.179
Requirement	Initial 4D function **shall** provide the capability to define an RTA constraint on any waypoint (except pseudo waypoint and FMS computed waypoint).
Title	RTA waypoint
Status	<Validated>
Rationale	RTA function is expected to provide operational benefit in all flight phase of a flight. Initial 4D function does not support multi-RTA operations. RTA can be defined in FMS active, temporary (TMPY) and any secondary (SEC) flight plan (FMS offers capability to have 1 RTA defined in active flight plan and 1 RTA defined in each TMPY and SEC flight plan at the same time).
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0077	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0072	<Partial>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-179	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

[REQ]

Identifier	REQ-09.01-TS-0.190
Requirement	Initial 4D function **shall** provide the capability to define a required accuracy related to the RTA value.
Title	RTA accuracy
Status	<DELETED>
Rationale	ATM requirements regarding RTA accuracy may be different within TMA or en-route phase of flight. Since it is expected that flying high accuracy RTA will generate guidance order changes lead to fly less optimized and less comfortable trajectories (more margins to be taken into account in vertical profile computation etc.) with potential impact also on passenger comfort, engine wear etc. It is preferable to fly with high accuracy RTAs only when required.
Category	<Functional>
Validation Method	N/A
Verification Method	N/A

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	N/A	<Full>
<SATISFIES>	<ATMS Requirement>	N/A	<Full>
<ALLOCATED_TO>	<Functional block>	N/A	N/A
<APPLIES_TO>	<Operational Focus Area>	N/A	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-190 DELETED Accuracy further defined in validation activities and detailed in REQ-09.01-TS-0.201	N/A
<ALLOCATED_TO>	<Project>	N/A	N/A

[REQ]

Identifier	REQ-09.01-TS-0.201
Requirement	Initial 4D function **shall** allow to define the following required accuracy related to the RTA value: +/-30s and +/-10s as defined in RTCA DO-236C Change 1 [9] / EUROCAE ED-75D [10].
Title	RTA accuracy value
Status	<Validated>
Rationale	According to validation activities, +/-10s accuracy applies to TMA but +/-30s could be enough in medium density, medium complexity TMA airspace, +/-30s applies to en-route. A default +/-30s accuracy value will be considered by the FMS in both en-route and TMA. These accuracy values are guaranteed only within the “Initial 4D horizon” as defined in DO-236C Change 1 [9] and detailed in section 2.1.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG07.0100	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0098	<Full>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-201	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.01-TS-1.212

Requirement	Initial 4D function **shall** compute an RTA "missed/made" status over the whole duration of an i4D operation. - RTA status ="made" when the A/C is predicted to sequence the waypoint within the defined RTA accuracy tolerance. - RTA status="missed" when the aircraft is predicted to sequence the waypoint outside the defined RTA accuracy tolerance.
Title	RTA status monitoring
Status	<Validated>
Rationale	When an RTA is being flown, flight crew shall have clear and unambiguous feedback on A/C capacity to meet RTA. The RTA accuracy tolerance is a tolerance considered by the FMS on the RTA accuracy to avoid triggering an RTA missed as soon as the RTA accuracy is exceeded while the RTA is still predicted as achievable.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG07.0200	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG07.0300	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0091	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0095	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-PRF1.0006	<Full>
<ALLOCATED_TO>	<Functional block>	Alert	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-212 Requirement slightly reworded	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

[REQ]

Identifier	REQ-09.01-TS-1.225
Requirement	Initial 4D function **shall** ensure that any RTA defined within associated reliable RTA interval will be satisfied (considering its required accuracy) with reliability on a 95% probability basis. This shall include in particular robustness to wind and temperature errors as defined in RTCA DO-236C Change 1 [9] / EUROCAE ED-75D [10]
Title	RTA reliability
Status	<Validated>
Rationale	10s at 95 % in descent and 30s at 95% in en-route are the values defined in RTCA DO-236C Change 1 [9] / EUROCAE ED-75D [10]. In order to ensure that any RTA defined within associated reliable RTA interval will be satisfied with reliability on a 95% probability basis (as defined in RTCA DO-236C Change 1 [9] / EUROCAE ED-75D [10]), the pilot has to fly the 4D trajectory in managed guidance mode. For Regional aircraft, reliable RTA interval shall take into account corresponding margin due to A/C performance model accuracy and due to the fact that managed guidance mode is not always available.
Category	<Performance>
Validation Method	<Analytical Modelling>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG07.0100	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0098	<Full>

<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-225 Standardisation document reference updated	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.01-TS-1.236
Requirement	The RTA speed target used for guidance shall be upper limited by “maximum allowable RTA speed schedule” defined by the flight crew. This shall have no impact on RTA resulting performance (accuracy/reliability).
Title	RTA maximum speed
Status	<Validated>
Rationale	This is to cope with cases where flight crew does not want to operate the A/C at high speed (temporary A/C limitation, airline policy etc.). Consistency with corresponding reliable RTA interval has to be ensured. If Vmax is modified after RTA insertion, the RTA performance might be impacted. Vmax value entered by the flight crew is rejected by the system if Vmax is superior to the maximum VMO-DELTA/MMO-DELTA value considering all flight phases. If Vmax is accepted by the system, Min(Vmax; VMO-DELTA/MMO-DELTA of the current flight phase) is used for guidance; in conformance with REQ-09.01-TS-1.304.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG07.0100	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0098	<Full>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-236	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

[REQ]

Identifier	REQ-09.01-TS-0.933
Requirement	The RTA speed target used for guidance **shall** be lower limited by the “minimum allowable RTA speed schedule” defined by the FMS. This shall have no impact on RTA resulting performance (accuracy/reliability).
Title	RTA minimum speed
Status	<DELETED>
Rationale	This is to allow the flight crew to comply with potential airline-specific requirements and policy. ATC may also need to limit the minimum speed for operational reasons. Consistency with corresponding reliable RTA interval values needs to be insured. The minimum allowable RTA speed schedule has to be within the aircraft speed envelope and in conformance with any potential ATC-related constraints as required by REQ-09.01-TS-0.304. Note the technical feasibility and operational needs and benefits need to be analysed deeper.
Category	<Functional>
Validation Method	N/A
Verification Method	N/A

