OFA04.02.01 (Integrated Surface Management) Final SPR

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Task contributors
AIRBUS; DFS; ENAIRE; **ENAV**; *Eurocontrol; INDRA;SEAC;THALES*

Abstract

This document is the P06.07.02 D45 Integrated Surface Management OFA_SPR relating to A-SMGCS Routing and Planning and Guidance functions operational concept developed for Phase 2. It is an evolution of the P06.07.02 D77 OFA04.02.01 (Integrated Surface Management) Interim SPR [47]. As it is considered a document at OFA04.02.01 level, it contains both P06.07.02 and P06.07.03 Safety Requirements.

On P06.07.02 side the list of safety and performance requirements has been updated on the basis of the inputs coming from V3 validation activities for advanced surface routing for Phase 2. From safety perspective, it focuses on the operational hazards resulted from system-related failures.

From P06.07.03 perspective, it encompasses Provision of Cleared Route to Mobiles

both by Voice (i.e. R/T) and by data link, Airfield Ground Lighting (AGL) Service and Virtual Block Control.

Therefore, in order to have a complete understanding of the whole Safety Assessment including the success approach, this P06.07.02 D45 Integrated Surface Management OFA_SPR has to be read together with the "Integrated Surface Management Safety Assessment Report (SAR)" [33] produced in cooperation with P16.06.01

Authoring & Approval

Prepared By - *Authors of the document.*		
Name & Company	**Position & Title**	**Date**
Michele Raimondo / ENAV	P06.07.02 T037 Task Leader	03/08/2016
Fabio Maria Donello / ENAV	P06.07.03 T029 Contributor	03/08/2016
Paloma Montero Martìn / ENAIRE	P06.07.02 T037 Contributor	29/07/2016
Jean-Etienne Hiolle / THALES	P06.07.02 T037 Contributor	26/07/2016
Juan Barrio Gutierrez / INDRA	P06.07.02 T037 Contributor	26/07/2016
Marcus Biella / DFS	P06.07.03 T029 Task Leader	24/08/2016
Roger Lane / Eurocontrol	P06.07.03 T029 Contributor	27/07/2016
Benoit Morizet / AIRBUS	P06.07.02 T037 Contributor	26/07/2016
Gonçal Berástegui / INDRA	P06.07.02 T037 Contributor	26/07/2016

Reviewed By - *Reviewers internal to the project.*		
Name & Company	**Position & Title**	**Date**
Michele Raimondo / ENAV	P06.07.02 T037 Task Leader	24/08/2016
Jean-Etienne Hiolle / THALES	P06.07.02 T037 Contributor	16/08/2016
Benoit Morizet / AIRBUS	P06.07.02 T037 Contributor	24/08/2016
Paloma Montero Martìn / ENAIRE	P06.07.02 T037 Contributor	25/08/2016
Diane Gawrysiak / AIRBUS	P06.07.03 T029 Contributor	24/08/2016
Gonçal Berástegui / INDRA	P06.07.02 T037 Contributor	07/09/2016
Roland Kaps-Becker / SEAC	P06.07.02 T037 Contributor	25/08/2016

Reviewed By - *Other SESAR projects, Airspace Users, staff association, military, Industrial Support, other organisations.*		
Name & Company	**Position & Title**	**Date**
Fabio Maria Donello / ENAV	P06.07.03 Project Manager	08/09/2016
Generoso Paolillo / LEONARDO	P12.01.07 Project Manager	08/09/2016
Nicolas Leon / DSNA	P06.07.01 Project Manager	No comments received
Juan Barrìo Gutierrez / INDRA	P12.03.03 / P12.04.03 Project Manager	07/09/2016
Andrea Cosmi / LEONARDO	P12.03.04 Project Manager	09/09/2016
Rainer Kaufhold / DFS	OFA04.01.01 Coordinator	No comments received
Ala Ross Groskreutz / ENAIRE	P06.02 Project Manager	No comments received
Andy Knight / Heathrow	OFA05.01.01 Coordinator	No comments received
Cristina Martin Barcena / ENAIRE	P06.09.02 Project Manager	No comments received
Frederique Ayache / Eurocontrol	P06.03.01 Project Manager	No comments received
Garance Raynaud / Airbus	P09.13 Project Manager	No comments received
Cristina Morales Carballo / INDRA	P12.05.04 Project Manager	No comments received
Eric Perrin / Eurocontrol	P16.06.01 Project Manager	No comments received

Approved for submission to the SJU By - *Representatives of the company involved in the project.*		
Name & Company	Position & Title	Date
Michele Raimondo / ENAV	P06.07.02 Project Member	15/09/2016
Juan Barrio Gutierrez / INDRA	P06.07.02 Project Member	13/09/2016
Paloma Montero Martìn / ENAIRE	P06.07.02 Project Member	15/09/2016 (silent approval)
Hervé Drévillon / DSNA	P06.07.02 Project Manager	14/09/2016
Jean Etienne Hiolle / THALES	P06.07.02 Project Member	09/09/2016
Roland Kaps-Becker / SEAC	P06.07.02 Project Member	13/09/2016
Garance Raynaud / AIRBUS	P06.07.02 Project Member	12/09/2016
Marcus Biella / DFS	P06.07.03 T029 Task Leader	09/09/2016
Roger Lane / Eurocontrol	P06.07.02 Project Member	15/09/2016 (silent approval)
Massimo Corazza / LEONARDO	P06.07.03 Project Member	15/09/2016 (silent approval)
Alan Gilbert / NATMIG	P06.07.03 Project Member	15/09/2016 (silent approval)
Martina Stehlikova / HONEYWELL	P06.07.03 Project Member	15/09/2016 (silent approval)

Rejected By - *Representatives of the company involved in the project.*		
Name & Company	Position & Title	Date
None.		

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00.00.03	07/09/2016	Draft	ENAV	Document updated after internal and external review
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This deliverable consists of SJU foreground.

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Executive summary

This document is the deliverable corresponding to task T037 (Update of OFA04.02.01 Safety and Performance Requirements (V3)) of SESAR project 06.07.02 A-SMGCS Routing and Planning function. It has been produced by the P06.07.02 but it has to be considered an integrated document at OFA04.02.01 level in coordination with P06.07.03. In terms of maturity level, this document consolidates all V3 validation results obtained in OFA04.02.01 activities in Release 5.

In fact it is important to highlight that the scope of the 06.07.03 project is closely linked to the 06.07.02 Routing and Planning project where the generation of the 'planned route' and its subsequent uplink by data link to the cockpit is covered.

So this document contains an updated list of Safety and Performance Requirements related to each operational process and service provided by the A-SMGCS Routing & Planning and Guidance functions as described in the P06.07.02 D46 OFA04.02.01 Final OSED [35].

The following table indicates which SESAR Solution enables implementing each of the operational services related to the OFA04.02.01, as well as the corresponding Operational Improvement steps.

