



STEP1 V3 Final Complexity Management SPR

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Abstract

This deliverable includes the final version of the S1 V3 Complexity Management SPR which provides the safety and performance requirements for Complexity Assessment and Resolution (CAR) concept. It is based on the final version of the S1 V3 Complexity Management OSED.

This deliverable covers the SESAR Solution #19 'Automated Support for Traffic Complexity Detection and Resolution'.

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Rational for rejection
None.

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Executive summary

This document provides the final version of the Safety and Performance Requirements (SPR) for the Complexity Assessment and Resolution (CAR) Service within the scope of P04.07.01 in Step1 which addresses the SESAR Solution #19 'Automated Support for Traffic Complexity Detection and Resolution'. It is based on an update of the Interim version of the Step1 V3 Complexity Management SPR taking into account the results from the EXE-04.07.01-VP-005 performed in Release 5 as well as the latest version of the Step1 V3 Complexity Management OSED.

P04.07.01 addresses the implementation of Complexity Assessment and Resolution (CAR) Service and associated tools and procedures CAR is used in high traffic density airspace regions (ATC Centres) in which an environment (in terms of system capabilities) exists that enables the refinement of airspace sectorisation and traffic planning to be fully dynamic and used to adjust the controller workload balance. In the ATC Centre individual flight optimisation in terms of complexity is performed.

The derivation of safety requirements have been supported by an OSA (Operational Safety Assessment). This safety assessment allows the definition of safety criteria for the new concept and supports derivation of the safety requirements so that the concept is designed in such a way that safety criteria are met. The OSA encompasses the definition of validation objectives to be addressed in the planned validation exercises and also takes into account the validation results already available to check if the design is compliant with the safety criteria.

The derivation of performance requirements has followed the top-down principle, originating at B.04.01 level, cascaded down from validation targets at OFA level to performance requirements at P07.02 level and subsequently to P04.07.01 level. This assessment evaluates the impact on the KPAs Capacity (En Route), QoS, Cost-Effectiveness as well as on the transversal area Human Performance.

1 Introduction

1.1 Purpose of the document

This document provides the final version of the Safety and Performance Requirements (SPR) for the Complexity Assessment and Resolution (CAR) Service in Step1. It addresses the **SESAR Solution #19 'Automated support for Traffic Complexity Detection and Resolution'**.

It is based on an update of the Interim version of the Step1 V3 Complexity Management SPR taking into account the results from the EXE-04.07.01-VP-005 performed in Release 5 as well as the latest version of the P04.07.01 D68 – 'Step1 V3 Final Complexity OSed' [20]. The SPR also provides their allocation to Functional Blocks. They shall identify the requirements needed to fulfil each KPA and include, or reference, the sources justifying those requirements.

1.2 Scope

This document supports the operational services and concept elements identified in the Operational Service and Environment Definition (OSed) [20]. These services are expected to be operational (IOC) in the Step 1 deployment phase.

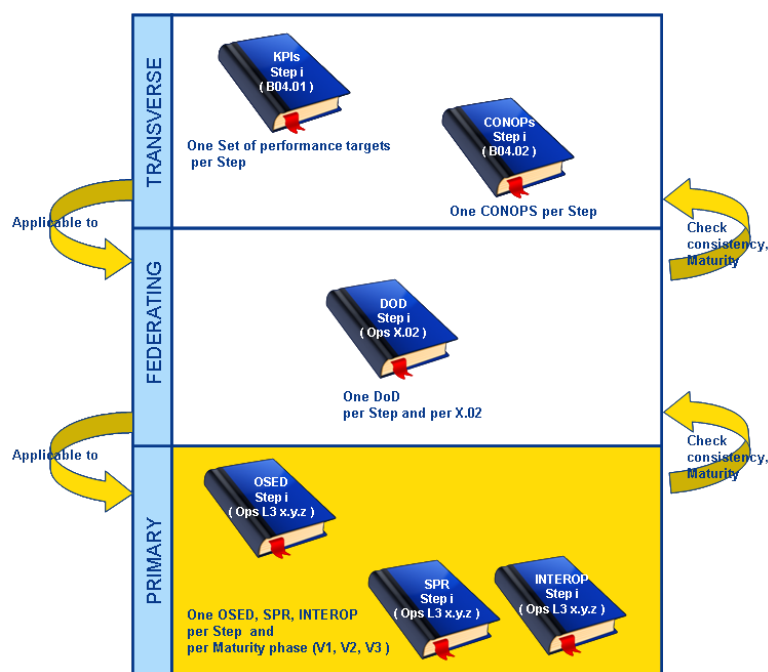


Figure 1: SPR document with regards to other SESAR deliverables

In Figure 1, the Steps are driven by the OI Steps addressed by the project in the Integrated Roadmap document [17].

The final version of this document is based on an update of the interim version of the Step1 V3 Complexity Management SPR [21] taking into account the results from the EXE-04.07.01-VP-005 performed in Release 5 as well as the latest version of the Step1 V3 Complexity Management OSed [20].

Moreover the Safety Assessment Report included in the Appendix A has been update in order to include all the complexity management concept elements (i.e. resolution of potential complexity imbalances by means of trajectory management measures).

1.3 Intended readership

Intended audience of this document are:

founding members



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- P04.07.01 Members (ENAIRES, EUROCONTROL, DFS, DSNA and NATS);
- Project Members of the technical project P10.08.01 in charge of the prototype development needed to perform P04.07.01 validation activities (ENAIRES, INDRA and THALES);
- Projects performing validation activities that complete the validation path of the complexity management concept (P13.02.03, P04.07.08, SWP04.03 and SWP05.03);
- Projects within OFAs 05.03.03 'Dynamic Airspace Configuration' and OFA 05.03.04 'Enhanced ATFCM Processes';
- Project from WP08 for supporting the definition of information exchange requirements;
- Project in charge of consolidation activities (B.04.01, B.05, P16.06.0Xs, P10.01.07 and SWPs 04.02 and 07.02).

1.4 Structure of the document

§1 provides the high level description of the document, indexes, glossary, acronyms, dependencies and other introductory information.

The purpose of the §2 and 3 is to establish clear relations between the concept and the requirements on the basis of definitions provided in P04.07.01 D68 – Step1 V3 Final OSED [20] and on the results of previous exercises (mainly EXE-04.07.01-VP-001 in Release 1, EXE-04.07.01-VP-002 in Release 4 and EXE04.07.01-VP-005 in Release 5) described in P04.07.01 D13 [18], D14 [19] and D72 [22] Step1 VALRs.

§4 lists applicable and reference documents.

Appendix A presents the main elements of the Safety Assessment, which justifies the requirements listed in §3.2.

1.5 Background

This SPR document is based on the initial safety assessment work done in SESAR Project 04.07.01 Complexity Management in En Route and previous work done for the TMS (Traffic Management System) in MUAC.

1.6 Glossary of terms

Term	Definition	Source
Airspace Management	Airspace Management is the process by which airspace options are selected and applied to meet the needs of the ATM community.	ICAO 9854
	Airspace Management is integrated with Demand and Capacity Balancing activities and aims to define, in an inclusive, synchronised and flexible way, an optimised airspace configuration that is relevant for local, sub-regional and regional level activity to meet users' requirements in line with relevant performance metrics.	SWP07.02 SWP04.02
	Airspace Management primary objective is to optimise the use of available airspace, in response to the users demands, by dynamic time-sharing and, at times, by the segregation of airspace among various airspace users on the basis of short-term needs.	
	It aims at defining and refining, in a synchronised and a flexible way, the most optimum airspace configuration at local, sub-regional and regional levels in a given airspace volume and within a particular timeframe, to meet users requirements while ensuring the most performance of the European Network and avoiding as	

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Term	Definition	Source
	much as possible any disruption. Airspace Management in conjunction with AFUA is an enabler to improve civil-military co-operation and to increase capacity for the benefit of all users.	
Air Traffic Control Clearance	<p>Authorisation for an aircraft to proceed under conditions specified by an air traffic control unit.</p> <p>Note: For convenience, the term "air traffic control clearance" is frequently abbreviated to "clearance" when used in appropriate contexts.</p> <p>The abbreviated term "clearance" may be prefixed by the words "taxi", "take-off", "departure", "En Route", "approach" or "landing" to indicate the particular portion of flight to which the air traffic control clearance relates.</p> <p>Note: they can be delivered by voice or data link.</p>	ICAO Doc 4444
Air Traffic Control Instruction	Directives issued by air traffic control for the purpose of requiring a pilot to take a specific action	ICAO Doc 4444
ATM Layered Planning	The intrinsic uncertainties within the traffic prediction process together with current ATM organisation leads us to regard air traffic control and air traffic flow management as a set of planning layers in which each layer addresses a particular future time frame of the traffic evolution. Each layer is characterised by the problems it addresses and the type of measures it takes to re-optimize the traffic plans. Layered planning should be seen as a continuous and seamless operation, which at times may be performed by one actor and at other times by several actors in unison.	SWP04.02 (following Eurocontrol ODT works)
Business / Mission Trajectory	A trajectory, which expresses the business or mission intentions of the airspace user (respectively mainline, regional, business, general or military aviation). It includes both surface and airborne segments and is built from, and updated with the most timely and accurate data available in the Network Operations Plan (NOP), including turn-around elements.	ATM lexicon
Collaborative decision making	A set of applications aimed at improving flight operations through the increased involvement of airspace users, ATM service providers, airport operators and other stakeholders in the process of air traffic management. It induces an environment in which the consequences of decisions taken are visible to all partners. Note: Collaborative decision-making applies to all layers of decisions, from longer-term planning activities through to real-time operations, and is based on the sharing of information about events, preferences and constraints.	ATM lexicon & ATM Masterplan glossary
Complexity	<p>In the ATM context, traffic complexity refers to the number of simultaneous or near-simultaneous interactions of trajectories in a given volume of airspace.</p> <p><u>Note:</u> As there are additional factors that construct complexity on the top of the simultaneous and near simultaneous number of interactions (most simple ones being: weather, mixture of traffic, co-ordination conditions), which don't appear in this definition, we'll prefer to define complexity as measure of the difficulty that a</p>	ATM lexicon Note from P04.02