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	N/A	<Full>
<SATISFIES>	<ATMS Requirement>	N/A	<Full>
<ALLOCATED_TO>	<Functional block>	N/A	N/A
<APPLIES_TO>	<Operational Focus Area>	N/A	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-933 DELETED After validation activities, there is no need for the pilot to change the minimum allowable RTA speed schedule.	N/A
<ALLOCATED_TO>	<Project>	N/A	N/A

[REQ]

Identifier	REQ-09.01-TS-1.271
Requirement	Initial 4D function design **should** maximize aircraft reliable RTA interval considering Maximum and Minimum allowable RTA speed schedule.
Title	RTA reliable interval
Status	<Validated>
Rationale	In future ATM concepts, RTA will be used to sequence inbound aircraft at a particular point. If the reliable RTA interval is too small, the ATC controller will not have enough flexibility to optimize air traffic flow. Maximizing reliable RTA interval is an operational need from the controller, however at the end of validation activities, no minimum window size value has been defined and this requirement exists as an operational objective to answer this need. This requirement is a design objective and can be implemented independently from the other requirements.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG07.0100	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0098	<Full>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-271 Requirement slightly reworded.	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

[REQ]

Identifier	REQ-09.01-TS-1.282
Requirement	When RTA is active and A/C is in managed guidance mode, RTA function induced speed increments **should** be minimized (in terms of amplitude) to an operationally acceptable level.
Title	RTA speed increments
Status	<Validated>
Rationale	According to ATC feedback, an RTA design with a series of small speed increment/decrement and frequent speed updates as soon as these required adjustments are known/identified by the FMS is preferred to an RTA design with a limited number of speed updates occurrence and infrequent (i.e. waiting for bigger steps before being activated by the FMS), large high speed increments/decrements. Operationally acceptable, according to current operations, means that A/C speed variations of less than 5% from the flight plan speed are not subjected to

	ATC notification. This requirement is a design objective and can be implemented independently from the other requirements.
Category	<Performance>
Validation Method	<Flight Trial>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0109	<Full>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-282 Requirement slightly reworded and clarified.	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.01-TS-1.304
Requirement	RTA speed target used for guidance **shall** take into account flight plan constraints in managed guidance mode.
Title	Flight Plan constraints
Status	<Validated>
Rationale	RTA computation needs to take into account other constraints. RTA design will have to account for reduced reliable RTA interval in speed restricted segment within the Initial 4D horizon as defined in section 2.1 (below speed limit altitude for example). Navigation (lateral/vertical) requirements from RTCA DO-236C Change 1 [9] / EUROCAE ED-75D [10] are applicable to RTA flight. In case of incompatibility between RTA and any other constraint, the non-conformance is solved through pilot/controller communication.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0099	<Full>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-304 Requirement slightly reworded Standardisation document reference updated	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

[REQ]

Identifier	REQ-09.01-TS-1.934
Requirement	RTA defined into the system **shall** not be deleted by the system if a selected mode is engaged. Upon reversion to managed guidance mode, Initial 4D function shall resume speed guidance according to the defined RTA.
Title	Selected mode with active RTA
Status	<Validated>
Rationale	This is to facilitate potential ATC conflict resolution efforts. In case of ATC intervention, flight crew will potentially use selected mode. Once the ATC intervention is complete, the function needs to be able to

	resume the i4D operation in order to comply with the RTA previously instructed. During the intervention, speed might be frozen by the system or the flight crew. Note that in this case, RTA reliability may not be guaranteed. Not applicable to Military A/C: Avionics modifications would be required.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0099	<Full>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-934-4 Rationale for no military applicability added	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

[REQ]

Identifier	REQ-09.01-TS-0.941-4
Requirement	Any running ASPA S&M manoeuvre **shall** be automatically stopped if a time constraint is entered in the active F-PLN.
Title	ASPA S&M and i4D exclusivity
Status	<DELETED>
Rationale	The i4D function and ASPA S&M application are considered as exclusive: it is not possible to keep a given spacing and insure that a time constraint will be made on a waypoint at the same time. Regional A/C will not be able to perform ASPA S&M operations in short/mid-term.
Category	<Operational>
Validation Method	N/A
Verification Method	N/A

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<Enabler>	A/C-15	<Full>
<SATISFIES>	<ATMS Requirement>	N/A	N/A
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.02.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-941-4 DELETED ASPA operations outside of P09.01 scope.	N/A
<ALLOCATED_TO>	<Project>	N/A	N/A

[REQ]

Identifier	REQ-09.01-TS-2.003
Requirement	When sequencing the RTA waypoint, or upon the cancellation of the RTA when the aircraft is already in descent, the aircraft **shall** maintain the last speed required to meet the RTA, unless otherwise instructed by ATC.
Title	I4D stopped
Status	<Validated>
Rationale	This is to avoid important speed variations while in TMA, as also identified in REQ-09.01-TS-1.282. When the RTA is cancelled while in cruise, the aircraft will resume its optimal speed except if a new RTA is inserted in the FMS.
Category	<Functional>
Validation Method	<Real Time Simulation>

Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG08.0100	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0113	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0115	<Full>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New requirement	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

[REQ]

Identifier	REQ-09.01-TS-0.942
Requirement	Any running i4D function **shall** be automatically stopped if ASPA S&M application is activated.
Title	I4D and ASPA S&M exclusivity
Status	<Validated>
Rationale	The i4D function and ASPA S&M application are considered as exclusive: it is not possible to keep a time constraint and ensure a given spacing will be maintained at the same time. Regional A/C will not be able to perform ASPA S&M operations in short/mid-term.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<Enabler>	A/C-15	<Full>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.02.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-942-4	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

3.1.1.2 Computation of Reliable ETAmin and Reliable ETAmax

[REQ]

Identifier	REQ-09.01-TS-1.338
Requirement	Initial 4D function **shall** include the capability to compute reliable ETAmin and ETAmax values for any flight plan waypoint eligible for an RTA.
Title	Reliable ETAmin/max interval on waypoint
Status	<Validated>
Rationale	Reliable ETAmin and reliable ETAmax values represent the lower and the upper bound of the reliable RTA interval respectively and will be used in support of RTA negotiation with ATC controller. Reliable RTA interval is computed for all flight plan waypoints where an RTA can be defined. Only one reliable RTA interval is displayed on-board the aircraft and downlinked to the ground at a time.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0071	<Full>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-338	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