Operational Service	SESAR Solution involved	SESAR Solution id	Corresponding OI step(s)	Maturity level
Route generation integrating planning information	Automated assistance to controller for surface movement planning and routing	#22	AO-0205	V3
Provision of Cleared Route to Mobiles by Voice (R/T)	Manual taxi routing function	#26	AUO-0603-A	V2
Provision of Planned and Cleared Route to Mobiles by Data Link	D-TAXI service for CPDLC application	#23	AUO-0308-A	Partial V3[1]
	Improved vehicle guidance[2]	N/A	AO-0206	V2
			AO-0215	V2
Airfield Ground Lighting	Guidance assistance through airfield ground lighting	#47	AO-0222-A	V3
Virtual Block Control	Virtual block control in LVPs	#48	AO-0223	V3

Table 1: Operational services, SESAR Solutions and OI steps in OFA04.02.01 scope

Operational Safety Assessment (OSA), reported in the "Integrated Surface Management Safety Assessment Report (SAR)" [33], and Operational Performance Assessment (OPA), included in this document, aim at showing the whole process carried out to derive the requirements. So in order to have a complete understanding of the whole safety assessment including the success approach, this Integrated Surface Management OFA_SPR has to be read together with the "Integrated Surface Management Safety Assessment Report (SAR)" [33] document produced in coordination with P16.06.01. It is important to highlight that the SAR has been produced at OFA04.02.01 level and, therefore, it can be considered as an integrated version.

Safety and performance requirements were produced following the general approach promoted by P16.06.01 into the SESAR Safety Reference Material (SRM) [25] and into the related guidelines [26] including both success and failure approach:

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[1] SESAR Solution #23 is indicated as having partially achieved the V3 maturity level, as validation activities have identified operational issues in busy airports. In other airports, V3 maturity level has been achieved.

[2] Improved vehicle guidance was identified as SESAR Solution #24 at one stage, but was eventually removed from the portfolio of SESAR Solutions when it was concluded it would not reach a sufficient maturity level to envisage its industrialisation at the end of the SESAR 1 programme.

- Success approach refers to the pre-existing hazards which by definition exist in the operational environment before the A-SMGCS Routing and Planning and Guidance function has been applied. Therefore the objective is to identify the main benefits expected to be gained from the introduction of the routing and planning and Guidance function.

- Failure approach concerning with the failure of the change introduced and not with what the change is required to do in the first place. Therefore, this phase includes the abnormal operating conditions under which the system has to operate in degraded mode.

The main results derived from that assessment are:

- Safety objectives to mitigate the effects of operational hazards. They define the maximum frequency of occurrence at which a hazard can be tolerated to occur.

- Safety requirements to meet the above defined safety objectives. They could be seen as risk mitigation means required to reduce the risk (s) to an acceptable level.

The description of the success approach and failure approach is contained in the Integrated Surface Management Safety Assessment Report (SAR)" [33] as agreed with P16.06.01.

From performance perspective, the OPA aims at defining the performance requirements associated to the A-SMGCS routing and planning and guidance functions. The scope of the OPA is to:

- Identify the potential defects
- Measure the adequacy of the outputs
- Assess the reliability of the operations

To achieve these objectives, definition of the main Key Performance Areas (KPAs) and of the related Key Performance Indicators (KPIs) expected to be impacted by the A-SMGCS Routing and Planning and Guidance function has been considered as starting point. At this stage, the main KPAs identified are capacity, efficiency, predictability, environmental sustainability and cost effectiveness.

The identified Performance Indicators have been assessed by using the Operational Scenarios implemented for the Fast Time Simulation performed in Madrid and Paris CDG TWR airport environment (i.e. EXE-06.07.02-VP588, EXE-06.07.02-VP-670 and EXE-06.07.02-VP-671). Selection of several optimization criteria allowed performing a comprehensive analysis about their effect on the established performance indicators. Therefore, the outcomes reported in the document illustrate, also through a quantitative data, the influence of various optimization criteria on the overall system performance. As this approach focuses on the potential impact of the A-SMGCS Routing and Planning and Guidance function on the main Key Performance Areas, the corresponding performance requirements aim to meet the expected contribution to overall ATM performance.

Besides, this Operational Performance Assessment includes also a more system oriented approach by analysing parameters which are strictly related to the performances of the system under assessment, as integrity, availability and time processing. Performance requirements corresponding to these parameters are defined as well. It is worth noting that there remains to proceed with defining some quantitative values (probability, times …).

The current document builds on the Interim SPR for OFA04.02.01 ([47]), which had been developed after Releases 2 and 3, as well as complementary V2 validation activities. Compared to this interim version, this document includes the outcome of the validation activities performed both by operational project 06.07.03 ([43], [44]) and 06.03.01 in Release 5 ([45], [46]). Validation results obtained in exercises EXE-06.07.03-VP-092, EXE-06.07.03-VP-720, EXE-06.09.02-VP-679, EXE-06.03.01-VP-699, EXE-06.03.01-VP-719, EXE-06.03.01-VP-758, EXE-06.03.01-VP-759 and EXE-06.03.01-VP-761 are thus reflected in this Final SPR of OFA04.02.01 through conclusion on the status (i.e. confirmed through validation or still to be validated) of safety and performance requirements.

1 Introduction

1.1 Purpose of the document

This Final Safety and Performance Requirements (SPR) document provides the safety and performance requirements for Services related to the A-SMGCS Routing and Planning and Guidance functions as described in the OFA04.02.01 Final OSED [35]. 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. This document is used to provide the basis for ensuring that these SPR requirements are applicable during initial implementation and continued operation.

1.2 Scope

The scope of the document is to provide Safety and Performance requirements through a Safety and Performance assessment focusing on the A-SMGCS Routing and Planning and Guidance functions and including also the inputs related to the Virtual Block Control as described in the OFA04.02.01 Final OSED [35]. .
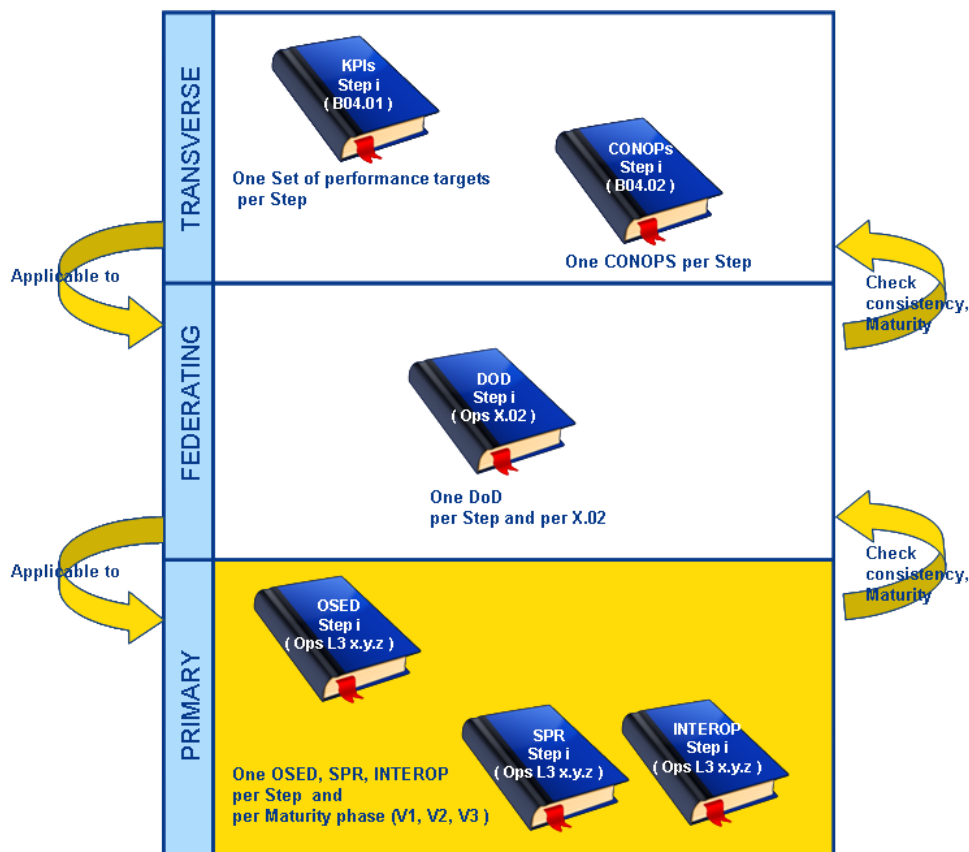
Figure 1: SPR document with regards to other SESAR deliverables

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

In detail, this SPR covers the OIs relevant for OFA 04.02.01, which are AO-0205, AO-0206, AO-0222, AO-0223, AUO-0308, and AUO-0603-A. Moreover, it also addressed the AO-0215 concerning the provision of ground clearances to vehicle driver's via data link.