Term	Definition	Source
	particular traffic situation will present to an air traffic controller.	
Complexity Management	Assessment and resolution of complexity problems within the given constraints is called Air Traffic Complexity Management. It is performed by the Network Management function in strong co-ordination with the Extended ATC planning function by managing and balancing controllers' workload to achieve the goal of maximising the throughput of the ATM system, by not wasting, or leaving unused, any latent capacity, and of reducing safety risks related to workload variations.	P04.02
Complexity Assessment and Resolution Service	Complexity Assessment and Resolution Service represents a dynamic, automated service, which applies a complexity function using metrics, within a defined airspace of operation in order to predict future controller workload within the appropriate look ahead time horizon. This horizon is directly dependant on trajectory prediction (TP) accuracy and the level of capability and interoperability of ATM systems and tools.	SWP04.02
Complexity metric	It determines workload for a prescribed sector and a prescribed air traffic situation. Complexity metric can be based on different methodologies, which are best suited for the local ATM environment. It is important that the outcome results are useable at network level and that the methodology is transparent.	SWP04.02
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.	WPB.04.02 CONOPS Step 1
Decision making tool	A system-support tool, which helps the controller to evaluate situations and take, informed decisions.	SWP04.02
Dynamic sectorisation	The geographical and vertical limits of a control sector will be adapted to the traffic flow to optimise the capacity in real-time. Dynamic sectorisation does not imply that ATC will be faced with sector configurations that are not known either to them or to the supporting FDP and RDP systems. Sector configurations will be part of the pre-determined scenarios of the ACC and will be simulated and training will be provided prior to usage.	SWP04.02
En Route phase	That part of the flight from the end of the take-off and initial climb phase to the commencement of the approach and landing phase.	ATM Lexicon
Flight Object	The system instance view of a flight. It is the Flight Object that is shared between the IOP stakeholders. <u>Note:</u> The 'Flight Object' (FO) is a concept to support the sharing of consistent flight data between all ATM stakeholders.	ATM lexicon Note from P04.02

Term	Definition	Source
Free Routing	Free routing corresponds to the ability of an Airspace User to plan/re-plan route according to the User defined segments	WP B.04.02 Free Route Issue Management
Ground-Ground interoperability (GG-IOP)	Any Interoperability needed between ground units for the purpose of negotiating, and sharing the various data	SWP04.02
4-Dimensional Trajectory	A set of consecutive segments linking waypoints and/or points computed by FMS (airborne) or by TP (ground) to build the vertical profile and the lateral transitions; each point defined by a longitude, a latitude, a level and a time.	ATM Lexicon
Network Management Function (NMF)	<p>Network Management Function is an integrated ATM activity with the aim of ensuring optimised Network Operations and ATM service provision meeting the Network performance targets, which encapsulates:</p> <ul style="list-style-type: none"> • Collaborative layered planning and execution processes, including the facilitation of business/mission trajectories; • Airspace organisation and management processes; • Demand and Capacity Balancing processes through all planning and execution phases to ensure the most efficient use of airspace resources, to anticipate and solve workload/complexity issues and to minimize the effects of ATM constraints; • The enabling of UDPP process; • The provision and maintenance of Operation Plans covering the range of activity, i.e. Network to Local; • The provision of relevant complexity resolution advice to ATC operations. <p>Based on CDM, the Network Management Function is executed at all levels (Regional, Sub-regional and Local) throughout all planning and execution phases, involving, as appropriate, the adequate actors (e.g. NM, FM, LTM...).</p>	SWP07.02/B.04.02
Network Operations Plan (NOP)	<p>A set of information and actions derived and reached collaboratively and both relevant to, and serving as a reference for, the management of the Pan-European network in different timeframes for all ATM stakeholders, which includes, but is not limited to, targets, objectives, how to achieve them and anticipated impact. The NOP has a dynamic and rolling lifecycle starting in the strategic phase and progressively updated up to and including the execution and post-operations phases.</p> <p><u>Note:</u> It supports and reflects the result of the collaborative ATM planning process: at each phase, stakeholders collaborate in developing a common view of the planned network situation, allowing each of them to take informed decisions considering the network effect and the Network Manager to ensure the overall co-ordination of individual decisions needed to support network performance.</p>	ATM lexicon

Term	Definition	Source
Nominal/Non-Nominal/Exceptional Conditions	<p>Nominal conditions relate to flight circumstances, which are optimal and fully reflect the SESAR objectives for flying and adhering to an agreed reference trajectory, in accordance with all ATC clearances and constraints. As step 1 progresses towards step2 and onwards SESAR2020, the flight conditions should increasingly tend towards the nominal case.</p> <p>Non-nominal conditions relate to circumstances, which are to be expected in the Step 1 timeframe because of shortfalls in the various concepts, equipages and procedures. Typically they will involve various ATC measures such as conflict avoidance and complexity reduction. They also include situations where a dialogue or negotiation process is rejected for some reason.</p> <p>Exception conditions relate to circumstances which should not normally occur. For example, this includes any failure (air or ground) to reply to an operational request or dialogue. They also include situations where flight behaviour is found to be in significant contradiction to the agreed course of action, with the exception of certain unavoidable circumstances, such as unexpected weather conditions, which will be regarded as non-nominal.</p>	SWP04.02
Queue Management	<p>The tactical establishment and maintenance of a safe, orderly and efficient flow of traffic.</p> <p>Note: It includes the handling of queues, both in the air and on the ground. It operates on individual flights and is closely related to, and sometimes indistinguishable from, the Separation Provision process.</p> <p>It aims at facilitating the highest achievable capacity of the ATM System and to manage delays in a fuel-efficient and environmentally acceptable manner.</p>	ATM Lexicon
Reference Business/Mission Trajectory	The business/mission trajectory which the airspace user agrees to fly and the ANSP and Airports agree to facilitate (subject to separation provision).	ATM lexicon
Initial Reference Business/Mission Trajectory	An extended flight plan, with trajectory data which is the result of the collaborative planning process that develops and establishes agreement for the iSBT/SMT. It is published immediately prior to the execution phase. It initially contains all of the data included in the agreed iSBT/SMT, (including key elements of the routing and timings, such as agreed targets (TTO/TTA)). It may be refined, updated or revised during the execution phase.	SWP04.02 for Step 1 (iRBT/iRMT)
Revision of the initial Reference Business or Mission Trajectory	<p>The revision of the initial Reference Business or Mission Trajectory (iRBT/iRMT) is launched when there is a need for human intervention to change the route and/or altitude/ Flight Level and/or time features (Targets and/or Constraints),</p> <p>It is mostly triggered at Controller or Flight Crew initiative but it may also be initiated by other ground actors (LTM, FOC/WOC...). However, iRBT/iRMT revisions can only be implemented by ATCOs and the Flight Crew.</p> <p>Revisions are launched only when duly required, mainly due to hazards (traffic, weather), or inability for the aircraft system to meet a constraint/target (e.g. missed CTA). or fine sequencing</p>	SWP04.02

Term	Definition	Source
	(CTA or CTO allocation) or business needs.	
Route Availability Document (RAD)	The RAD is a common reference document containing the policies, procedures and description for route and traffic orientation. It also includes route network and free route airspace utilisation rules and availability.	European Route Network Improvement Plan
Safety Net (Ground based and airborne)	An airborne and/or ground based function within the ATM system whose sole purpose is to alert aircrew/ATCO of the imminence of a hazardous situation (e.g., risk of aircraft collision, terrain collision, or airspace penetration) so that it can be resolved in a timely manner.	ATM lexicon
Sector Family	A Sector Family represents a group of adjoining airspace blocks (dynamically adjustable ATC sectors) that are treated as a single ATM airspace entity. The Sector Family is established to provide a contiguous volume of airspace, which is sufficiently large to enable coordinated NMF & Extended ATC Planning activities based on same procedures, working methods, data availability and granularity.	SWP04.02
Shared Business/Mission Trajectory	Published Business/Mission trajectory that is available for collaborative ATM planning purposes. The refinement of the SBT/SMT is an iterative process.	ATM lexicon
Initial Shared Business/Mission Trajectory	An extended flight plan, with trajectory data (as specified for UP4DT/ReqMT) for use in the period leading up to the execution phase of the flight. It incorporates flight intentions which are progressively refined with information provided by the Airspace users. The initial SBT/SMT available in Step 1 will only reflect the medium-term planning.	SWP04.02 for Step 1 (Initial SBT/SMT)
Subject Flight	A flight of primary interest during the scenario.	SWP04.02
Target Time of Arrival	An Arrival Time which is not a constraint but a progressively refined planning time that is used to coordinate between arrival and departure management applications. It is an ATM computed time.	ATM lexicon
Trajectory Adjustment through Constraint of Time (TRACT)	TRACT is a service used to reduce controllers' workload by reducing the number of potential conflicts by trajectory adjustment. The trajectory adjustment relies, among others, on FMS generated trajectory that will facilitate more reliable information and potentially better decision aid performance. The computed speed adjustments are translated into Controlled Time Over (CTO) which are operated via Data link between ground system and airborne system. Note: The flight crew will play a key role in the process, as the CTO will be submitted to them for validation.	SWP04.02
Traffic	Traffic synchronizations is about fine-tuning the position of an	Extract from the WP