[REQ]

Identifier	REQ-09.01-TS-1.349
Requirement	Reliable ETAmin **shall** be computed by using the aircraft speed envelope upper restricted by the “maximum allowable RTA speed schedule” taking into account wind/temp margins.
Title	Reliable ETAmin computation
Status	<Validated>
Rationale	Wind error margins shall be added to ensure that any RTA set within reliable RTA interval will be sequenced within required accuracy tolerance with 95% probability. This maximum allowable RTA speed profile will be alterable by the crew and will be used for both reliable ETAmin computation and as a maximum allowable speed for speed guidance while in RTA operation.
Category	<Functional>
Validation Method	<Analytical Modelling>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0071	<Full>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-349 Rationale updated	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

[REQ]

Identifier	REQ-09.01-TS-1.937
Requirement	Reliable ETAmax **shall** be computed by using the aircraft speed envelope taking into account wind/temp margins.
Title	Reliable ETAmax computation
Status	<Validated>
Rationale	Minimum allowable speed schedule is not alterable by flight crew.
Category	<Functional>
Validation Method	<Analytical Modelling>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0071	<Full>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-937 Requirement and rationale updated to align the content on last validation results.	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A

<ALLOCATED_TO>	<Project>	P09.03	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

[REQ]

Identifier	REQ-09.01-TS-0.360
Requirement	Both reliable ETAmin and ETAmax values **shall** be computed with a resolution of one second.
Title	ETAmin and ETAmax resolution
Status	<Validated>
Rationale	This is to ensure consistency with RTA required accuracy (which can be as low as +/-10s).
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG07.0100	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0098	<Full>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-360	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

3.1.1.3 Time estimates accuracy

[REQ]

Identifier	REQ-09.01-TS-1.372
Requirement	Initial 4D function **shall** provide the capability to compute time estimates for any flight plan waypoint eligible for RTA with a resolution of one second.
Title	ETA resolution
Status	<Validated>
Rationale	The predicted 4D trajectory downlinked to ATC will include ETA for all flight plan waypoint with a resolution of 1s. According to current navigation system design, ETA for RTA constrained waypoint is already computed and displayed on RTA page with a resolution of 1s.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0071	<Full>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-372	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

[REQ]

Identifier	REQ-09.01-TS-1.383
Requirement	Initial 4D function **shall** have the capability to compute ETA such that the maximum ETA error is less than 1% of the flight time remaining to the fix the ETA is calculated for or 10seconds, whichever is greater, for the entered

	conditions and flight plan.
Title	ETA accuracy
Status	<Validated>
Rationale	New ATM concepts focus on A/C improved predictability. Having accurate ETA will improve accuracy of 4D trajectory computed by navigation systems and downlinked to ATC. The objective is to provide predictions accurate enough to allow ATC to build and maintain a sequence of A/C based on transmitted data. Having more accurate time estimates will also have beneficial impact on i4D function (need for reduced ETA error compensation via speed adjustments). This performance requirement on ETA reliability is based on DO236C Change 1 [9] and EUROCAE ED-75D [10]. An aircraft already compliant with DO236 is compliant with this requirement.
Category	<Performance>
Validation Method	<Analytical Modelling>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	N/A	N/A
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-383 Requirement wording aligned on ED-75D [10] formulation.	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

3.1.2 Communication Requirements

Typical Data Link System architecture for regional aircraft is different from datalink structure for mainline aircraft (i.e. different exchanges with FMS, limited CPDLC, ADS-C and FOC functionalities). CPDLC and ADS-C requirements are based on WG78/SC214 SPR ver. H [7].Communication requirements are analysed in further detail in P09.01 D58 “Interface requirements between the aircraft and the ATC systems” [11].

3.1.2.1 General

[REQ]

Identifier	REQ-09.01-TS-0.407
Requirement	ADS-C and CPDLC datalink applications **shall** be installed and active on board the A/C.
Title	Datalink capability availability
Status	<Validated>
Rationale	Initial 4D function features communication exchanges with ATC via CPDLC and downlink of both 4D trajectory and reliable ETAmin/ETAmax values via ADS-C. This requirement is considered as validated in the frame of 09.01 and 09.03 projects; however, additional activities should be considered in order to validate the official release of datalink standardisation document [8].
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-31a	<Full>
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0100	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0110	<Full>

<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0200	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0210	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0008	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0009	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-407	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.01-TS-0.429
Requirement	All ETA, reliable ETAmin/max, RTA value to be exchanged between A/C and ATC via CPDLC or ADS-C shall have a resolution of 1sec.
Title	Datalink time information resolution
Status	<Validated>
Rationale	This is due to 1s ETA resolution required by DO-236C Change 1. This requirement is considered as validated in the frame of 09.01 and 09.03 projects; however, additional activities should be considered in order to validate the official release of datalink standardisation document [8].
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-31a	<Full>
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0012	<Partial>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-429 RTCA and EUROCAE applicable document updated	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

3.1.2.2 CPDLC

[REQ]

Identifier	REQ-09.01-TS-1.418
Requirement	As a general requirement, the management of all Initial 4D CPDLC messages **shall** comply with general requirements related to FANS C function.
Title	I4D CPDLC message compatibility with FANS C
Status	<Validated>
Rationale	This is to ensure compatibility between different Airbus functions. Applicable to Airbus aircraft only. *FANS C: Airbus function which manages datalink communication in European continental airspace.* This requirement is considered as validated in the frame of 09.01 project; however, additional activities should be considered in order to validate the official release of datalink standardisation document [8].
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-31a	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0008	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0009	<Full>

<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-418 Document reference updated Rationale updated	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A

[REQ]

Identifier	REQ-09.01-TS-1.935
Requirement	As a general requirement, the loading of all Initial 4D CPDLC messages **shall** comply with requirements related to FANS C function.
Title	I4D CPDLC message compatibility with FANS C
Status	<Validated>
Rationale	This is to ensure compatibility between different Airbus functions. Applicable to Airbus aircraft only. *FANS C: Airbus function which manages datalink communication in European continental airspace.* This requirement is considered as validated in the frame of 09.01 project; however, additional activities should be considered in order to validate the official release of datalink standardisation document [8].
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-31a	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0008	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0009	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-935-4 Document reference updated Rationale updated	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A