This SPR is a contribution for the OFA04.02.01 Integrated Surface Management. Enhanced Guidance Assistance to Aircraft and vehicles on the Airport Surface Combined with Routing will provide the Flight Crew and vehicle drivers with a Cockpit Display System/Vehicle Display System (CKDS/VDS) showing guidance instructions as a layer on top of the AMM.

The CDS/VDS will also be able to show taxiways, runways, fixed obstacles, own aircraft position and surrounding traffic. An increased level of automation of Airfield Ground Lighting (AGL) will mean that taxiway lights will be switched on in front of the mobile according to its progress and other traffic.

The future routing and planning and guidance environment on the airport level comprises the following services:

- Route generation integrating planning information.
- Provision of cleared route to mobiles by voice (R/T).
- Provision of planned and cleared route to mobiles by data link.
- Airfield Ground Lighting (AGL)
- Virtual Block Control.

1.3 **Intended readership**

The main audience for this SPR is:

- The federating project P06.02 (Coordination and consolidation of operational concept definition and validation)
- OFA04.02.01, including the projects it encompasses, for integrating the developments in A-SMGCS Routing and Planning Function into the full advanced surface routing concept.
- OFA04.01.01 which aims at defining the operational concept for the integration between departure and surface management.
- OFA05.01.01 for the interactions with the AOP and the de-icing manager
- Project P06.09.02 which aims at defining an Advanced Integrated Controller Working Position (A-CWP) on the basis of the HMI requirements related to the functions developed by the primary projects P06.07.z and P06.08.z, such as A-SMGCS Routing and Planning.
- Project 06.03.01 is responsible for the V3 integrated validations of several 06.YY.ZZ projects dealing with the airport in the ATM environment.
- Project 06.07.01, since interaction with Safety Nets needs to be assured
- P09.13 regarding the data link application
- The system project 12.01.07 to ensure the coherency of the OFA04.02.01 Architecture with the related Technical Architecture Description (TAD)
- Technical project P12.03.03 to provide safety and performance requirements which will support prototype development.
- Technical projects P12.03.04
- P12.04.03 regarding the airport FDPS
- P12.05.04 regarding the HMI aspect
- P16.06.01 which provides the guidelines needed to carry out an effective safety assessment.
- and more generally, SJU community.

1.4 Structure of the document

The structure of this SPR is as follows:

The structure of the document is as follows:

- **Chapter 1** (the present section) provides introductory information about the document in terms of purpose and scope of the document as well as background information to be considered as input for our safety assessment.
- **Chapter 2** provides a summary of the operational concept and services related to the A-SMGCS Routing & Planning and Guidance functions as described in the OFA04.02.01 Final OSED [35]
- **Chapter 3** is dedicated to the collection of the safety and performance requirements coming from both safety and performance assessment.
- **Chapter 4** lists the applicable and reference documents
- **Appendix A** describes the whole safety and performance assessment performed to derive the related requirements.

As external document, a Surface Routing and Planning and Guidance Safety Assessment Report is delivered together with this OFA04.02.01 Final SPR to provide evidence of all the safety assurance activities performed, in cooperation with P16.06.01, for a complete safety assessment.

1.5 Background

Coordination with P16.06.01 has been useful to understand the whole process required to perform a complete safety assessment as promoted in both SESAR Safety Reference Material (SRM) [25] and the relative guidelines [26]. The approach described deals with both the identification of the pre-existing hazards (i.e. success approach) and of the failures of the System (i.e. failure approach). All the carried out safety assurance activities are reported in the Integrated Surface Management Safety Assessment Report (SAR) [33]which has been developed in cooperation with P16.06.01 partners.

Regarding the failure approach, the guidelines provided by both EUROCAE ED-78A [5] and EUROCONTROL Safety Assessment Methodology (SAM) [7] documents have been considered as input. Pre-requisite for both safety and performance assessment is to have a clear picture of the services which will be provided by the concerned function and of the environment in which it will operate. For that reason, the operational environment and services described in the Second Integrated Surface Management Interim OSED [35] have been considered as input.

Once the hazards have been identified and the associated safety objectives have been set, it is required to analyse the proposed architecture in order to identify the potential causes which could lead to the hazards and to derive the safety requirements. For this purpose surface routing and planning context delineated within the P12.01.07 [27] has been taken into account.

Regarding the performance assessment, OFA validation reports [48],[49],[50] and P06.07.03 V2 Step 1 Validation Report [41] have allowed focusing on the main Key Performance Areas (KPA) expected to be impacted by the introduction of the surface routing and planning and guidance function. Preliminary quantitative figures have been derived from the outcomes of these validation exercises.

Starting point is the SPR for Phase 1 [24].

In terms of maturity level, this document consolidates all V3 validation results obtained in OFA04.02.01 activities in Release 5 (EXE-06.03.01-VP-679, EXE-06.03.01-VP-699, EXE-06.03.01-VP-719, EXE-06.03.01-VP-758, EXE-06.03.01-VP-759 and EXE-06.03.01-VP-761).

1.6 Glossary of terms

Term	Definition
Abnormal conditions	Abnormal conditions' are those external changes in the operational environment that the ATM/ANS functional system may exceptionally encounter (e.g. severe WX, airport closure, etc.) under which the system may be allowed to enter a degraded state provided that it can easily be recovered when the abnormal condition passes and the risk during the period of the degraded state is shown to be acceptable [see SRM [25] In the document Abnormal conditions is a generic term which covers all the situations where the system has to operate in a degraded mode including total loss, partial loss and corruption of routing and planning information.
Airfield Ground Lighting (AGL)	The entire understanding of Airfield Ground Lighting refers to all lighting fixtures on the ground of an airport. But from the SESAR guidance perspective and the resulting Follow-the-Greens perspective, the understanding of AGL is limited to all taxiway centreline lights and all stop bars at an airport. [23] ▪ This service will correlate the cleared route with the taxi instructions provided by the ATCO or the surface management system and illuminate the taxiway lights and stop bars a specified distance ahead of the mobile in question, switching them on and off automatically, taking into account other traffic and timing constraints, to guide the mobile as it progresses along its assigned route.
Airport Moving Map (AMM)	(Base Layer) potential additional layer to the basic layer are: - Ground Traffic Display Layer (GTD), - Data Link Clearance Layer, - Guidance Instruction Layer, - Alerting Layer, ▪ The number of layers implemented on an AMM will depend on the environment that the mobile is destined to operate in e.g. commercial aircraft using major airports may have all layers available whilst smaller aircraft may use just the AMM with GTD. [34]
Alert	Two levels of alert are defined in the A-SMGCS concept [30]. These are: ▪ Stage 1 alert is used to inform the controller that a potentially dangerous situation may occur, and he/she needs to be aware of. According to the situation, the controller receiving a stage 1 alert may take a specific action to resolve the alert if needed. This is called INFORMATION step; ▪ Stage 2 alert is used to inform the controller that a critical situation is developing which needs immediate action. This is called ALARM step.
A-SMGCS (Advanced – Surface Movement Guidance and Control System)	A system providing routing, guidance and surveillance for the control of aircraft and vehicles in order to maintain the declared surface movement rate under all weather conditions within the aerodrome visibility operational level (AVOL) while maintaining the required level of safety [31]
Cockpit Display	Throughout this document references to CKDS and VDS are at a generic