Term	Definition	Source
synchronization	individual aircraft into a stream that optimises the utilisation of a constrained resource, hence improving the overall outcome of the process	B04.02 Step 1 CONOPS section 3.2.1
Update of the iRBT/iRMT	<p>A trajectory update implies an Air-Ground and/or Ground-Ground trajectory distribution. The update of the iRBT/iRMT is triggered automatically, on request or periodically.</p> <p>The update of the initial Reference Business or Mission Trajectory (iRBT/iRMT) is automatically triggered when the trajectory predictions continuously computed by the ground and/or aircraft system(s), differ from the previously shared trajectory predictions by more than a defined threshold</p> <p>See section 2.2.1.2.2</p>	SWP04.02

1.7 Acronyms and Terminology

Term	Definition
2D, 3D, 4D	2 Dimensional, 3 Dimensional, 4 Dimensional (Trajectory)
ACC	Area Control Centre
AFUA	Advanced Flexible Use of Airspace
AMAN	Arrival Management/Arrival Manager
ANSP	Air Navigation Service Provider
AoR, AOR	Area Of Responsibility
ARES	Airspace Reservation/Restriction
ASM	Airspace Management
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATFCM	Air Traffic Flow and Capacity Management
ATM	Air Traffic Management
ATMS	Air Traffic Management System
ATS	Air Traffic Service
AU	Airspace User
AUP	Airspace User Plan
BT/MT	Business Trajectory/Mission Trajectory

Term	Definition
B2B	Business to Business
CAR	Complexity Assessment and Resolution
CBA	Cross-Border Area
CDM	Collaborative Decision Making
ConOps / CONOPS	SESAR Concept of Operations
CTA	Controlled Time of Arrival
CTO	Controlled Time of Over- fly
CWP	Controller Working Position
DCB	Demand and Capacity Balancing
DOD / DoD	Detailed Operational Description
DRA	Direct Routing Airspace
EAD	European AIS Database
EASA	European Aviation Safety Agency
EATCHIP	European Air Traffic Control Harmonisation and Integration Program
EATMA	European Air Traffic Management Architecture
E-ATMS	European Air Traffic Management System
EC	Executive Controller
ECAC	European Civil Aviation Conference
EPP	Extended Projected Profile (sent via ADS-C)
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
ETFMS	Enhanced Tactical Flow Management System
FAB	Functional Airspace Blocks
FDP	Flight Data Processing
FDPS	Flight Data Processing System
FL	Flight Level

Term	Definition
FM	Flow Management
FMP	Flow Management Position
FMS	Flight Management System
FOC	Flight Operations Centre
FUA	Flexible Use of Airspace
HF	Human Factors
HMI	Human Machine Interface
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
INAP	Integrated Network Management and extended ATC Planning
INTEROP	Interoperability Requirements
IOP	Interoperability
IR	Implementing Rule
KPA	Key Performance Area
LTM	Local Traffic Manager
MTCd	Medium Term Conflict Detection
NM	Network Manager
NMF	Network Management Function
NMOC	Network Management - Operation Centre
NOP	Network Operation Plan
OAT	Operational Air Traffic
OFA	Operational Focus Area
OI	Operational Improvement
OSA	Operational Safety Assessment
OSD	Operational Service and Environment Definition
PBN	Performance Based Navigation

Term	Definition
PC	Planning Controller
QoS	Quality of Service
RAD	Route Availability Document
RBT	Reference Business / Mission Trajectory
R&D	Research & Development
RMT	Reference Mission Trajectory
ReqMT	Requested Mission Trajectory
RNAV	Area Navigation
RNP	Required Navigation Performance
SBT	Shared Business / Mission Trajectory
SESAR	Single European Sky ATM Research Programme
SESAR JU/SJU	SESAR Joint Undertaking
SESAR Programme	The programme which defines the Research and Development activities and Projects for the SJU.
SIL	Safety Integrity Level
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency.
SMT	Shared Mission Trajectory
SPR	Safety and Performance Requirements
STAM	Short Term ATFCM Measures
TCT	Tactical Controller Tool
TP	Trajectory Predictor / Trajectory Prediction (as a function)
TRACT	TRajjectory Adjustment through Constraint of Time
TSA	Temporary Segregated Area
TTA	Target Time of Arrival
TTG	Time to Gain
TTL	Time to Lose
TTO	Target Time Over

Term	Definition
UPR	User Preferred Route
VPA	Variable Profile Area
WOC	Wing Operations Centre
WP	Work Package

2 Summary of Operational Concept (from OSED)

2.1 Description of the Concept Element

This document describes the main aspects of the operational concept related to the Complexity Assessment and Resolution (CAR) Service and associated tools and procedures at the level of ACC centre addressed by the SESAR Solution #19, as defined in P04.07.01 – D68 ‘Step1 V3 Final Complexity Management OSED’ [20].

2.1.1 Concepts elements related to SESAR Solution #19

Complexity Assessment and Resolution (CAR) concept addresses the automated tools support to the ATC team in identifying, assessing and resolving local complexity situations. It relies on a real time integrated process for managing the complexity of the traffic with capability to reduce traffic peaks through early implementation of measures for workload balancing.

Scope of complexity assessment:

Automated tools continuously monitor sector demand and evaluate traffic complexity (by applying predefined complexity metrics) according to a predetermined qualitative scale. Forecast complexity coupled with demand **enables** ATFCM to take timely action to adjust capacity, or demand profiles through various means, in collaboration with ATC and airspace users.

Complexity prediction is used by Local Network Manager and/or ACC Supervisor roles. Analysing aircraft trajectories using SBT/RBT and other demand information, coupled with the use of validated complexity metrics, allows prediction of changes in traffic complexity and potential overload situations, allowing mitigation strategies to be applied.

Scope of complexity resolution:

Complexity prediction will **support decision making processes** such as:

- Determine the optimum organization of ATC sectors;
- Apply dynamic ATM constraints (on traffic flows (e.g. Level Cap));
- Modify individual trajectories by route or level;

The tools that assist in resolving complexity issues includes a 'What-if' capability where resolution strategies can be trialled before implementation and may provide assistance in identifying the trajectory or trajectories that are causing the most complexity, through interactions or application of sequencing measures or other constraints.

Concept Maturity Level Assessment

The following table shows the maturity level of the Operational Improvements Step CM-0103A and CM-0104A, as presented in P04.07.01 – D68 ‘Step1 V3 Final Complexity Management OSED’ [20].

Operational Package	Operational Focus Area	OIs or Operational Services	Initial Maturity Level	Target Maturity Level	Maturity Level after the exercise
PAC05 Integrated and Collaborative Network Management	Enhanced ATFCM Processes.	CM-0103-A — Automated Support for Traffic Complexity Assessment	V2	V3	V3
	Enhanced ATFCM Processes.	CM-0104-A — Automated Controller Support for Trajectory Management	V2	V3	Intermediate V3

Table 1.Maturity Level Assessment

Taking into account the results from all the validation activities performed within the SESAR Sol #19 framework, it can be stated that the **complexity assessment** to detect potential overloads from 3 hours up to 20 minutes is at the end of V3 maturity level.

However the **complexity resolution aspects** by means of trajectory management have achieved different maturity levels:

- Trajectory management measures analysis and preparation, including what-if functionality is at the end of V3 level (ready for Large Scale Demonstration and subsequent deployment, no more V3 validation required);
- Trajectory management measures coordination is at early V3 level (not ready for Large Scale Demonstration and major additional V3 validation is required);
- Trajectory management measures implementation is at mid V3 level (ready for Large Scale Demonstration but some remaining V3 validation is required).

Finally, the complexity assessment has been probed to support the resolution of overloads by means of capacity management (i.e. refinement of sectorisation).

2.1.2 Differences between new and previous Operating Methods

Table below details the main differences between new and previous Operating Methods addressed by SESAR Solution #19.

Operational method element used	Current	SESAR Solution #19
ATFM Planning	Based on Sector hourly entry rates or in best case on sector occupancy	Increased awareness and reliability of traffic and workload predictions.
Prediction of workload	Manual	Supported by automated CAR tool.
Roles	Ops Supervisor, FMP	Ops Supervisor, Local Network Manager
Sector configuration management	Static, linked to demanding procedures and static coordination arrangements	Dynamic based on seamless implementation of pre-defined schedules taking into account workload predictions of CAR tool.
Accuracy of prediction	Based on standard FPL information	Based on ATC Centre System information and Enhanced Tactical Flow Management System (EFTMS) data.

Table 2. Differences between new and previous Operating Methods – SESAR Solution #19

2.2 Description of Operational Services

As explained in P04.07.01 – D68 ‘Step1 Final OSED’ [20], CAR is a service that is used by the Local Network Management function in order to manage, balance, individual ATCO (or sector ATCO team) workload at local level (ACC) and to achieve the goal of maximising the throughput of the ATM system by not wasting, or leaving unused, any latent capacity and reduces safety risks related to workload variations.

CAR is used in high traffic density airspace regions (ATC Centres) in which an environment (in terms of system capabilities) exists that enables the refinement of airspace sectorisation and traffic planning to be fully dynamic and used to adjust the controller workload balance. In the ATC Centre individual flight optimisation in terms of complexity is performed.

The key feature of the Complexity Management optimisation process is the use of complexity metrics that encapsulate the relationship between workload and traffic.