[REQ]

Identifier	REQ-09.01-TS-1.001
Requirement	As a general requirement, the management of Initial 4D CPDLC **shall** comply with messages as defined in P09.01 SESAR document D58 [11], based on draft versions of EUROCAE ED-228A [8].
Title	CPDLC message definition
Status	<Validated>
Rationale	This corresponds to the set of messages required to operate Initial 4D function. The supported set of messages in the quoted standard is presented in interoperability P09.01 SESAR document D58 [11].The entire set of message might not be supported due to technical limitations or low operational interest. This requirement is considered as validated in the frame of 09.01 and 09.03 projects; however, additional activities should be considered in order to validate the official release of datalink standardisation document [8].
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-31a	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0120	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0009	<Full>

<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): NEW-INITIAL4D-001 Requirement updated with reference to applicable EUROCAE datalink standard and SESAR Interoperability document.	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.01-TS-1.002
Requirement	The Initial 4D function **shall** support the automatic upload of 3D route clearances with time, altitude or speed constraints as required P09.01 SESAR document D58 [11], based on draft versions of EUROCAE ED-228A [8].
Title	CPDLC 3D route clearance upload
Status	<Validated>
Rationale	As required in EUROCAE ED-228A [8]. This corresponds to CPDLC “load” selection on DCDU/mailbox. This requirement is considered as validated in the frame of 09.01 and 09.03 projects; however, additional activities should be considered in order to validate the official release of datalink standardisation document [8].
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-31a	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0038	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): NEW-INITIAL4D-002 Requirement and rationale updated with reference to applicable EUROCAE datalink standard and SESAR Interoperability document.	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

3.1.2.3 Airborne Dependent Surveillance – Contract (ADS-C)

[REQ]

Identifier	REQ-09.01-TS-1.590
Requirement	Initial 4D function **shall** provide the capability to process and manage ADS-C “EPP request and report contract” as defined in P09.01 SESAR document D58 [11], based on draft versions of EUROCAE ED-228A [8].
Title	EPP contract
Status	<Validated>
Rationale	ADS-C is used to downlink aircraft predicted 4D trajectory to support (among others) 3D route synchronisation, 4D trajectory monitoring and use by ATC which are one of key enablers for Initial 4D concept. The ADS-C EPP report will include 4D trajectory. The usage of this report may be based on “On Event”, “Periodic” or “On Demand” contract. This requirement is considered as validated in the frame of 09.01 and 09.03 projects; however, additional activities should be considered in order to validate the official release of datalink standardisation document [8].
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG02.0100	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0023	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-590 Requirement and rationale updated with reference to applicable EUROCAE datalink standard and SESAR Interoperability document.	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.01-TS-1.601
Requirement	The 4D trajectory to be downlinked to the ground **shall** include a reliability status indicating whether the computed information is reliable or not as defined in P09.01 SESAR document D58 [11], based on draft versions of EUROCAE ED-228A [8].
Title	4D trajectory downlink reliability
Status	<Validated>
Rationale	The predicted 4D trajectory is the trajectory the A/C is supposed to fly should the A/C be flown with managed guidance modes engaged. In case trajectory parameters are not being tracked by airborne automation (autopilot, auto-throttle, etc…), the predicted 4D trajectory may be no more representative of the actual trajectory. This requirement is considered as validated in the frame of 09.01 and 09.03 projects; however, additional activities should be considered in order to validate the official release of datalink standardisation document [8].
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0012	<Partial>
<ALLOCATED_TO>	<Functional block>	<Communication>	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-601	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.01-TS-1.612
Requirement	Initial 4D function **shall** provide the capability to process and manage ADS-C “ETAmin/ETAmax requests and reports” as defined in P09.01 SESAR document D58 [11], based on draft versions of EUROCAE ED-228A [8].
Title	ETAmin/max request on identified waypoint
Status	<Validated>
Rationale	This message is used as the mean to downlink aircraft reliable ETAmin and reliable ETAmax to ATC so that ATC can define a feasible RTA. This report mechanization would be “On Demand”, Request message would contain the identification of the waypoint for which the information is requested. Downlinked information would correspond to reliable ETAmin/max value on requested waypoint.

	This requirement is considered as validated in the frame of 09.01 and 09.03 projects; however, additional activities should be considered in order to validate the official release of datalink standardisation document [8].
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0059	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-612 Requirement and rationale updated with reference to applicable EUROCAE datalink standard and SESAR Interoperability document.	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.01-TS-0.623
Requirement	Both ADS-C “EPP report” and “ETAmin/ETAmax report” data **shall** be related to active flight plan.
Title	ADS-C report data
Status	<Validated>
Rationale	ATC needs data related to the trajectory to be flown. This requirement is considered as validated in the frame of 09.01 and 09.03 projects; however, additional activities should be considered in order to validate the official release of datalink standardisation document [8].
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG07.0400	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0103	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-PRF1.0008	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-623	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.01-TS-1.315
Requirement	The ADS-C report generation time **shall** be compliant with EUROCAE ED-228A [8].
Title	ADS-C report time performance
Status	<Validated>
Rationale	An Aircraft needs to be capable to provide ADS-C reports in a timely manner. For the aircraft domain, EUROCAE ED-228A [8] makes no distinction between the FMS (which is the main data provider for the ADS-C report) and the remainder of the aircraft system. Generation and transmission of ADS-C

	reports are performed by the aircraft system as a whole, which characterised by the time $RSTP_{AIRCRAFT.}$ More details are available in Appendix F-3 and F-4 of EUROCAE ED-228A [8]. As the ADS-C application supports 4DTBO and ATC Comm ATS functions in ENR-1, TMA and APT airspace as defined in EUROCAE ED-228A [8]. Performance requirements defined by specification RSP 160 are of particular interest for 4D function. For RSP 160, $RSTP_{AIRCRAFT}$ is 86s. This requirement is considered as validated in the frame of 09.01 and 09.03 projects; however, additional activities should be considered in order to validate the official release of datalink standardisation document [8].
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0012	<Partial>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-315-4 Requirement updated with information from last EUROCAE standard available issue.	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