Term	Definition
System (CKDS) and Vehicle Display System (VDS)	*level and do not refer to one specific manufacturer or product. It is foreseen that these display systems will have the following different graphical layers of visual information which can be individually displayed on top of the base layer which is the Airport Moving Map, It is assumed that in the future when reliability and data accuracy are assured that these systems will be able to be used legally as a replacement for paper maps/charts. [23]*
Conflict	*Since there are no defined separation minima on the airport surface, a surface conflict is better defined as a situation in which if the movement of aircraft or vehicles is continued at their current speed and direction, a collision is likely to result. [32]*
Corrupted information	*Incorrect or misdirected information elaborated by the routing and planning function [32]*
Degraded mode of operation	*Degraded mode of operation is a pre-defined reduced level of operational service invoked by equipment outage or malfunction, staff shortage or procedures [25]*
Enhanced Vision System	*An electronic means to provide the flight crew with a sensor-derived or enhanced image of the external scene through the use of imaging sensors such as forward looking infrared, millimetre wave radiometry, millimetre wave radar, and / or low light image [23]*
Failure	*The inability of any element of the Air Traffic Management System to perform its intended function or to perform it correctly within specified limits [32].*
Failure approach	*It is the second step required to complete an Operational Safety Assessment. It deals solely with the system-generated hazards, created by failures of the A-SMGCS planning and routing functions [25]*
Hazard	*Hazard shall mean any condition, event, or circumstance which could induce an accident. This covers both pre-existing aviation hazards (not caused by ATM/ANS functional systems) and new hazards introduced by the failure of the ATM/ANS functional systems [25].*
Manual Intervention	*Any step or action where a human being has to interact with the system or with another human being. E.g. acknowledge of a route change by flight crew, manual or semi-automatic edition of a route by the ATCO, etc.[30]*
Normal Conditions	*Normal conditions are those conditions of the operational environment the ATM/ANS functional system is expected to encounter in day-to-day operations and for which the system must always deliver full functionality and performance [25]*
Partial Loss	*Partial unavailability of one of routing and function capability. [25]*
Pre-existing hazard	*Pre-existing hazard by definition exists in the operational environment before any form of 'deconfliction' has taken place. It is, therefore, not caused by the system – rather, the main purpose of introducing the system is to eliminate this pre-existing hazard or at least maintain the associated risks at an acceptably low level [25].*
Safety Assessment	*The SAR shall provide a detailed report on the outputs of the safety-assessment process – i.e. the Safety Assurance Activities constituting the*

Term	Definition
Report (SAR)	*process whose aim is to provide right evidence to show that the subject of the safety assessment is (and will be) acceptably safe, as defined by the SAfety Criteria [25].*
Safety objective	*Safety objective shall mean the functional, performance and integrity safety properties of the air navigation system, derived at the OSED level. Safety objectives describe what the air navigation system has to provide across the interface between the service provider and service user in order that the SAfety Criteria are satisfied. They provide mitigation of the pre-existing risks; and limit the risks arising from failures within the air navigation system. As objectives, they should specify what has to be achieved – how it is achieved is covered by safety requirements – from Article 2(11) of Regulation (EC) No 1035/2011.* *This definition relates to a broader interpretation of what a hazard is. It addresses two types of hazards: "pre-existing", which the ATM/ANS functional system has to mitigate; and "system-generated" hazards, which are created by failure of the ATM/ANS functional system. Consequently the safety objectives have to provide mitigation of the pre-existing hazards as well as mitigations of the system-generated hazards derived from the service-level failure analysis.* *Currently, in Regulation (EC) No 1035/2011, the following definitions apply: "'hazard' means any condition, event, or circumstance which could induce an accident" and "'safety objective' means a qualitative or quantitative statement that defines the maximum frequency or probability at which a hazard can be expected to occur" [25]*
Safety requirements	*Safety requirement shall mean the necessary risk reduction measures identified in the risk assessment to achieve a particular safety objective. They describe the functional, performance and integrity safety properties at the system-design level as well as organisational, operational, procedural, and interoperability requirements or environmental characteristics – from Article 2(12) of Regulation (EC) No 1035/2011.* *Currently, in Regulation (EC) No 1035/2011, the following definition applies: "'safety requirement' means a risk-mitigation means, defined from the risk-mitigation strategy that achieves a particular safety objective, including organisational, operational, procedural, functional, performance, and interoperability requirements or environment characteristics" [25]*
Success approach	*It is the first step required to perform a complete Operational Safety Assessment in which we assess how effective the new concepts and technologies would be when they are working as intended – i.e. how much the pre-existing risks that are already in aviation will be reduced by the ATM changes. This is concerned with the positive contribution to aviation safety that the ATM changes make in the absence of failure [25]*
Total Loss	*Total unavailability of the information elaborated by the routing and planning function in normal conditions [25]*
Virtual Block Control (VBC)	*Under low visibility conditions, VIS 3 conditions, the Block Spacing Control is applied to ensure the adequate spacing between succeeding aircraft. From safety perspective, both flight crews' and ATCOs' situational awareness are envisaged to be increased by displaying Virtual Stop Bars (VSBs) on ground HMI and in the on-board AMM. [23]*

Term	Definition
Worst Credible Case	*The worst credible case (WCC) is the worst case more credible than others. The allocation of safety objectives is applied to the WCC [25]*

1.7 Acronyms and Terminology

Term	Definition
ADD	Architecture Definition Document
AGL	Airfield Ground Lighting
AMM	Airport Moving Map
AMMW	Active Millimetre Wave
AODB	Airport Operational Database
A-SMGCS	Advanced Surface Movement Guidance and Control System
ATC	Air Traffic Control
ATC System	In the context of this document the term ATC system refers to a combination of the A-SMGCS (Surveillance and Control) and the Electronic Flight Strips
ATCO	Air Traffic Control Officer
ATM	Air Traffic Management
ATS	Air Traffic Service
ATSU	Air Traffic Service Unit
CDS	Cockpit Display System
CPDLC	Controller Pilot Data Link Communications
CVS	Combined Vision System
CWP	Controller Working Position
DCL	Departure Clearance
DLIC	Data Link Initiation Capability Service
DOD	Detailed Operational Description
D-TAXI	Data Link Taxi Instructions
EASA	European Aviation Safety Agency
E-ATMS	European Air Traffic Management System
EBS	Enhanced Braking System
EFS	Electronic Flight Strips
EMMA	European Airport Movement Management by A-SMGCS