CAR is supported by automated tools capable of assessing traffic complexity over the area of operation (ACC). The automated function provides feedback on the characteristics of the predicted complexity figures identifying those components (airspace structures and trajectories) that are contributing the most to the sector complexity and controller workload. (CM-0103-A).

Several potentially complementary approaches allow the assessment of complexity from either a microscopic or a macroscopic point of view. The following three approaches were adopted within the P04.07.01 scope to calculate complexity indicators (more information can be found in §2.2.4.4 of Step1 V3 Final Complexity Management OSED [20]):

- Algorithmic approach which is mature enough to be implemented as demonstrated in the performed validation activities;
- Cognitive approach which has been assessed to be mature, although some improvements are needed before implementation as described in exercise validation report [22];
- Lyapunov-Convergence approach which requires further work to reach the same level of maturity as described in exercise validation report [19].

Complexity Assessment and Resolution (CAR) in ATM is performed within several different time horizons. From short term planning to execution phase, which could be up to 3h and down to 25 minutes from real time. Complexity Management for ATC sectors is firstly handled by the local Network Management function through enhanced ATFCM processes.

Table 2 provides the list of relevant DOD Processes and Services in the context of the SESAR Solution #19 identifying the link with the applicable Operational Processes and Services defined in the DOD04.02 [23].

DOD Process / Service Title	Process/ Service identification	Process/ Service short description	Reference to 04.02 DOD section where it is described
Perform Extended ATC Planning	Assess traffic complexity	To assess the complexity of the future traffic situation at the ACC level based on forecasts within a 120 min look-ahead time.	Section 5.1.2
	Determine de-complexing solution	To identify a potential solution to reduce the imbalance of complexity (using "What-if" facilities) The applicable measures are based on either Dynamic re-sectorisation or trajectory management solutions.	Section 5.1.2
	Coordinate de-complexing solution	Co-ordination may involve different actors depending on the de-complexing solution including network management function.	Section 5.1.2
	Prepare de-complexing solution implementation	Among the potential de-complexing measures, LTM will make a full evaluation of the solution for positive network performance impact, and will update the necessary information to actually trigger the implementation of the chosen de-complexing solution.	Section 5.1.2
	Implement de-complexing dynamic re-sectorisation	At the appointed time the new Sector Configuration is implemented to re-distribute traffic flows. Executive Controllers instruct the Concerned flights to contact the appropriate sector via voice or data link.	Section 5.1.2
	Implement trajectory management solutions	This includes the management of individual trajectories (re-routing, change of FL, allocation of a TRACT issued CTO).	Section 5.1.2
	Monitor de-complexing	Activity related to the monitoring of the de-complexing solution's implementation and	Section 5.1.2

DOD Process / Service Title	Process/ Service identification	Process/ Service short description	Reference to 04.02 DOD section where it is described
	solution implementation	impact.	
	Manage Complexity Management co-ordination receipt	Co-ordination requests are sent to the relevant actors, including if necessary the network manager.	Section 5.1.2

Table 3. List of the relevant 04.02 DOD Processes and Services

2.3 Description of Operational Environment

This section describes the expected operational environment for the CAR Service defined in SESAR STEP 1 En Route DOD [23].

2.3.1 Airspace characteristics

Airspace organisation planning and management based on current Implementing Rule (IR).

Military aspects based on current IR related to Flexible Use of Airspace (FUA).

CAR concept is mainly applicable in regions of high traffic loads in which classical sectorisation and flow control measures are insufficient to support the capacity demand. Such airspaces could be regarded as those in which the capacity, in terms of aircraft occupancy, of its sectors can exceed a certain percentage (e.g. 80%) of the nominal maximum. Local circumstances will dictate whether CAR application is performance beneficial in medium complexity areas.

Safety consideration is the impact of sectorisation planning and changes on safety in the context of its application in CAR.

2.3.2 Ground technical capabilities

This section summarizes the capabilities of the ground system that are expected to be available to support En Route operations within the timeframe of SESAR Step 1. Note that these descriptions do not fully detail all the capabilities but provide those characteristics which are relevant to this document (more detail can be found in §4.1.2 of P04.07.01-D68 Final Complexity Management OSED [20]).

2.3.2.1 ATC support tools

2.3.2.1.1 Complexity Assessment and Resolution (CAR) tool

Basic CAR tool will continuously predict and monitor traffic complexity within 3 hours look-ahead time horizon. Only the basic indication of predicted complexity will be displayed (unacceptable, excessive, critical, acceptable or manageable), without advisories related to the resolution of the complexity problems.

The tool that assist in resolving complexity issues includes a 'What-if' capability where resolution strategies can be trialled before implementation and provides assistance in identifying the trajectory or trajectories that are causing the most complexity, through interactions or application of sequencing measures or other constraints.

Complexity Assessment and Resolution process is performed with awareness of adjacent sectors' air traffic situations; typically LTM would have a responsibility to maintain the controller workload at an acceptable level and optimise trajectories within the area of operation (with the objective to be as conflict free as possible and at the same time taking into consideration any constraints imposed to aircraft by other tools such as TTL/TTG imposed by AMAN).

This document concentrates on safety aspects of the functions and use of this specific tool including interrelations with other sub-systems within the ATC Centre.

2.3.2.1.2 Conflict detection tools for planning purpose

Conflict detection tools for planning purpose will support the controller within planning look-ahead time horizon (e.g. 20-30 min). One of the examples of such tool would be Medium-term Conflict Detection, indicating conflicts, risks, exit problems and context traffic to the controller. The conflict detection tool for planning purposes (MTCD) outputs are used as one of the parameters for assessing and predicting complexity when the algorithmic approach is used. It is also used by the human actors to further analyse complex traffic situations and the workload.

Safety considerations in respect to the use of conflict detection at different planning levels are not in the scope of this document. Only the use of MTCD data for predicting complexity in the CAR tool is in the scope of this document.

2.3.2.1.3 Arrival management extended to En Route

AMAN into En Route concept enables the modification of the trajectories of flights (based on arrival management constraints) while still in the Area of Responsibility of En Route sectors. At Step1 level, basic input from the Arrival Manager into the CAR tools was considered.

Safety considerations of the impact of use AMAN originating TTG/TTL in En Route sectors.

2.3.2.1.4 Conformance monitoring

Conformance monitoring tools continuously monitor the actual aircraft progress in relation to the system trajectory and will either display non-conformances to the controller or trigger automatic trajectory re-calculation.

Safety consideration related on automated support for conformance monitoring to complexity (workload) prediction.

2.3.2.2 Human Machine Interface (HMI)

This document covers only the safety considerations of the CAR tool HMI.

2.4 Roles and responsibilities

This section summarizes the roles and responsibilities related to the complexity management concept within the timeframe of SESAR Step 1. Note that these descriptions do not fully detail all the involved roles and responsibilities but provide those which are relevant to this document (more detail can be found in Transition ConOps SESAR 2020 [25]).

2.4.1 Local Traffic Manager Role

As described in Transition ConOps SESAR 2020 [25], the Local Traffic Manager (LTM) is a role exercised at local level that contributes to the Network Management Function:

- The Local Traffic Manager functionally lies in between the Flow Manager and ATC planning actors, taking a view over a sector family or group of sectors (potentially a complete ACC) and any Airfield Towers that fall within the Local Traffic Manager's area of responsibility. He acts as the coordinating link between the ANSP, sub-regional and regional flow and airspace management;
- He develops and coordinates locally and adequately within the FAB area and appropriate partners, catalogues of dDCB measures to solve hotspots at local/FAB level during execution phase;
- The Local Traffic Manager has the leading role in the DCB/dDCB processes in execution phase (and appropriately in the short term planning phase close to execution);
- He monitors the situation at local level and anticipates hotspots and workload issues. In case of an imbalance, he is responsible for:
 - Declaring the hotspot;

- Identifying the adequate solutions (Airspace Configuration and flow / trajectory management if necessary);
 - Assessing their impact, looking for optimisation, coordinating and refining them with concerned partners (other LTMs, AUs, Airports, Flow Manager, Network Manager, ATC actors...);
 - using CDM process, except if time doesn't permit, implementing them (or delegating the implementation to the adequate actors), requiring a sub-regional or regional action where necessary.
- The output of this DCB/dDCB process is decision on the ATM Network Management which is integrated into the rolling NOP;
 - The Local Traffic Manager provides a bridge in understanding between operational perceptions of complexity, workload & demand and how that translates into DCB requirements as deliverable occupancy & workload values;
 - In execution and as appropriate within the short term planning phases, the Local Traffic Manager works closely with Supervisors and ATC Planners (through INAP (Integrated Network Management and extended ATC planning) function). The LTM is also likely to either be a Supervisor, or report to one, and as such will retain local safety accountability. As such any proposed DCB initiatives will have to be approved by him;
 - The LTM is one of the roles related to the function: he brings the expertise of Workload Assessment and Resolution with Network Management dimension awareness to facilitate a continuous and coherent activity with extended ATC planning process.

For further details on the LTM responsibilities in the long and medium term planning, refer to Transition ConOps SESAR 2020 [25].

2.4.2 ACC Supervisor

As stated in Transition ConOps SESAR 2020 [25], the ACC Supervisor is responsible for the general management of all activities in the Operations Room. He decides on staffing and manning of Controller Working Positions in accordance with expected traffic demand. Supported by simulations of traffic load and of traffic complexity, and assisted by the NMF (Network Management Function), he takes decisions concerning the dynamic adaptation of sector configurations to balance capacity to forecast demand. Based on the results of simulations the required flow control measures may be implemented by ATFCM through a CDM process.