3.1.2.4 FOC

[REQ]

Identifier	REQ-09.01-TS-1.846
Requirement	The Initial 4D function **shall** have the capability to uplink wind and temperature data via FOC datalink.
Title	Wind/temp FOC capability
Status	<Validated>
Rationale	Accuracy and time control authority needs to be fed with up-to-date external data. This requirement requires the availability of MET data uplink request. MET data will be provided to the A/C through FOC. Data for increased number of levels are necessary to ensure sufficient accuracy of time estimates and reliability of operation. Temperature data is included in ARINC 702A-4 [16].
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0098	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-846 Rationale updated with last validation results.	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

3.1.3 HMI Requirements

3.1.3.1 RTA and Reliable RTA Interval computation

[REQ]

Identifier	REQ-09.01-TS-1.670
Requirement	Current ETA and reliable RTA interval **shall** be available for display to the flight crew for any waypoint at which an RTA can be defined prior to actually entering an RTA at this waypoint.
Title	ETA and reliable RTA interval display
Status	<Validated>
Rationale	This will allow flight crew to make the system compute reliable RTA interval for any waypoint in support of RTA value negotiation with ATC without having to effectively define a RTA on this waypoint. This means that, in accordance with current FMS design (for ETA only), the current ETA and reliable RTA interval(reliable ETAmin/reliable ETAmax) values shall be computed and displayed to the flight crew as soon as the RTA waypoint identifier is defined on the RTA page. The ETA and reliable RTA interval is displayed only for one waypoint at a time. Display of reliable RTA interval on regional A/C still needs to be evaluated due to limited MCDU evolution.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0071	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0097	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0118	<Full>
<ALLOCATED_TO>	<Functional block>	HMI	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-670 Rationale updated for clarification purpose	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

[REQ]

Identifier	REQ-09.01-TS-0.659
Requirement	Maximum allowable RTA speed schedule (used as an upper limit for both RTA speed target for guidance and reliable ETAmin computation) **shall** be modifiable by the crew at any time; except in approach flight phase.
Title	Vmax modification
Status	<Validated>
Rationale	This is to ensure that the reliable ETAmin downlinked via ADS-C is properly computed based on flight crew input. Operationally, flight crew may need to modify the Vmax anytime during the flight (for example when entering a turbulence area). If Vmax is modified after RTA insertion, the RTA performance might be impacted. Regional A/C fly relatively slowly (compared to mainline A/C) and often close to their maximum speed. The use of maximum allowable RTA speed schedule for regional A/C is therefore not deemed necessary.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG07.0100	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0098	<Full>
<ALLOCATED_TO>	<Functional block>	HMI	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-659	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

[REQ]

Identifier	REQ-09.01-TS-0.940
Requirement	Minimum allowable RTA speed schedule (used as a lower limit for both RTA speed target for guidance and reliable ETAmax computation) shall be modifiable by the flight crew at all times except in approach flight phase.
Title	RTA minimum allowable speed
Status	<DELETED>
Rationale	This is to ensure that the reliable ETAmin downlinked via ADS-C is properly computed based on flight crew input. Regional A/C fly relatively slowly (compared to mainline A/C) and often close to their maximum speed. The use of maximum allowable RTA speed schedule for regional A/C is therefore not deemed necessary.
Category	<Functional>
Validation Method	N/A
Verification Method	N/A

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	N/A	<Full>
<SATISFIES>	<ATMS Requirement>	N/A	<Full>
<ALLOCATED_TO>	<Functional block>	N/A	N/A
<APPLIES_TO>	<Operational Focus Area>	N/A	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-940 DELETED After validation activities, there is no need for the pilot to change the minimum allowable RTA speed schedule.	N/A
<ALLOCATED_TO>	<Project>	N/A	N/A

[REQ]

Identifier	REQ-09.01-TS-0.681
Requirement	Whenever the RTA is predicted missed, the Initial 4D function **shall** indicate the “missed” status of the time constraint in the pilot’s primary field of view wherever the RTA waypoint is.
Title	RTA missed display
Status	<Validated>
Rationale	Need for RTA status display in the flight crew primary field of view depends on operational impact of A/C RTA non-conformance. The RTA may be set on a waypoint several waypoints ahead from the current A/C position; the alert should be still available to the flight crew, wherever the RTA waypoint is. Pilot is responsible to alert ATC in case of RTA missed.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>

<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG07.0300	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0091	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-PRF1.0007	<Full>
<ALLOCATED_TO>	<Functional block>	HMI	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-681	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

3.1.3.2 CPDLC

[REQ]

Identifier	REQ-09.01-TS-1.704
Requirement	General mechanization of CPDLC messages (and associated downlinks) **should** minimize associated flight crew workload.
Title	CPDLC message management
Status	<Validated>
Rationale	Initial 4D and any associated messaging needs to have minimum impact on flight crew workload. The use of automatic upload of received clearances should be considered whenever possible. Loadable CPDLC messages are listed in interoperability P09.01 SESAR document D58 [11]. This requirement is a design objective and can be implemented independently from the other requirements. This requirement is considered as validated in the frame of 09.01 and 04.10 projects; however, additional activities should be considered in order to validate the official release of datalink standardisation document [8].
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-31a	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0038	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0082	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0110	<Full>
<ALLOCATED_TO>	<Functional block>	<HMI>	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-704 Rationale updated with reference to the last applicable document.	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

3.1.3.3 ADS-C

[REQ]

Identifier	REQ-09.01-TS-0.716
Requirement	The management of “EPP” ADS-C request and report **shall** not require dedicated flight crew actions.
Title	EPP transparency for Flight Crew
Status	<Validated>
Rationale	This is to minimize flight crew workload. In accordance with current ADS-C functions implementation. This requirement is considered as validated in the frame of 09.01 and 04.10 projects; however, additional activities should be considered in order to validate the official release of datalink standardisation document [8].
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0118	<Full>
<ALLOCATED_TO>	<Functional block>	<HMI>	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-716	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

[REQ]

Identifier	REQ-09.01-TS-0.727
Requirement	The management of “ETAmin/max” ADS-C request and report **shall** not require dedicated flight crew actions.
Title	ETAmin/max transparency for Flight Crew
Status	<Validated>
Rationale	This is to minimize flight crew workload. In accordance with current ADS-C functions implementation. This requirement is considered as validated in the frame of 09.01 and 04.10 projects; however, additional activities should be considered in order to validate the official release of datalink standardisation document [8].
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0118	<Full>
<ALLOCATED_TO>	<Functional block>	<HMI>	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Previous Reference (D06): FRD-INITIAL4D-727	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A
<ALLOCATED_TO>	<Project>	P04.10	N/A

3.1.4 Military Functional Requirements

The requirements listed below are applicable to Military aircraft, transport and/or fighter. By default when no precision is provided in the field <ALLOCATED_TO> | <PROJECT> (i.e. P09.03 indicated), it means that the requirement is applicable to both transport and fighter.