Term	Definition
ET	Expiration Time
EUROCAE	European Organisation for Civil Aviation Equipment
EUROCONTROL	European Organisation for the Safety of Air Navigation
EVS	Enhanced Vision System
FAA	Federal Aviation Administration
FOV	Field of View
GMG	Ground Marker Guidance
GTD	Ground Traffic Display
HDD	Head Down Display
HMI	Human Machine Interface
HUD	Head Up Display
ICAO	International Civil Aviation Organization
IER	Information Exchange Requirements
IR	Infrared
IRS	Interface Requirements Specification
INTEROP	Interoperability Requirements
KPA	Key Performance Areas
KPI	Key Performance Indicator
LVC	Low Visibility Conditions
LVP	Low Visibility Procedures
MWIR	Mid- Wavelength infrared
OFA	Operational Focus Areas
OI	Operational Improvement
OSED	Operational Service and Environment Definition
PF	Pilot flying
PMMW	Passive Millimetre Wave
PNF	Pilot not flying

Term	Definition
QoS	Quality of Service
R/T	Radio Telephony
RIMCAS	Runway Incursion Monitoring and Collision Avoidance System
SAR	Safety Assessment Report
SESAR	Single European Sky ATM Research Programme
SESAR Programme	The programme which defines the Research and Development activities and Projects for the SJU.
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency.
SPR	Safety and Performance Requirements
SWIR	Short Wavelength infrared
TAD	Technical Architecture Description
TCL	Taxiway Centre Lights
TS	Technical Specification
TWY	Taxiway
VBC	Virtual Block Control
VDS	Vehicle Display System
VHF	Very High Frequency
VSB	Virtual Stop Bars
VSB$_{IHP}$	VSB referred to an Intermediate Holding Position
VSB$_{NIHP}$	VSB Not linked to Intermediate Holding Position
WFF	Wettbewerbsfähiger Flughafen (Competitive Airport)

2 Summary of Operational Concept (from OSED)

This section provides a summary of the operational concept and the related operational services related to the A-SMGCS Routing & Planning and Guidance functions as described in the OFA04.02.01 Final OSED [35].

2.1 Description of the Concept Element

The objective of the Integrated Surface Management is to improve surface operations by creating systems to optimize the traffic on the surface (through route planning), to reduce R/T communications and to increase pilots and vehicle drivers situational awareness.

The future routing and planning and guidance environment on the airport level comprises the following main services:

- **Route generation integrated with planning information.** This service deals with the generation of the most suitable taxi route on the basis of a list of defined constraints and ATCO inputs. Planned taxi time associated to the planned taxi route is calculated as well

- **Provision of cleared route to mobiles by voice (R/T).** This service deals with the transmission of a planned route from ATCO to the flight crew and vehicle driver when no Data Link service is available and in times of critical or emergency situations.

- **Provision of planned and cleared route to mobiles by Data Link.** This service deals with the transmission from ATC to mobiles of non-time critical messages (Expected Taxi Route, Start Up, Push back, Taxi and Taxi Revision) and reception of mobiles requests and answers by data link in order to reduce R/T. Additionally addresses the display of this information on cockpit and vehicle display systems (Airport Moving Map, Ground Traffic Display)

- **Airfield Ground Lighting.** This service deals with the activation of taxiway lights according to the cleared route to guide the mobile along its assigned route.

- **Virtual Block Control.** This service deals with the creation and management of Virtual Stop Bars by the ATCO through the CWP when Low Visibility Procedures (LVP) are applied. This Virtual Block Control improves situational awareness for the ATCO and also for flight crews, by preventing conflicts and infringements between aircraft during taxiway operations under LVC.

It is not necessary to implement all of these services at the same time, but from safety point of view it could be better to do it. Therefore in this second way, the exchange of information between all installed services has to be well structured and organized, especially if more than one guidance service is provided at an airport. In this case the integrated network has to guarantee that individual guidance information as provided to a user appears synchronous and represents identical instructions on all available guidance means.

2.2 Description of Operational Services

The next sections briefly describe how the mentioned services are delivered as done in the P06.07.02 D46 - OFA 04.02.01 Final OSED [35]

2.2.1 Route generation integrated with planning information

The aim of these services is to calculate the most suitable route on the movement area for an aircraft or vehicle and the calculation of the unimpeded (unrestricted) time it will take for the mobile to taxi/drive on the given route.

The route generation service is provided by the routing and planning functions which take into account inputs from Air Traffic Controllers (ATCOs), other movements (actual and future) and known constraints. The principal information that is required to calculate/generate a taxi route is as follows:

- Current position (for airborne arrivals this will be the assigned landing runway);
- Intended position (destination); and
- Constraints (runway configuration, standard taxi routes, type of aircraft, pushback direction, priorities, time constraints, blocked taxiways, visibility conditions, de-icing procedures and

requirements, downlinked runway exits from aircraft equipped with Enhanced Braking System (EBS)[3] etc.).

In case route optimisation is used, the Routing and Planning functions will also take into account other movements.

This information can be typically provided by

- A-SMGCS (surveillance function);
- Flight Plan Data Processing system (FDPS)
- A-CDM platform
- Stand and Gate Management
- In the case of the vehicles by the driver via R/T
- De-icing Manager
- Enhanced Braking system via data link, if fitted on-board the aircraft
- Airport operations Plan (AOP) and
- DMAN

In the majority of the cases the route will be automatically planned in advance, in the case of arriving traffic prior to the landing or in the case of departing traffic before it leaves the stand. For this purpose, the planning and routing function needs the position and route of other mobiles that will be active while executing the planning route. Regarding the calculation of the taxi time there will be considered the length of the route, number of turns, optimization procedures and fixed parameters per taxiway segments.

The resolution of conflicting situations may lead to many route recalculations; to avoid this, the advanced surface routing is expected to have the capability to assess the severity of the conflict detected, by making two distinctions:

- Relevant conflicting situations would justify a route recalculation when a mobile blocks the movement of another mobile during an extended time period for which the calculated taxi time exceeds a given threshold
- Non severe conflicting situation encompass planning routes where there is a loss of separation between mobiles but without involving a blocking situation for an extended period of time and that would preferably be solved by the ground traffic controller in the tactical phase.

At any rate, the conflict detection and resolution is an advanced feature of this operational service, and is out of the scope of SESAR Solution #22.

The Degree of ATCO involvement in the route generation depends on the level of automation (operational environment). Due to workload reason, it is envisaged that the **automatic mode** will be used as default even if the change between the modes will be transparent for the controllers. However, the ATCO will be able to input a manual route in case of failure of the automatic calculation and shall always (i.e. regardless the level of automation) validate the planned taxi routes before it is provided to mobiles.

2.2.2 Provision of cleared route information to mobiles by voice (R/T)

In the future, an additional means of communicating taxi instructions will be via data link, for e.g. through the D-TAXI service for aircraft. However, **R/T communications shall remain for:**

- establishing first contact with the Flight Crew or Vehicle Driver for radio check;
- issuing runway clearances;
- issuing safety/time-critical communication;
- issuing emergency communication;
- mobiles not data link equipped; and
- data link failure.

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[3] Although EBS is considered in SESAR operational concept, any other means to downlink the expected runway exit is acceptable for the routing function.

From safety perspective, R/T communication has to be always considered as backup of Data Link service as well as means to establish the first contact between controllers and pilots/vehicle drivers. In such a way, controllers are always aware of the mobiles under their responsibility.