The ACC Supervisors main responsibilities are:

- Analysis of traffic flows and sector load in collaboration with the LTM and the Flow Manager;
- Split or combining of control sectors according to expected traffic load after co-ordination with the Local Traffic Manager;
- Allocation of sector configuration and declared capacity;
- Decide on staffing and manning of Controller Working Positions according to their training and sector validations;
- The planning, activation and de-activation of flow control measures on the day of operations;
- Coordinating with the other concerned Supervisors on the activation and de-activation of special use airspace;
- Collaboration with the Local Traffic/Flow Manager regarding re-routeing of traffic in case of overload;
- Initiates implementation/removal of ACC flow measures based on runway acceptance rates;
- Collaboration with adjacent ACC Supervisors.

For further details on the additional ACC Supervisor responsibilities, refer to Transition ConOps SESAR 2020 [25].

2.4.3 Remark on actor, role and responsibilities terms

According to the Transition ConOps SESAR 2020 [25], following are the terms actor, roles and responsibilities described to get a better understanding and distinction between actor and roles.

- **ATM actor** is a person, organisation or technical system authorised/licensed to act within the ATM System.
- A **role** is a collection of responsibilities that an ATM actor can take.

Note: A role can be performed by several ATM actors. One ATM actor can perform several roles.

- **Responsibility** is the obligation to conduct assigned tasks to a successful conclusion.

The actual deployment of ATM actors varies throughout Europe and is dependent upon a number of local factors including: company policy; local procedures; method of operations; and traffic environment. In some cases a particular actor may be responsible for: all of a given role; part of the tasks of a given role; several roles; or part of the tasks of several roles. Likewise some actors may be named differently and implemented at different organizational levels.

In this context, the roles related to CAR in Step 1 are LTM and ACC Supervisor defined at concept level. However the final decision on which specific actor should be assigned to those roles will be made at local level taking into account the local procedures and operational environment.

2.5 Constraints

The main constraints for the CAR in Step 1 are:

- Accuracy of the input Flight Data Processing (FDP) data to be used for complexity prediction, due to the required time horizon and quality characteristics of that data;
- Human Factors (HF) constraints related to frequent sector configuration changes;
- Additional co-ordination procedures required by introducing of additional layer of planning without adequate automated support in STEP 1.

3 Requirements

All the safety and performance requirements listed in this document are related to the CAR service. This section includes the traceability of these requirements with the P04.07.01 D68 'Step1 V3 Final OSed' [20].

3.1 System Performance Requirements

[REQ]

Identifier	REQ-04.07.01-SPR-1000.0010		
Requirement	The system shall comply with the following latency and response time requirement under the defined load conditions		
	Maximum time of complexity assessment after manual trigger	sec	180
	Maximum response time for a HMI based request (excluding automatic resolution request) until screen update	sec	5
	Maximum response time for a local HMI action until screen update	sec	2
Title	System latency and response		
Status	<Validated>		
Rationale	Usability of the complexity tool in order to ensure appropriate and timely action by the operator, thus reduce associated safety risk.		
Category	<Operational><Design>		
Validation Method	<Real Time Simulation>		
Verification Method	<Test>		

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSed-0001.0020	<Partial>
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-1000.0020		
Requirement	Minimum number of sector configuration schedules available simultaneously in the system shall be 20.		
Title	System capacity – sector configurations		
Status	<Validated>		
Rationale	Usability of the complexity tool in order to ensure appropriate and timely action by the operator, thus reduce associated safety risk.		
Category	<Operational><Design>		
Validation Method	<Real Time Simulation><Shadow Mode>		
Verification Method	<Test>		

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSed-0001.0001	<Partial>
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-1000.0030		
Requirement	Minimum number of FPs to be handled simultaneously by the system shall be 10000.		
Title	System capacity – Flight Plans		

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Status	<Validated>
Rationale	Usability of the complexity tool in order to ensure appropriate and timely action by the operator, thus reduce associated safety risk.
Category	<Operational><Design>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0005.0002	<Partial>
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<APPLIES TO>	<Operational Focus Area>	OFA05.03.03	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-1000.0040
Requirement	Minimum number of simultaneous what-if environments shall be 10.
Title	System capacity – What-if environments
Status	<Validated>
Rationale	Usability of the complexity tool in order to ensure appropriate and timely action by the operator, thus reduce associated safety risk.
Category	<Operational><Design>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-1000.0050
Requirement	Maximum time between automatic recalculation of prediction at system level shall be 1 min.
Title	System capacity – automatic calculation time
Status	<Validated>
Rationale	Usability of the complexity tool in order to ensure appropriate and timely action by the operator, thus reduce associated safety risk.
Category	<Operational><Design>
Validation Method	<Shadow Mode><Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0020	<Partial>
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

Note: Maximum time of computation / optimization after a change or on demand is a function of

- Number of sector configuration schedule (actual and what if);
- Number of sectors;
- Number of flight plans (actual and what if);
- Time horizon;
- Complexity indicator type.

3.2 Safety Requirements

3.2.1 Complexity Prediction and Resolution

[REQ]

Identifier	REQ-04.07.01-SPR-2000.0010
Requirement	The system shall indicate periods of overload and under load in defined sector configurations.
Title	Complexity prediction of overloads/under loads
Status	<Validated>
Rationale	To ensure that corrective action by the LTM are appropriate and timely, thus reduce associated safety risks
Category	<Safety><Operational>
Validation Method	<Shadow Mode><Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
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<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-2000.0020
Requirement	The system should suggest alternative sector configurations that guarantee the level of sector complexity within predefined limits
Title	Complexity Resolution of overloads/ under loads
Status	<Validated>
Rationale	To ensure that the advice on alternative sector configurations is appropriate and reduce associated risks.
Category	<Operational>
Validation Method	<Shadow Mode><Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0001	<Partial>
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<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-2000.0030
Requirement	The system should indicate the expected impact on workload on individual sectors caused by individual trajectories.
Title	Complexity Prediction on individual trajectories
Status	<Validated>
Rationale	To ensure that the corrective actions on individual trajectories by the operator using system are appropriate and timely, thus reduce associated safety risks.
Category	<Operational>
Validation Method	<Shadow Mode><Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-2000.0040
Requirement	The system should allow for the What –if trajectory promulgation that ensures reduction of complexity on concerned sectors upon their implementation.
Title	Complexity resolution on individual trajectories
Status	<Validated>
Rationale	To ensure that implementation of alternative individual trajectories proposed by the system are appropriate and timely, thus reduce associated safety risks.
Category	<Safety>
Validation Method	<Shadow Mode><Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0001	<Partial>
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<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-2000.0050
Requirement	The system shall compute complexity indicators for all sectors at all times.
Title	Complexity prediction availability

Status	<Validated>
Rationale	To ensure system integrity, thus reduce associated safety risk.
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
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<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-2000.0060
Requirement	The complexity indicators calculated by the system shall be corrected in respect of defined calculation method (complexity assessment methodology).
Title	Complexity prediction correctness
Status	<Validated>
Rationale	The complexity methodology is assessed being used in order to ensure system integrity, thus reduce associated safety risk. The calculation should be always corrected by one calculation method being in use. It is applies on the weighted occupancy presentation, where the calculation is done based on algorithmic approach, but the indicator for complexity is represented as an occupancy figure.
Category	<Safety><Reliability>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0014	<Partial>
<APPLIES TO>	<Operational Focus Area>	OFA05.03.03	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-2000.0070
Requirement	The warnings generated and presented to the operator by the system shall be displayed promptly in order to ensure appropriate action by the operator defined in separate procedure.
Title	System HMI integrity
Status	<Validated>
Rationale	To ensure appropriate and timely action by the operator, thus reduce associated safety risk. The warnings will be presented in the next 60 seconds (based on operational feedback from validation activities execution).
Category	<HMI><Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSD-0004.0001	<Partial>
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

3.2.2 System

[REQ]

Identifier	REQ-04.07.01-SPR-2010.0010
Requirement	Since the Traffic Management function is an assistance tool, a failure of this function shall never have an effect on any other element of the operational ATC system.
Title	System- No feedback to Operational System
Status	<Validated>
Rationale	To ensure FDPS system integrity
Category	<Reliability>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSD-0004.0001	<Partial>
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-2010.0020
Requirement	All operational implementations of system procedure(s) shall cover how system will be used in relation to other related systems; particularly defining what to do if results are in error and when/ how restrictions are applied due to system.
Title	System in relation to other systems
Status	<Validated>
Rationale	To ensure mitigation of the potential errors in Complexity Prediction thus reduce associated safety risks.
Category	<Reliability>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSD-0004.0001	<Partial>
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-2010.0030
Requirement	System hardware and software shall be procured / developed to meet at least the requirements of IEC61508 Safety Integrity Level 1 (SIL 1).
Title	System-safety integrity level
Status	<Validated>
Rationale	To ensure system integrity
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0005.0001	<Partial>
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-2010.0040
Requirement	System shall not negatively affect any higher integrity system.
Title	System- Not negatively affect
Status	<Validated>
Rationale	To ensure system integrity
Category	<Reliability>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0004.0001	<Partial>
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