[REQ]

Identifier	REQ-09.03-TS-2.001
Requirement	As a general requirement in STEP 1 communication related to RTA function **should** not be managed by using datalink applications but by using voice communication.
Title	Military – RTA communication
Status	<In Progress>
Rationale	By consulting Military Datalink Interoperability roadmap it is possible to see that datalink applications will be available on STEP 2
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Partial>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A

<CHANGED BECAUSE OF>	<Change Order>	New Requirement	N/A
<ALLOCATED TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.03-TS-2.002
Requirement	Two different single time constraints (CTO) **shall** be used in order to manage the entry and the exit of military aircraft to a TRA/TSA.
Title	Military – Multiple CTO
Status	<In Progress>
Rationale	The entry in a TRA/TSA and the exit from the TRA/TSA shall be managed by using CTO in order to maximize civil-military interoperability.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Partial>
<ALLOCATED TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED BECAUSE OF>	<Change Order>	New Requirement	N/A
<ALLOCATED TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.03-TS-2.003
Requirement	Two different single time constraints (CTO) **shall** be defined and negotiated with ATC before the entry of the military aircraft in the TRA/TSA. The first CTO shall be relative to the entry waypoint of the TRA/TSA, the second CTO shall be relative to the exit point of the TRA/TSA.
Title	Military – Multiple CTO negotiation
Status	<In Progress>
Rationale	Two different single time constraints (CTO) shall be defined and negotiated with the ATC before the entry of the military aircraft in the TRA/TSA because it is assumed that a military aircraft will stop communication with the ATC at the entry waypoint of TRA/TSA.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Partial>
<ALLOCATED TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED BECAUSE OF>	<Change Order>	New Requirement	N/A
<ALLOCATED TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.03-TS-2.004
Requirement	3D coordinates (latitude, longitude and altitude) of the entry waypoint and exit waypoint of the TRA/TSA **shall** be defined and agreed with ATC during mission planning phase.
Title	Military – TRA/TSA entry and exit waypoints definition
Status	<In Progress>
Rationale	On a transport-type aircraft the pilot will have access to the navigation database via MCDU and he will plan the route by selecting agreed entry and exit waypoint of TRA/TSA. On a fighter aircraft the pilot will have access to the planned routes loaded on

	ground in the Mission Computer via the MPS. Fighter planned route will already involve and entry and an exit waypoint of the TRA/TSA.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Partial>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.03-TS-2.005
Requirement	In case where a renegotiation of CTOs is requested by the ATC, the pilot **shall** have a mean in order to modify at any time before TRA/TSA entry waypoint the two different single time constraints (CTO) on the entry and the exit waypoint of a TRA/TSA.
Title	Military – TRA/TSA entry and exit time renegotiation
Status	<In Progress>
Rationale	In order to increase flexibility the ATC can renegotiate CTOs. In occurrence of a renegotiation the pilot will have the possibility to manually insert negotiated CTOs in the MC via the MCDU.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Partial>
<ALLOCATED_TO>	<Functional block>	HMI	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.03-TS-2.006
Requirement	A single time constraint (CTA) **should** be used in order to manage the arrival of a military aircraft in a busy TMA.
Title	Military – Time of arrival in a TMA
Status	<In Progress>
Rationale	Transport-type aircraft could have the necessity to have access to airports concerning busy TMAs. In this case the aircraft should have means in order to allow ATC managing the arrival by using a CTA.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Partial>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.03-TS-2.007
Requirement	3D coordinates (latitude, longitude and altitude) of the CTA waypoint **shall** be defined and agreed with ATC during mission planning phase.
Title	Military – CTA waypoint definition
Status	<In Progress>
Rationale	The absence of datalink applications in STEP 1 determines the necessity to negotiate 3D coordinate of the CTA point during the mission planning phase.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Partial>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.03-TS-2.008
Requirement	CTA **shall** be negotiated with ATC via voice communication when the aircraft is in the AMAN horizon.
Title	Military – CTA negotiation
Status	<In Progress>
Rationale	Negotiation inside the AMAN horizon is in conformance with civil RTA functionality.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Partial>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.03-TS-2.009
Requirement	In case of a renegotiation of CTA is requested by ATC, the pilot **shall** have a mean in order to modify at any time CTA loaded on MC via MCDU.
Title	Military – CTA renegotiation
Status	<In Progress>
Rationale	In order to increase flexibility the ATC can renegotiate CTA. In occurrence of a renegotiation, the pilot will have the possibility to manually insert negotiated CTA in the MC via the MCDU.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Partial>
<ALLOCATED_TO>	<Functional block>	HMI	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A

<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.03-TS-2.010
Requirement	The speed commanded by the DA/FD to FCS **shall** be available for display to the crew when the RTA function is engaged.
Title	Military – RTA speed information display
Status	<In Progress>
Rationale	Need for DA/FD commanded IAS display on flight crew primary field of view is considered crucial in order to allow the pilot monitoring the RTA function and identify possible failures or bad functioning.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Partial>
<ALLOCATED_TO>	<Functional block>	HMI	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.03-TS-2.011
Requirement	A label indicating that the RTA function is active shall be available for display to the crew while the RTA function is engaged.
Title	Military – Active RTA function indication to the crew
Status	<In Progress>
Rationale	The pilot need to know if the RTA function is active or not.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Partial>
<ALLOCATED_TO>	<Functional block>	HMI	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

[REQ]

Identifier	REQ-09.03-TS-2.012
Requirement	The crew should be aware of an on-going ADS-C contract with the ATC.
Title	Military – On-going ADS-C connection indication to the crew
Status	<Validated>
Rationale	This is to prevent unwanted military data sharing with ATC. This requirement is considered as validated in the frame of 09.03 project; however, additional activities should be considered in order to validate the official release of datalink standardisation document [8].
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<ALLOCATED_TO>	<Functional block>	HMI	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	P09.03	N/A

3.1.5 Rotorcraft Functional Requirements

The requirements listed below are applicable to rotorcraft.