Besides, R/T communication has always to be kept as primary option for controllers in case of time-critical situations (such as deviations from cleared route) to establish a quick contact with mobiles in order to have an overview from on-board side.

When using R/T communication, the ATCO will verify that the planned route provided by the routing and planning service is acceptable and then transmit instructions to the Flight Crew/vehicle driver and input these guidance instructions into the ATC system. The A-SMGCS will then display the cleared route and any further part of the route not yet cleared (pending route) providing the ATCO a better situation awareness and allowing detecting any non-conformance to ATC procedures or instructions

2.2.3 Provision of planned and cleared route to mobiles by Data Link

From safety perspective, data link communications between Tower Controllers, Flight Crews and Vehicle Drivers enable displaying the messages exchanged as a text on HMIs and storing these messages as data into the ATC system. Therefore, it is expected a reduction of potential misunderstandings occurring via voice. At the same time, it is important to mention that one problem with data link communications is that the loss of the "party line" effect (i.e. aircraft on a common frequency can monitor all transmissions on that frequency with the opportunity to hear instructions to other pilots) would remove an important source of information for pilots about ATC environment. However, the party line could also be a source of errors by pilots who act on instructions directed to other aircraft. Therefore, the implementation of data link communications offers an additional channel and thus reduces the strain on busy airport frequencies. Information is delivered directly to its addressee and having it displayed on an HMI allows for more time to read and process it than with R/T, reducing the potential number of misunderstandings and errors.

Additionally for those aircraft and vehicle equipped with Cockpit and Vehicle Display Systems device will be able to display graphically the planned or cleared taxi route layer on top of the AMM base layer.

However, it is important to highlight that the definition of data link service for vehicles has not achieved the same maturity level as the one used for aircraft. Therefore, data link service for vehicles is recommended to be further investigated during SESAR 2020 horizon.

2.2.3.1 D-TAXI service

The baseline for the D-TAXI concept developments has been the standards developed by RTCA SC-214 [36] and EUROCAE WG-78 [37] to define the safety, performance and interoperability requirements for Air Traffic Services supported by data communications

A prerequisite for D-TAXI to be used at an airport is that the following services are in place:

▪ **Data Link Initiation Capabilities** (DLIC) enabling data link communication between ATC Ground and mobile systems. DLIC is initiated when the mobile wants to use Aeronautical Telecommunication Network (ATN) for communication purposes.
The DLIC service provides the log-on procedure to the ATN and exchanges the required application information. The DLIC process supports addressing requirements for Air Traffic Service Communication applications such as Controller Pilot[4] Data Link Communications (CPDLC)
  The DLIC supports the update of application information;
  The DLIC service propagates application information, implementing the contact procedure a given time before the centre exit;
▪ **ATC Communications Management** (ACM) service provides automated assistance to the Flight Crew or Vehicle Driver, current and next controllers for conducting the transfer of ATC communications. *Note: Only required if transfer of communication will be performed by data link.*

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[4] In this case Pilot indicates both Pilot and Vehicle drivers.

The D-TAXI service for aircraft consists of the following sub-services[5]

- **Departure Taxi Route Information** – information provided prior to departure on the expected taxi-out route as well as other departure information. In the future, Departure Taxi Route Information could be part of the Departure Clearance (DCL) as well.
- **Start-Up** – Approval for aircraft engine start-up as well as departure information.
- **Push-back** – Approval for aircraft push-back from a stand as well as departure information.
- **Taxi-Out** – Taxi route instructions for aircraft to taxi from a point on the airport to another point on the airport surface.
- **Arrival Taxi Route Information** – The expected arrival taxi route as well as other arrival information provided to Flight Crews while still in flight.
- **Taxi-In** – Taxi route instruction for aircraft to taxi from landing runway exit to another point on the airport, provided after clearing the landing runway.
- **Taxi Revision** – Change to any previously delivered taxi route.

The use of D-TAXI messages should not affect the operations at an airport especially concerning response times for taxi and revised taxi dialogue. In cases where this could be a factor the use of R/T should be preferred. At certain airports a limited set of messages could be implemented if other forms of guidance are in use (e.g. R/T or Follow the Greens). Detailed conclusions on the maturity level achieved by this SESAR Solution, notably for the different messages under validation in various environments, are provided in 06.03.01 Release 5 Validation Report.

When the D-TAXI service is implemented the Flight Crew will still be required to make first contact on each frequency by R/T to ensure that two-way contact is available by R/T in case it is required for operational purposes

In addition to the messages related to the D-TAXI service, the use of Contact message (of the ACM service) has been shown to be at V3 maturity level as instruction to flight crew to establish voice contact with the specified ATS unit on the specified frequency.

Whilst it is foreseen that initial taxi route information is given by data link, for safety reasons, it is also required to keep the option for using R/T in time critical or emergency situations (especially the taxi revision which often happens following a route deviation), in cases where data link is not serviceable and for giving clearances that concern entering a runway protection area (e.g. line up, take off, cross and enter).

The Data Link for Vehicles service is intended to cover the following two sub-services:

- **Proceed / Tow –** Instructions for vehicle drivers to proceed/tow from a point on the airport to another point on the airport surface.
- **Proceed / Tow Revision** – Change to any previously delivered route.

It is worthwhile to highlight that vehicles can move freely on the movement area, but access to some areas (e.g. runway, specific taxi) needs authorization from the ATCO. To have access to the limited areas, all vehicles must respect some specific points referred to the local procedures. For that reason the Data Link messages cited above will be used only in the limited areas.

As the listed D-TAXI services refer to the surface ground and approaching operations, the main actors involved in the corresponding operations are Flight Crew/vehicle driver, Tower Clearance Delivery Controller and Tower Ground Controller (or Apron at some airports). D-TAXI instructions are not provided once the aircraft leaves the departure holding point for the take-off runway.

2.2.4 Airfield Ground Lighting (AGL) Service

The AGL service provides individual guidance information to any mobile which has a cleared route. While other guidance services are partly or fully depending on on-board installations, guidance via AGL is purely a ground based service. However, all services (Routing & Planning Function, D-TAXI

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[5] Further messages are expected to be investigated during SESAR 2020 horizon.

clearance, CDS, VDS etc.) need to be synchronised to give either the Flight Crew or the Vehicle Driver the same route indication from any service.

Using individually switched AGL is one way to automate guidance instructions to mobiles which reduces R/T communication and thereby the stress level of ATCOs and the danger of misunderstandings and misinterpretations. The flight crew will move their aircraft corresponding to the guidance indicated by the AGL. The same applies to all other mobiles moving on the taxiway centre line, such as tow tugs, follow-me cars and other vehicles following a route provided by the A-SMGCS.

The workload resulting from delivering guidance information to Flight Crews or Vehicle Drivers will be minimized in the future. Most information can be sent to the corresponding receivers via data link.

The AGL Guidance Service comprises three sub-services called Centralised Service, Communication Service, and Ground Service. The Centralised Service is shared with all other means of guidance relying on centralised data, especially the CDS and VDS. In the following paragraphs the Centralised Service will be mainly described as it takes into account the AGL operational aspects. The other services (Communication and Ground Service) will be only cited because they are referring to the AGL technical part.

2.2.4.1 Centralised Service

The Centralised Service will automatically control the switchable AGL infrastructure in the field along the assigned route in order to guide each mobile based on

- the route as defined by the A-SMGCS Routing Service
- the cleared route (taxi instructions) issued by the ATCO via the HMI.