3.2.3 Functionalities and performances

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2001
Requirement	The Complexity Assessment Function shall assess complexity for a given set of Complexity Management Configuration, Environment Data and Flight Data.
Title	Complexity Assessment Function
Status	<Validated>
Rationale	Requirement derived from design analysis – normal operational conditions included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0014	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0014	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0015	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2002
Requirement	The Individual Contribution of Flights Function shall use the complexity prediction to calculate the contribution to complexity of each flight, and shall

	make it available to the trajectory what-if function.
Title	Individual Contribution of Flights Function
Status	<Validated>
Rationale	Requirement derived from design analysis – normal operational conditions included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0003.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0007	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2003
Requirement	The trajectory what-if function shall provide to LTM on the HMI a list of flights sorted by their contribution to the complexity prediction.
Title	List of flights in trajectory what-if function
Status	<Validated>
Rationale	Requirement derived from design analysis – normal operational conditions included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0001	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2004
Requirement	LTM shall be able to manually select any flight from the list and test trajectory what-if on it.
Title	Manual selection of flights in the trajectory what-if function
Status	<Validated>
Rationale	Requirement derived from design analysis – normal operational conditions included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0009	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A

<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2005
Requirement	Trajectory what-if on a selected flight shall allow LTM to test trajectory changes to the selected flight.
Title	Test of trajectory changes in the trajectory what-if function
Status	<Validated>
Rationale	Requirement derived from design analysis – normal operational conditions included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0011	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2006
Requirement	The complexity prediction function shall receive the selected trajectory change and provide information on the complexity of the scenario being tested.
Title	Complexity Assessment of the trajectory what-if scenarios
Status	<Validated>
Rationale	Requirement derived from design analysis – normal operational conditions included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0009	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2008
Requirement	The sectorisation what-if function shall allow LTM on the HMI to manually select sectorisation changes and test what-if on them.
Title	Manual selection of potential sectorisation changes to test
Status	<Validated>
Rationale	Requirement derived from design analysis – normal operational conditions included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2009
Requirement	The complexity prediction function shall receive the selected sectorisation change and provide information on the complexity of the scenario being tested.
Title	Complexity Assessment of the sectorisation what-if scenarios
Status	<Validated>
Rationale	Requirement derived from design analysis – normal operational conditions included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0021	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2011
Requirement	The complexity prediction function shall test the sectorisation changes under user request.
Title	Test of sectorisation changes under user request
Status	<Validated>
Rationale	Requirement derived from design analysis – normal operational conditions included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2012
Requirement	The complexity prediction function shall test the sectorisation changes and provide information on the complexity of the scenario being tested.
Title	Complexity Assessment of the optimal sectorisation change
Status	<Validated>
Rationale	Requirement derived from design analysis – normal operational conditions included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>

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Verification Method	<Test>
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[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2014
Requirement	CAR users shall be regularly trained on the system.
Title	CAR Users Training
Status	<Validated>
Rationale	Requirement derived from design analysis – hazard mitigation included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0019	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2015
Requirement	Tools shall be available for complexity resolution by trajectory and airspace management through conventional planning.
Title	Tool availability for conventional planning (in case of detected CAR tools failure)
Status	<Validated>
Rationale	Requirement derived from design analysis – hazard mitigation included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0007	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2016
Requirement	Procedures shall be established describing the transition to conventional planning for complexity resolution by trajectory and airspace management.
Title	Transition procedures to conventional planning (in case of detected CAR

	tools failure)
Status	<Validated>
Rationale	Requirement derived from design analysis – hazard mitigation included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0007	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2017
Requirement	Training shall be provided to users on the transition to and use of conventional planning for complexity resolution by trajectory and airspace management.
Title	Training on the transition procedures to conventional planning (in case of detected CAR tools failure)
Status	<Validated>
Rationale	Requirement derived from design analysis – hazard mitigation included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0019	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2018
Requirement	Sectorisation optimization will run independently from manual sectorisation what-if.
Title	Sectorisation optimization
Status	<Validated>
Rationale	Requirement derived from design analysis – hazard mitigation included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0002	<Partial>

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<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0003	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2019
Requirement	Trajectory what-if shall be available for manual complexity resolution by trajectory management.
Title	Trajectory What-if
Status	<Validated>
Rationale	Requirement derived from design analysis – hazard mitigation included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0006	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2020
Requirement	Sectorisation What-if shall be available for manual complexity resolution by airspace management, independently from sectorisation optimization.
Title	Sectorisation What-if
Status	<Validated>
Rationale	Requirement derived from design analysis – hazard mitigation included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2021
Requirement	The CAR system shall check the reliability of flight plans.
Title	Reliability of flight plans
Status	<Validated>
Rationale	Requirement derived from design analysis – hazard mitigation included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

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Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0012	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2023
Requirement	The HMI shall display the Prediction status (e.g. refreshing/updated/failure).
Title	Prediction status display
Status	<Validated>
Rationale	Requirement derived from design analysis – hazard mitigation included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0004.0001	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

3.2.4 Integrity and reliability

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3024
Requirement	The frequency of occurrence of Loss of Complexity Assessment shall not be greater than 8,00E-06 (per fh)
Title	Occurrence of Loss of Complexity Assessment Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0004.0001	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3025
Requirement	The frequency of occurrence of Loss of Complexity Management HMI shall not be greater than 4,00E-06 (per fh).
Title	Occurrence of Loss of Complexity Management HMI Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

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[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0004.0001	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3026
Requirement	The frequency of occurrence of Loss of NMOC / ETFMS Connection shall not be greater than 3,00E-06 (per fh).
Title	Occurrence of Loss of NMOC/ETFMS Connection Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0005.0002	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3027
Requirement	The frequency of occurrence of Loss of Environment Data shall not be greater than 5,00E-06 (per fh).
Title	Occurrence of Loss of Environment Data Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0005.0001	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3028
Requirement	The frequency of occurrence of Undetected corruption of Complexity Assessment shall not be greater than 2,67E-06 (per fh).
Title	Occurrence of Undetected corruption of Complexity Assessment Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>

Verification Method	<Test>
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[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0004.0001	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3029
Requirement	The frequency of occurrence of Undetected corruption of Complexity Management HMI shall not be greater than 1,33E-06 (per fh).
Title	Occurrence of Undetected corruption of Complexity Management HMI Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0004.0001	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3030
Requirement	The frequency of occurrence of Undetected corruption of NMOC / ETFMS Connection shall not be greater than 1,00E-06 (per fh).
Title	Occurrence of Undetected corruption of NMOC / ETFMS Connection Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0005.0002	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3031
Requirement	The frequency of occurrence of Undetected corruption of Environment Data shall not be greater than 1,67E-06 (per fh).
Title	Occurrence of Undetected corruption of Environment Data Frequency
Status	<Validated>

Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0005.0001	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3032
Requirement	The frequency of occurrence of Late Complexity Assessment shall not be greater than 4,00E-06 (per fh).
Title	Occurrence of Late Complexity Assessment Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0004.0001	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3033
Requirement	The frequency of occurrence of Late Complexity Management HMI shall not be greater than 2,00E-06 (per fh).
Title	Occurrence of Late Complexity Management HMI Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0004.0001	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3034
Requirement	The frequency of occurrence of Late NMOC / ETFMS Connection shall not be greater than 6,00E-06 (per fh).

Title	Occurrence of Late NMOC / ETFMS Connection Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0005.0002	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3035
Requirement	The frequency of occurrence of Late Environment Data shall not be greater than 8,00E-06 (per fh).
Title	Occurrence of Late Environment Data Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0005.0001	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3036
Requirement	The frequency of occurrence of Loss of Complexity Prediction display shall not be greater than 5,00E-05 (per fh).
Title	Occurrence of Loss of Complexity Prediction display Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3037
Requirement	The frequency of occurrence of LTM fails to use trajectory what-if shall not be greater than 7,50E-04 (per fh).

Title	Occurrence of LTM fails to use trajectory what-if Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0003.0001	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3038
Requirement	The frequency of occurrence of Undetected corruption of Complexity Prediction display shall not be greater than 1,67E-05 (per fh).
Title	Occurrence of Undetected corruption of Complexity Prediction display Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3039
Requirement	The frequency of occurrence of LTM wrong use of trajectory what-if shall not be greater than 2,33E-04 (per fh).
Title	Occurrence of LTM wrong use of trajectory what-if Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0003.0001	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3040
Requirement	The frequency of occurrence of Delay in Complexity Prediction display shall

	not be greater than 5,00E-05 (per fh).
Title	Occurrence of Delay in Complexity Prediction display Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3041
Requirement	The frequency of occurrence of LTM delay using trajectory what-if shall not be greater than 7,00E-04 (per fh).
Title	Occurrence of LTM delay using trajectory what-if Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0003.0001	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3042
Requirement	The frequency of occurrence of Loss of individual contribution of flights computation shall not be greater than 5,00E-06 (per fh).
Title	Occurrence of Loss of individual contribution of flights computation Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0001	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3043
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Requirement	The frequency of occurrence of Undetected corruption of individual contribution of flights computation shall not be greater than 1,67E-06 (per fh).
Title	Occurrence of Undetected corruption of individual contribution of flights computation Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0001	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3044
Requirement	The frequency of occurrence of Late individual contribution of flights computation shall not be greater than 5,00E-06 (per fh).
Title	Occurrence of Late individual contribution of flights computation Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0001	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3045
Requirement	The frequency of occurrence of Loss of complexity prediction display shall not be greater than 1,00E-05 (per fh).
Title	Occurrence of Loss of complexity prediction display Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3046
Requirement	The frequency of occurrence of LTM fails to use sectorisation what-if shall not be greater than 7,00E-05 (per fh).
Title	Occurrence of LTM fails to use sectorisation what-if Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3047
Requirement	The frequency of occurrence of Undetected corruption of complexity prediction display shall not be greater than 3,33E-06 (per fh).
Title	Occurrence of Undetected corruption of complexity prediction display Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3048
Requirement	The frequency of occurrence of LTM wrong use of sectorisation what-if shall not be greater than 2,33E-05 (per fh).
Title	Occurrence of LTM wrong use of sectorisation what-if Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A