[REQ]

Identifier	REQ-04.10-GEN1-i4DT.0030
Requirement	The onboard avionic system shall be capable of processing the wind direction/speed and temperature received from the MET provider during the flight at a periodic update rate, in order to re-estimate the ETA in case of evolution of the weather situation along the trajectory
Title	Weather resilience
Status	<In Progress>
Rationale	Rotorcrafts are sensitive (much more than airlines) to the wind and temperature on the trajectory, in such a way that the ETA window may no longer be reachable when these conditions change during the flight
Category	<Functional>
Validation Method	<Real Time Simulation>
Validation Method	<Expert Group (Judgement Analysis)>
Verification Method	<Review of Design><Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	ENB03.01.01 TMF	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	04.10	N/A

[REQ]

Identifier	REQ-04.10-GEN1-i4DT.0040
Requirement	The ground system should be capable of processing an alternative proposal in case of rotorcraft inability to comply with CTA. An alternative 3D trajectory should be proposed to the rotorcraft before declaration of missed CTA.
Title	Vertical profile adaptation to comply with CTA
Status	<In Progress>
Rationale	Thanks to rotorcraft climb/descent/speed performance, it could be possible to propose another vertical path to join the FATO (rotorcraft can descent at high vertical speed). If this alternate procedure is not available, a new time window will be defined with reference to the merging point determined for the rotorcraft trajectory.
Category	<Functional>
Validation Method	<Real Time Simulation>
Validation Method	<Expert Group (Judgement Analysis)>
Verification Method	<Review of Design><Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	ENB03.01.01 TMF	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	04.10	N/A

3.2 Adaptability

N/A

3.3 Performance Characteristics

Performance requirements are integrated within functional requirements. Dedicated performance related requirements are:

- REQ-09.01-TS-0.201
- REQ-09.01-TS-1.225
- REQ-09.01-TS-1.282
- REQ-09.01-TS-1.315
- REQ-09.01-TS-1.383

3.4 Safety & Security

3.4.1 Security Requirements

In the frame of SESAR 1 P09.01 activities and the development of Initial 4D function, no work has been conducted on this topic. In this condition, traceability to the following P05.06.01 SPR [13] requirements is not performed in this document:

- REQ-05.06.01-Step 1SPR IT3-SEC1.0003
- REQ-05.06.01-Step 1SPR IT3-SEC1.0004

3.4.2 Safety Requirements

The safety requirements below are extracted from the P05.06.01 SPR [13].

[REQ]

Identifier	REQ-09.01-TS-2.004
Requirement	The probability of FMS failing to detect and alert on unachievable RTA shall not exceed 2.0E-04 per Flight Hour.
Title	Probability of FMA failing to detect and alert on unachievable RTA
Status	<In progress>
Rationale	Extracted from P05.06.01 SPR [13]. No quantitative analysis has been performed in the scope of P09.01 project to demonstrate the probability defined in SPR. Further analysis must be performed to verify that the aircraft definition and implementation is in line with this requirement.
Category	<Safety>
Validation Method	<Analytical Modelling>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0105	<Full>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A

[REQ]

Identifier	REQ-09.01-TS-2.005
Requirement	The probability of non-detection by aircraft monitoring of RTA un-achievability shall not exceed 2.0E-04 per Flight Hour.
Title	Probability of non-detection by aircraft monitoring of RTA un-achievability
Status	<In progress>
Rationale	Extracted from P05.06.01 SPR [13]. No quantitative analysis has been performed in the scope of P09.01 project to demonstrate the probability defined in SPR. Further analysis must be performed to verify that the aircraft definition and implementation is in line with this requirement.
Category	<Safety>
Validation Method	<Analytical Modelling>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0107	<Full>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A

[REQ]

Identifier	REQ-09.01-TS-2.006
Requirement	The probability that an RTA becomes not met due to aircraft failures shall not exceed 1.0E-03 per Flight Hour.
Title	Probability that an RTA becomes not met due to aircraft failures
Status	<In progress>
Rationale	Extracted from P05.06.01 SPR [13]. No quantitative analysis has been performed in the scope of P09.01 project to demonstrate the probability defined in SPR. Further analysis must be performed to verify that the aircraft definition and implementation is in line with this requirement.
Category	<Safety>
Validation Method	<Analytical Modelling>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-11	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0108	<Full>
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A

[REQ]

Identifier	REQ-09.01-TS-2.007
Requirement	The probability of erroneous EPP message downlink shall not exceed 1.3E-04 per Flight Hour.
Title	Probability of erroneous EPP message downlink
Status	<In progress>
Rationale	Extracted from P05.06.01 SPR [13]. No quantitative analysis has been performed in the scope of P09.01 project to demonstrate the probability defined in SPR. Further analysis must be performed to verify that the aircraft definition and implementation is in line with this requirement.

Category	<Safety>
Validation Method	<Analytical Modelling>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-Step 1SPR IT3-SAF1.0135	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	P09.01	N/A

3.5 Maintainability

N/A

3.6 Reliability

Reliability requirements are integrated within functional requirements in section 3.1.

3.7 Functional block Internal Data Requirements

N/A

3.8 Design and Construction Constraints

N/A

3.9 Functional block Interface Requirements

Refer to functional requirements in section 3.1 and in P09.01 D58 “Interface requirements between the aircraft and the ATC systems” [11] for further details.

4 Assumptions

Remaining open points in the CTA concept definition have been further explored by P05.06.01 Expert Group and are available in the report integrated as an Appendix of P05.06.01 Step 1 OSED Final [12].