In situations where two or more mobiles are predicted to come into a conflicting situation the Centralised Service is expected to make individual guidance decisions by itself with the ATCO in the loop. Unless other specific rule apply or are defined, aircraft will be treated over vehicles and among the same group it will be "first come first served" to avoid hazardous situations.

The ATCO will monitor all the traffic in his/her Area of Responsibility via the CWP HMI. He/she will be responsible that all mobiles comply with the guidance provided via the AGL. The ATCO will be able to override the guidance decisions via the CWP HMI when it is deemed that there is an operational reason to do so.

When guidance is provided by Taxiway Centreline Lights (TCL), the AGL Service will automatically switch lamps individually or in small segments for each mobile along its cleared route. The view of the individual AGL illuminated in front of the mobile has a number of positive effects for the Flight Crews/Vehicle Drivers, such as:

- Increased awareness of the cleared route (for the concerned mobile and for other mobiles close by) and guidance instructions;
- Reduced possibility of misunderstanding;
- Increased free mental capacity for more important issues, (e.g. the safety of the movement).
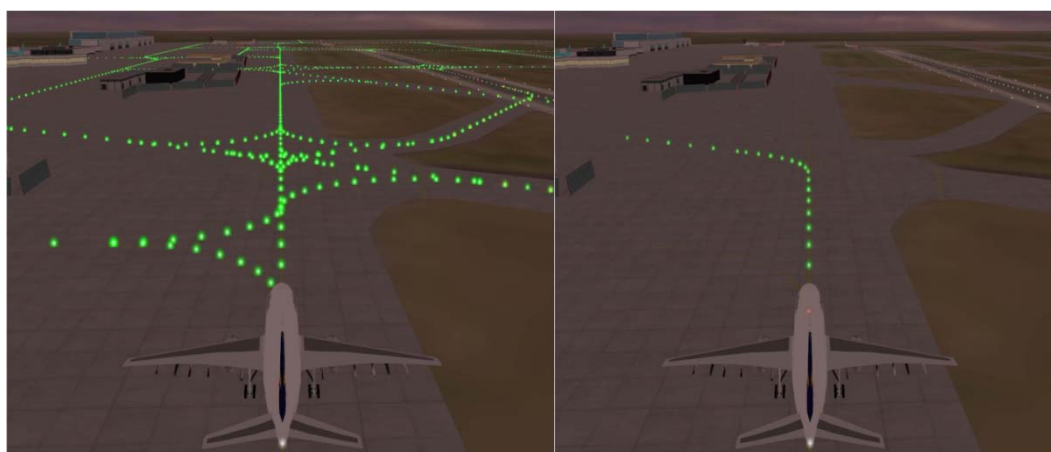
2.2.4.1.1.1.1   Figure 2: Static and Dynamic AGL

All in all the main tasks of the Centralised Service are to guarantee the necessary separation between two movements by switching the AGL accordingly and to solve possible conflicting situations in advance. For this purpose, the centralised service will be provided with all relevant information in order to be able to manage switching commands, such as awareness of the positions, clearances and previous instructions for all mobiles, as well as details on the aerodrome layout and possible constraints.

2.2.4.2 Ground Service

The Ground Service consists primarily of the switchable light infrastructure on the airport surface. For this operational document, the detailed description of the Ground Service in technical terms is out of scope. Further details on the technical issues, especially in terms of interoperability, can be found in OFA04.02.01 (Integrated Surface Management) Final INTEROP; D28- 06.07.03-;[51].

2.2.4.3 Communication Service

The sub-service Communication Service links the Centralised Service to the Ground Service. It provides a physical data link between the system components merging information and generating instructions and the lights in the field.

2.2.5 Virtual Block Control

Under low visibility conditions, VIS 3 conditions, the Block Spacing Control is applied to ensure the adequate spacing between succeeding aircraft. From safety perspective, both flight crews' and ATCOs' situational awareness are envisaged to be increased by displaying the VSBs on ground HMI and in the on-board AMM.

The implementation of a full Dynamic Virtual Block Control envisages two steps:

1. **Implementation of Virtual Block Control by means of Virtual Stop Bars** at pre-defined positions. This basic capability of the Virtual Block Control has been investigated during SESAR 1 timeframe and has achieved V3 maturity level.
2. **Implementation of Dynamic Virtual Block Control by means of Virtual Stop Bars** also NOT linked to any existing intermediate holding positions. This advanced capability of the Dynamic Virtual Block Control has not achieved V3 maturity level during SESAR 1 timeframe and, therefore, will be further investigated during SESAR 2020 horizon.

VSBs shall be displayed on the pilot and ATCO HMI with a different colour depending on their status. Anyway, as each virtual stop bar could be associated to two or more aircraft, it is recommended to display its status only once the aircraft is hooked in order to avoid any ambiguity for the controllers. The Watch Dog alerting functionality could be introduced with the scope of monitoring the compliance of aircraft to the instruction to hold position, ATCOs will have the chance to be alerted in case of VSB infringement with a positive impact on situational awareness and, therefore, on safety.
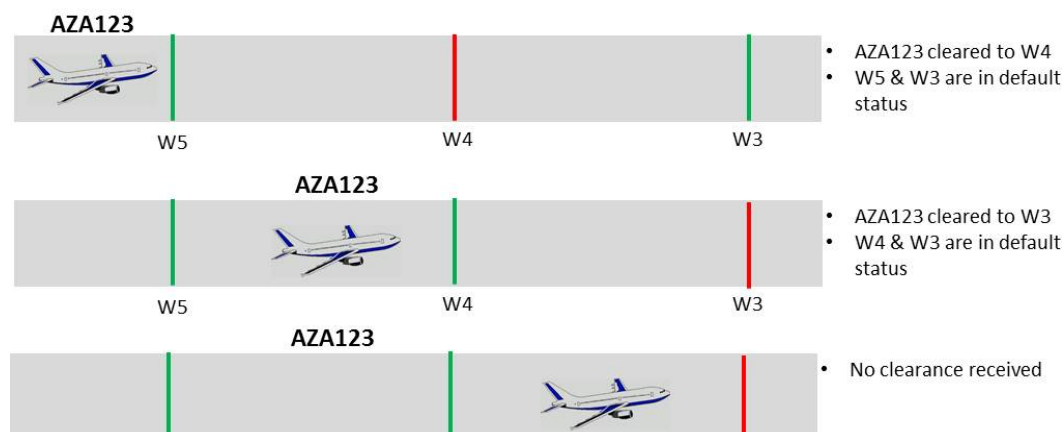
Figure 3: VSB status

2.3 Description of Operational Environment

The implementation of the A-SMGCS Routing and Planning and Guidance functions requires having the A-SMGCS Level 1 and 2 (according to the EUROCONTROL definition [28]) in operation at the airport. It means that the ATCO has a control function for all runways available which triggers a warning or an alarm in case of a runway incursion or a potential conflict.

Additionally, it is expected to have the Enhanced Braking System functionality available on some aircraft and therefore, the runway exit will be more predictable.

The following three different modes of routing automation will be applied:

1. Manual Mode: free route planning, without any assisting functionalities from the system;
2. Semi-Automatic Mode: free route planning, with assisting functionalities from the system to complete the route taking into account constraints such as restricted and construction areas; and
3. Automatic Mode: route proposal by the system taking into account information about aircraft type, taxiway rules, restricted and construction areas. Confirmation or modification by the ATCO will be possible. This will be the default mode, reverting to one of the others only when necessary.