<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A
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[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3049
Requirement	The frequency of occurrence of Delay in complexity prediction display shall not be greater than 1,00E-05 (per fh).
Title	Occurrence of Delay in complexity prediction display Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3050
Requirement	The frequency of occurrence of LTM delay using sectorisation what-if shall not be greater than 7,00E-05 (per fh).
Title	Occurrence of LTM delay using sectorisation what-if Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3051
Requirement	The frequency of occurrence of Loss of sectorisation optimization computation shall not be greater than 2,00E-05 (per fh).
Title	Occurrence of Loss of sectorisation optimization computation Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0001	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A

<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3052
Requirement	The frequency of occurrence of Undetected corruption of sectorisation optimization computation shall not be greater than 6,67E-06 (per fh).
Title	Occurrence of Undetected corruption of sectorisation optimization computation Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0001	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.3053
Requirement	The frequency of occurrence of Late sectorisation optimization computation shall not be greater than 2,00E-05 (per fh).
Title	Occurrence of Late sectorisation optimization computation Frequency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0001	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20IR.3001
Requirement	CAR System shall check the consistency on the sector configuration schedule.
Title	Sector Configuration Schedule Consistency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>

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<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0004	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20IR.3002
Requirement	CAR System shall check the consistency on flight plans.
Title	Flight Plans Consistency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0005.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0005.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0005.0004	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20IR.3003
Requirement	CAR System shall check the consistency on Environment Data (Airspace and predefined sector configurations).
Title	Environment Data Consistency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0005.0001	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20IR.3004
Requirement	CAR System shall check the integrity of Network Management system interface.
Title	Network Management system interface Integrity
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0005.0002	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20IR.3005
Requirement	A post analysis shall be performed to ensure pertinence of results (e.g. time checks).
Title	Post Analysis to ensure pertinence of results
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0005.0007	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20IR.3006
Requirement	CAR System shall implement a procedure / consistency check of Predefined Sector Sectorisations contained in Environmental Data to make sure LTM uses the latest.
Title	Predefined Sector Sectorisations Consistency
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20IR.3007
Requirement	LTM shall take into account external influences, not taken into account by CAR, in order to validate CAR results.
Title	External Influences to CAR processes
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0015	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-201R.3011
Requirement	CAR Tool Users shall know the limits of the system.
Title	System Limits
Status	<Validated>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0004.0001	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

3.3 Performance Requirements

Concerning performance requirements, they are supposed to be aligned to B4.1 Validation Targets and Performance Framework.

As stated by validation plans of exercises considered within the scope of P04.07.01, KPAs expected to be impacted by enhancements brought by foreseen validations are the following:

- Airspace Capacity (En Route).
- Quality of Service: more precisely, Punctuality is foreseen to be impacted. Anyhow, since B4.1 has not established quantified targets for that KPA (Temporal Efficiency, as stated by ICAO), validations will not provide quantified results on this area.
- Cost Effectiveness.
- Human Performance.

3.3.1 Capacity Requirements

[REQ]

Identifier	REQ-04.07.01-SPR-CAP1.0010
Requirement	Automated support for accurate and timely complexity prediction to identify upcoming congestions shall increase En Route throughput.
Title	En Route throughput increase thanks to automated support for traffic complexity assessment
Status	<Validated>
Rationale	Automated support for accurate and timely complexity prediction will allow a reduction of sectors capacity buffers introduced to cope with potential unforeseen traffic peaks thus increasing the En Route throughput.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0014	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0016	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0018	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0001	<Partial>
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<APPLIES_TO>	<Service>	Manage Traffic Complexity	N/A
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-CAP1.0020
Requirement	Automated support for traffic complexity management by means of capacity management measures shall increase the En Route throughput.
Title	En Route throughput increase thanks to sectorisation optimiser
Status	<Validated>
Rationale	By using a sectorisation optimizer and/or airspace what-if, it is possible to better react against peaks. The capacity is different for each sectorisation, so having a sectorisation optimizer allows finding the sectorisation that provides the maximum capacity for the given predicted traffic.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.03	N/A
<APPLIES_TO>	<Service>	Manage Traffic Complexity	N/A
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A

3.3.2 Cost-Effectiveness Requirements

[REQ]

Identifier	REQ-04.07.01-SPR-CEFF.0010
Requirement	Automated support for accurate and timely complexity prediction to identify upcoming congestions shall increase ATCo productivity.
Title	Cost-effectiveness increase thanks to automated support for traffic complexity assessment
Status	<Validated>

Rationale	Automated support for accurate and timely complexity prediction will allow a reduction of sectors capacity buffers introduced to cope with potential unforeseen peak thus increasing the ATCo productivity.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0014	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0016	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0018	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0001	<Partial>
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<APPLIES_TO>	<Service>	Manage Traffic Complexity	N/A
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-CEFF.0020
Requirement	Automated support for traffic complexity management by means of capacity management measures shall increase ATCo productivity.
Title	Cost-effectiveness increase thanks to sectorisation optimiser
Status	<Validated>
Rationale	The use of a sectorisation optimiser and/or airspace what-if will allow adjusting the sector configuration to meet the given demand whilst improving the utilisation of the workforce based on balanced workload distribution thus increasing ATCo productivity.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.03	N/A
<APPLIES_TO>	<Service>	Manage Traffic Complexity	N/A
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A

3.3.3 Departure Punctuality Requirements

[REQ]

Identifier	REQ-04.07.01-SPR-DPUN.0010
Requirement	Automated support for traffic complexity management by means of capacity management measures shall increase the number of aircrafts departing between +/- 3 minutes compared to SOBT.
Title	Departure punctuality increase thanks to sectorisation optimiser
Status	Validated
Rationale	By using a sectorisation optimizer and/or airspace what-if supported by workload assessment, it is possible to better react against peaks. The capacity is different for each sectorisation, so having a sectorisation optimizer allows finding the sectorisation that meets the given predicting traffic thereby avoiding unnecessary regulation.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.03	N/A
<APPLIES TO>	<Service>	Manage Traffic Complexity	N/A

3.3.4 Arrival Punctuality Requirements

[REQ]

Identifier	REQ-04.07.01-SPR-APUN.0010
Requirement	Automated support for trajectory management including trajectory what-if to solve imbalances by ATC team may decrease arrival punctuality of affected flights but the impact when considering the impact at Network level shall be negligible.
Title	Arrival punctuality when applying trajectory management
Status	<Validated>
Rationale	The introduction of automated support for trajectory management (including what-if capabilities) for ATC team may affect negatively the arrival punctuality of those flights affected by unexpected trajectory changes to solve the imbalances. However when considering the global ECAC picture arrival punctuality shall be maintained.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0011	<Partial>

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<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<APPLIES TO>	<Service>	Manage Traffic Complexity	N/A
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A

3.3.5 Fuel Efficiency Requirements

[REQ]

Identifier	REQ-04.07.01-SPR-FEFF.0010
Requirement	Automated support for traffic complexity management by means of capacity management measures shall decrease the fuel consumption per flight.
Title	Fuel efficiency / Environmental sustainability increase thanks to sectorisation optimiser
Status	<Validated>
Rationale	The use of a sectorisation optimiser and/or airspace what-if to find the best sectorisation to meet the given predicted traffic avoid the application of trajectory measures such as re-routings or level cappings which leads to an increase in fuel consumption for the affected flights.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0017	<Partial>
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.03	N/A
<APPLIES TO>	<Service>	Manage Traffic Complexity	N/A
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-FEFF.0020
Requirement	Automated support for trajectory management including trajectory what-if to solve imbalances by ATC team may increase fuel consumption of affected flights but the impact when considering the impact at Network level shall be negligible.
Title	Fuel efficiency decrease when applying trajectory management
Status	<Validated>
Rationale	The introduction of automated support for trajectory management (including what-if capabilities) for ATC team may affect negatively the fuel efficiency of those flights affected by unexpected trajectory changes to solve the imbalances. However when considering the global ECAC picture fuel efficiency shall be maintained.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0006	<Partial>

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<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0011	<Partial>
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<APPLIES TO>	<Service>	Manage Traffic Complexity	N/A
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A

3.3.6 Human Factors

[REQ]

Identifier	REQ-04.07.01-SPR-2020.0010
Requirement	The Users shall be regularly trained on the system in line with the defined local safety and training procedures.
Title	System HF - Training
Status	<Validated>
Rationale	To ensure appropriate and timely actions by the operator, to ensure safe use of non common sector configurations.
Category	<Operational><Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0019	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-2020.0020
Requirement	A post analysis shall be performed by actor in line with the local safety procedures to ensure pertinence of results.
Title	System HF – post analysis
Status	<Validated>
Rationale	To ensure pertinence of results and constant check of workload perception provided by the tool.
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0005.0007	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-2020.0030
Requirement	The Users shall know the limits of the system.
Title	System HF - limits
Status	<Deleted>
Rationale	To ensure safe use of system based resolutions through human mitigation of risks. This requirement has been replaced by REQ-04.07.01-SPR-2030.IR11.
Category	<Operational>

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Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

3.4 Information Exchange Requirements (IER)

[IER]