5 References

[1] Template Toolbox 03.00.00
https://extranet.sesarju.eu/Programme%20Library/SESAR%20Template%20Toolbox.dot

[2] Requirements and V&V Guidelines 03.00.00
https://extranet.sesarju.eu/Programme%20Library/Requirements%20and%20VV%20Guidelines.doc

[3] Templates and Toolbox User Manual 03.00.00
https://extranet.sesarju.eu/Programme%20Library/Templates%20and%20Toolbox%20User%20Manual.doc

[4] EUROCONTROL ATM Lexicon
https://extranet.eurocontrol.int/http://atmlexicon.eurocontrol.int/en/index.php/SESAR

[5] B.04.03 D128 ADD SESAR 1 edition

[6] IEEE / MIL Standards

[7] WG78/SC214 Safety and Performances – version H

[8] EUROCAE ED-228A Safety and Performance Requirements Standard for Baseline 2 ATS Data Communications (Baseline 2 SPR Standard)

[9] RTCA DO-236C Change 1 Minimum Aviation System Performance Standards: Required Navigation Performance for Area Navigation

[10] EUROCAE ED-75D Minimum Aviation System Performance Standards: Required Navigation Performance for Area Navigation

[11] 09.01 D58 Interface requirements between the Aircraft and the ATC systems

[12] 05.06.01 D84 Step 1 – Fully Validate SPR which includes final OSED

[13] 05.06.01 D84 Step 1 – Fully Validated SPR

[14] 05.06.01 D85 Step 1 – Fully Validated Interop

[15] 09.49-D03-002-Batch 1 & 2 - Consolidated Functional Airborne Architecture – Version 2

[16] ARINC 702A-4 Advanced flight management computer system

5.1 Use of copyright / patent material /classified material

5.1.1 Classified Material

N/A

Appendix A Rotorcraft operational requirements

The following requirements have been created as they are specific to rotorcraft i4D operations, and they have no dedicated requirements in the Aircraft i4D.

[REQ]

Identifier	REQ-04.10-GEN1-i4DT.0010
Requirement	A rotorcraft merging point shall be defined according to rotorcraft performance, at a suitable location within the controlled airspace
Title	Rotorcraft merging point
Status	<In Progress>
Rationale	For a rotorcraft to converge into the IFR traffic flows, an appropriate merging point has to be defined to enter the controlled airspace. This merging point shall be defined taking into account the rotorcraft performance, especially due to their condition of flying at lower (en-route) altitudes than fixed wings.
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	ENB03.01.01 TMF	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	04.10	N/A

[REQ]

Identifier	REQ-04.10-GEN1-i4DT.0011
Requirement	A rotorcraft metering point shall be defined into the IFR airspace after the rotorcraft merging point, point on which an RTA time constraint has to be set. The metering point shall be either the IAF, or the IF, or the FAF, depending on the airspace density / complexity
Title	Rotorcraft metering point
Status	<In Progress>
Rationale	The metering point is a constraint point, i.e. a merging point, with a target time of arrival assigned to that point. The calculation of the target time shall take into account the performance of rotorcraft operations (e.g. descent/ascent rate, speed) and be defined specifically for rotorcrafts. If the approach is SNI, the metering point can be located at the FAF (if the MAPt is separated). If the approach is non-SNI, the metering point cannot be located inside the interfering area because temporal separation has to be performed. In that case, the metering point has to be located just before this area.
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	ENB03.01.01 TMF	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	04.10	N/A

[REQ]

Identifier	REQ-04.10-GEN1-i4DT.0020

Requirement	During the transition from VFR into IFR, a time window shall be defined specifying the earliest point in time in which the rotorcraft is required to submit its intended business trajectory to ATC and the latest point in time to do so.
Title	Time window for RBT submission when transitioning from VFR to IFR
Status	<In Progress>
Rationale	The time windows shall be defined with reference to the merging point determined for the rotorcraft to enter IFR airspace (REQ-04.10-i4D.0010) and taking into account the metering time assigned to that merging point (REQ-04.10-i4D.0011) as well as comply to the i4D and CTA requirements.
Category	<Operational>
Validation Method	<Real Time Simulation>
Validation Method	<Expert Group (Judgement Analysis)>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	ENB03.01.01 TMF	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	04.10	N/A

[REQ]

Identifier	REQ-04.10-GEN1-i4DT.0050
Requirement	In case of FATO non used for SNI operation, rotorcraft approach procedure to be used for i4D, shall optimize the strategic separation between A/C and rotorcraft at least before the FAF for rotorcraft.
Title	Strategic separation between aircraft and rotorcraft arrival path with FATO not used with SNI operation.
Status	<In Progress>
Rationale	Limitation of aircraft and rotorcraft flow management constraints, limitation of airspace constraint.
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	ENB03.01.01 TMF	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	04.10	N/A

[REQ]

Identifier	REQ-04.10-GEN1-i4DT.0070
Requirement	The operational procedure for i4D integration in a TMA shall define the transition procedure which addresses the ATCO / PILOT communication when it turns from datalink to voice.
Title	Transition procedure applied in a TMA when the ATCO / PILOT communication turns from datalink to voice
Status	<In Progress>
Rationale	Adherence to the agreed concept
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	ENB03.01.01 TMF	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	04.10	N/A

[REQ]

Identifier	REQ-04.10-GEN1-i4DT.0080
Requirement	The AMAN/DMAN algorithms shall be able to take into account simultaneous aircraft and rotorcraft streams, and specifically i4D rotorcraft.
Title	The design of AMAN/DMAN tool capable of supporting the ATCO when managing a sequence which includes simultaneous aircraft and rotorcraft streams
Status	<In Progress>
Rationale	Adherence to the agreed concept
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	ENB03.01.01 TMF	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	04.10	N/A

[REQ]

Identifier	REQ-04.10-GEN1-i4DT.0081
Requirement	The AMAN/DMAN HMI shall be able to propose information in order to support the ATCO when managing simultaneous rotorcraft and aircraft streams, and specifically i4D rotorcraft.
Title	The use of AMAN/DMAN tool capable of supporting the ATCO when managing a sequence which includes simultaneous aircraft and rotorcraft streams.
Status	<In Progress>
Rationale	Adherence to the agreed concept
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	A/C-37a	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Navigation	N/A
<APPLIES_TO>	<Operational Focus Area>	ENB03.01.01 TMF	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	New Requirement	N/A
<ALLOCATED_TO>	<Project>	04.10	N/A

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