Identifier	Name	Content Type	Frequency	Safety Criticality	Confidentiality	Maximum Time of Delivery	Interaction Type	Free
IER-04.07.01-OSD-CAR1.0001	Complexity Count per sector	<Data>	Periodical	<Minor>	Public	Immediate	<One way>	N/A
IER-04.07.01-OSD-CAR1.0002	Complexity Count per flight	<Data>	Periodical	<Minor>	Public	Immediate	<One way>	N/A
IER-04.07.01-OSD-CAR1.0003	Update Airspace Configuration	<Data>	Ad hoc	<Severe>	Public	Immediate	<One way>	N/A
IER-04.07.01-OSD-CAR1.0004	Flight Data	<Data>	Periodical	<Major>	Public	Immediate	<One way>	N/A

Table 4: IER layout

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4 References and Applicable Documents

4.1 Applicable Documents

- [1] Template Toolbox 03.01.03
- [2] Requirements and V&V Guidelines 03.01.00
- [3] Templates and Toolbox User Manual 03.01.03
- [4] EUROCONTROL ATM Lexicon

4.2 Reference Documents

The following documents were used to provide input / guidance / further information / other:

- [5] Traffic Management System (TCM SYSTEM Level 1) Maastricht Upper Area Control Centre (MUAC)
- [6] P04.07.01 – D01 'Consolidation of previous studies (STEP 1)', Ed. 00.01.00
https://extranet.sesarju.eu/WP_04/Project_04.07.01/Project%20Plan/DEL04.07.01-D01-STEP%201%20Consolidation%20of%20previous%20studies-00.01.00.pdf
- [7] ED-78A GUIDELINES FOR APPROVAL OF THE PROVISION AND USE OF AIR TRAFFIC SERVICES SUPPORTED BY DATA COMMUNICATIONS.¹
- [8] ED-133 Flight Object Interoperability Specification
- [9] B.4.1 Performance Framework (validation targets, influence diagrams), Ed. 01.01.00
https://extranet.sesarju.eu/WP_B/Project_B.04.01/Project%20Plan/Perf%20Framework%20Docs/Edition%202/SESAR_Performance_Framework_Edition2_V01.01.00_Nov2014.aspx
- [10] B.4.1 Performance Framework (validation targets, influence diagrams), Ed. 01.01.00
https://extranet.sesarju.eu/WP_B/Project_B.04.01/Project%20Plan/Perf%20Framework%20Docs/Edition%202/SESAR_Performance_Framework_Edition2_V01.01.00_Nov2014.aspx
- [11] P10.01.07 D120 Technical Architecture Description – Cycle 2015, Ed. 00.01.00
- [12] SESAR Safety Reference Material
<https://extranet.sesarju.eu/Programme%20Library/Forms/Procedures%20and%20Guidelines.aspx>
- [13] SESAR Security Reference Material
<https://extranet.sesarju.eu/Programme%20Library/Forms/Procedures%20and%20Guidelines.aspx>
- [14] SESAR Environment Reference Material
<https://extranet.sesarju.eu/Programme%20Library/Forms/Procedures%20and%20Guidelines.aspx>
- [15] SESAR Human Performance Reference Material
<https://extranet.sesarju.eu/Programme%20Library/Forms/Procedures%20and%20Guidelines.aspx>
- [16] SESAR Business Case Reference Material
<https://extranet.sesarju.eu/Programme%20Library/Forms/Procedures%20and%20Guidelines.aspx>
- [17] WPB.01 Integrated Roadmap Data Set 15, December 2015

¹ The EUROCAE ED-78A has been used as an initial guidance material. ED-78A is useful, but is not an applicable document, because it mostly addresses the V4-V5 phases, whilst the SESAR R&D programme is focussed on development (V1-V2-V3, and because of its partial compliance with safety regulatory requirements).

- [18] P04.07.01 D13 'Step1 Final Validation Report – 1', Ed. 00.01.00
https://extranet.sesarju.eu/WP_04/Project_04.07.01/Project%20Plan/04.07.01.D13-STEP%201%20Final%20Validation%20Report-1.doc
- [19] P04.07.01 D14 'Step1 Final Validation Report – 2', Ed. 00.02.00
https://extranet.sesarju.eu/WP_04/Project_04.07.01/Project%20Plan/STEP%201%20Tasks/P04.07.01-T014%20Step1%20Final%20Validation%20Report%20-%202/P04.07.01-D14%20Step1%20Final%20Validation%20Report-2.docx
- [20] P04.07.01 D68 'Step1 V3 Final Complexity Management OSED', Ed. 00.02.00
- [21] P04.07.01 D63 'Step1 V3 Interim Complexity Management SPR', Ed. 00.01.01
- [22] P04.07.01 'D72 'Step1 Final Validation Report - 3' Ed. 00.20.00
https://extranet.sesarju.eu/WP_04/Project_04.07.01/Project%20Plan/STEP%201%20Tasks/P04.07.01-T075%20VP-005%20Validation%20Report/P04.07.01-D72%20Step1%20Final%20Validation%20Report%20-%203.docx
- [23] P04.02 D98 'WP4 Detailed Operational Description Step1', Ed. 00.07.01
https://extranet.sesarju.eu/WP_04/Project_04.02/Project%20Plan/04.02%20DOD%20STEP1%20Latest%20Version/WP%204%20Detailed%20Operational%20Description%20Step%201%20%20V7.1%20resubmission%20SJU%2020150622.docx
- [24] P07.02 D29 'Step1 Release5 Detailed Operational Description (DOD)', Ed. 00.04.01
https://extranet.sesarju.eu/WP_07/Project_07.02/Project%20Plan/Step1/07.02-D29-Step%201%20Release%205%20DOD.docm
- [25] B.04.02 D106 'Transition ConOps SESAR 2020', Ed. 01.00.00

Appendix A Assessment / Justifications

A.1 Safety Assessment Report for P04.07.01 in Step1



P04.07.01 Step 1 V3
Final Safety Assessm

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Appendix B SPR Requirements to be further validated

This appendix includes the Safety and Performance requirements identified within the P04.07.01 framework but out of the scope of SESAR Solution #19 that require further validation in SESAR 2020.

Safety Requirements – Functionalities and performances

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2007
Requirement	The manual trajectory change scenario shall also provide information on possible conflicts being induced by trajectory changes.
Title	Information on possible conflicts due to candidate trajectory changes
Status	<In Progress>
Rationale	Requirement derived from design analysis – normal operational conditions included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0005.0004	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2010
Requirement	The manual sectorisation change scenario shall also provide information on possible conflicts being induced by sectorisation changes.
Title	Information on possible conflicts due to candidate sectorisation changes
Status	<In Progress>
Rationale	Requirement derived from design analysis – normal operational conditions included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0015	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2013
Requirement	The sectorisation change scenario shall also provide information on possible conflicts being induced.
Title	Information on possible conflicts due to optimal sectorisation change
Status	<In Progress>
Rationale	Requirement derived from design analysis – normal operational conditions included in the Step 1 Safety Assessment Report.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

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[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0001.0015	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20SR.2022
Requirement	The CAR system shall use a cut-off time to constrain the search for optimization.
Title	Cut-off time for optimization
Status	<In Progress>
Rationale	Requirement derived from design analysis – hazard mitigation included in the Step 1 Safety Assessment Report
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0001	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

Safety Requirements – Integrity and reliability

[REQ]

Identifier	REQ-04.07.01-SPR-20IR.3008
Requirement	CAR System shall start the optimization of sectorisation with time close to current time.
Title	Time of sectorisation optimization
Status	<In Progress>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report. 'Current time' is related to when the operator request a proposal to optimise the airspace configuration. So, the CAR system will start the assessment of the most optimum sectorisation under user request and analysing all predefined ones from that moment onwards.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0001	<Partial>
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

[REQ]

Identifier	REQ-04.07.01-SPR-20IR.3009
Requirement	CAR System shall include a timer in place to constraint the search of optimization.

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Title	Time Constraint for sectorisation optimization
Status	<In Progress>
Rationale	Requirement derived from design analysis – internal system failures included in the Step 1 Safety Assessment Report Not clear to me, my opinion it is not necessary
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-0002.0001	<Partial>
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A

Performance Requirements – Capacity

[REQ]

Identifier	REQ-04.07.01-SPR-CAP1.0030
Requirement	Automated support for trajectory management including trajectory what-if to solve imbalances by ATC team shall increase En Route throughput.
Title	En Route throughput increase thanks trajectory management
Status	<In Progress>
Rationale	The introduction of automated support for trajectory management (including what-if capabilities) for ATC team makes them be better prepared to face unforeseen traffic peaks which may lead to a reduction of the sector capacity buffers thus, increasing En Route throughput.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0011	<Partial>
<ALLOCATED_TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.03.04	N/A
<APPLIES_TO>	<Service>	Manage Traffic Complexity	N/A
<APPLIES_TO>	<Service>	Performed Extended ATC Planning	N/A

Performance Requirements – Cost-Effectiveness

[REQ]

Identifier	REQ-04.07.01-SPR-CEFF.0030
Requirement	Automated support for trajectory management including trajectory what-if to solve imbalances by ATC team shall increase ATCo productivity.
Title	Cost-effectiveness increase thanks to automated support for traffic complexity assessment and trajectory management.
Status	<In Progress>
Rationale	The introduction of automated support for trajectory management (including what-if capabilities) for ATC team makes them be better prepared to face unforeseen traffic peaks which may lead to a reduction of the sector

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	capacity buffers thus, increasing ATCo productivity.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.01-OSED-REL5.0011	<Partial>
<ALLOCATED TO>	<Functional block>	Local Traffic Complexity Mgt (LTCM)	N/A
<APPLIES TO>	<Operational Focus Area>	OFA05.03.04	N/A
<APPLIES TO>	<Service>	Manage Traffic Complexity	N/A
<APPLIES TO>	<Service>	Performed Extended ATC Planning	N/A

-END OF DOCUMENT-

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