The airport's ANSP is also expected to provide the technical means supporting at least one guidance system, individually controlled lamps on aprons and taxiways for AGL and/or a VHF link for data link communications covering the aerodrome. The airport should also be connected to the approach centre, and possibly to the regional ACC above it, in order to allow providing planned routes to arriving aircraft via CPDLC.

2.3.1 Route Generation Integrated with planning Information

2.3.1.1 Operational Characteristic

Operational characteristics with regard to the three routing and planning modes are detailed below.

Manual Mode: In this mode the ATCO takes into account the whole traffic situation at the airport and decides on a route without the help of the system. After the ATCO has decided for an appropriate route it is assigned by the ATCO using the system. The system supports the ATCO to input the route, taking into account this quite static stock information:

- Starting point for mobiles on the ground;
- Airport layout (taxiway infrastructure); and
- Position of intersections, holding bars and stop bars.

Semi-automatic Mode: In this mode the system works predominantly automatically but the ATCO takes major decisions. The ATCO will initially need the information defined above in the manual mode, and then the system will assist the ATCO to complete the route taking into account the same information as defined below for the automatic mode.

Route definition will be based on the following:

- manual input in segments, starting point & end point from the Airport Operational Data Base (AODB) or the FDPS;
- multiple nodes at one time (A to Z via F, K and Y);
- straight lines between nodes filled by the System;
- automatic check against limitations, constraints, etc.;
- no optimisation of routes or resolution of conflicts; and
- no routing/planning for vehicles (as they are handled manually).

Automatic Mode: In this mode the route proposal is provided by the system. Therefore the information as for manual mode and semi-manual mode needs to be considered as well as the following very dynamic information:

- weather (i.e. Low Visibility Procedures (LVP) in use or not, depending on local procedures; it must be discussed if LVP can be adjusted if an A-SMGCS with additional control, routing and guidance functionalities as defined in 06.07.xx is in operational use);

- runway in use;

- continuously up-to-date information about the position and identity of each mobile on the movement area and aircraft approaching to land;

- prioritisation rules for individual aircraft (State aircraft, emergency flight) and time restrictions (TSATs from A-CDM);

- areas of responsibility (AoRs) and intermediate/holding points[6] corresponding to the clearance limits where jurisdiction is to be handed over from one controller to another;

- stands requiring push-back and those which do not, as well as possible push-back or push-pull points for each stand (which may depend on aircraft type);

- engine run-up time and procedure;

- de-icing type (on position or remote) and allocated de-icing area in case of remote de-icing;

- taxi procedures (remote holding);

- constraints (e.g. taxiways/segments unsuitable for certain types of aircraft, one-way usage); and

- downlinked runway exits for EBS-equipped aircraft

A predicted taxi time is calculated based on taxi distance and speed taking into account variety in taxi speeds (different speeds can be assigned to individual portions of taxiway for calculation purposes). It cannot be neglected that there is a different taxi speed for each moving vehicle (which can even be zero). That results in variability where a mobile is at a given time compared to its position on the surface. Also, when de-icing conditions prevail, the predicted taxi time considers the expected de-icing time (in the case de-icing is required) provided by the De-icing Manager.

The Routing and Planning Service is a key component of airport systems that enables reaching a high level of predictability of operations on the airport surface. More generally, it is also a key component of SESAR ATM operations as a whole, because routes and taxi times calculated by the Routing and Planning Service contribute to establishing the Business Trajectories by providing their ground segments.

In addition, the Routing and Planning Service is an enabler for other services, including conformance monitoring alerts in case of route deviation (06.07.01), guidance of mobiles on their assigned routes, display of routes on board aircraft for improved flight crew situational awareness (09.13), and calculation of accurate departure sequences on the runway through coupling with DMAN (06.08.04).

For these reasons, it is foreseen that SESAR operations will rely significantly on the Routing and Planning Service, inducing continuity constraints on the systems implementing this service, which may imply redundancy and an architecture based on sub-services (route generator, interfaces with other systems) working independently of each other. Such a service-oriented architecture would enable ensuring the overall Routing and Planning Service in degraded mode in case of failure one sub-service.

2.3.1.2 Roles and responsibilities

2.3.1.2.1 ATCO (Tower Clearance Delivery, Tower Ground and Tower Runway Controller, Apron Manager)

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[6] A handover point between two Areas of Responsibility can be in the form of an Intermediate Holding Point or it can be a more loosely defined area.

Route planning and modification of the planned route by an ATCO is possible regardless of the areas of responsibility. Nevertheless, when the modification of the planned route is made outside of his area of responsibility, some coordination may be required with the affected ATCOs.

Route clearance and modification of the cleared route is only possible in the area of responsibility of the concerned ATCO. It implies that handover points (which can be a more loosely defined area than a point) and adequate coordination procedures are necessary to manage the cleared route when it goes through several areas of responsibility.

A defined route (manually or a confirmation of a route proposal maybe generated by a more sophisticated route generating module) different from defined standard routes/handover points may lead to increased workload and inefficient traffic flow. Nevertheless it could be necessary for one ATCO to contact his counterpart for work process optimisation.

Based on the operational situation and on the purpose for which a route is created, the ATCO may decide which level of automation is appropriate to him and might need to handover tasks to the A-SMGCS routing and planning function.

The ATCO also assigns routes for vehicles or towed aircraft if necessary (depending on local procedures). Upon receiving a request from a vehicle or a tug towing an aircraft, the ATCO responsible for the area in which the vehicle manually or semi-automatically creates a route for this vehicle if the request can be granted.

2.3.1.2.2 Flight Crew

A Flight Crew operating an arriving aircraft equipped with EBS will have activated this on-board function before Top Of Descent. This enables the aircraft to downlink a predicted runway exit to the A-SMGCS planning and routing function, which uses this information as the starting point for the automatically generated planned route.

It's important to highlight that, during outbound operation, the flight crew doesn't provide information to the Route Generation Integrated with planning Information service

2.3.1.2.3 Vehicle Driver

Depending on the local procedures, vehicle drivers have to request a route in certain situations, such as to obtain a clearance before crossing a runway. Similarly, drivers of tugs towing an aircraft need to request a clearance from ATC before initiating their movement. These requests prompt the ATCO to create a route for this movement.

2.3.1.2.4 Other Actors

Most data required by the A-SMGCS routing and planning function to generate planned routes are provided automatically by external systems, but are entered into the overall ATC and managed by human actors who therefore have a remote role in routing. These notably include:

- The airport layout used for building taxi paths on AMMs, and potentially by the route generator and the ATCO CWP, rely on Airport Mapping Data Bases (AMDB) which are constructed by AMDB providers using data published in the respective AIP;

- The taxiway preferred directions and the standard routes, which are the basic rules, used by the route generator are defined by the Airport Air Traffic Services;

- The runway and taxiway configuration in use for the time the planned route is generated, as well as any runway or taxiway closures, are decided by the Airport Tower Supervisor;

- The aircraft type, which can restrict the taxiways usable for the aircraft, is provided by the Aircraft Operator in the flight plan;

- The allocated stand corresponding to the end point of the route for arriving aircraft and to the starting point of the route for departing aircraft is defined by the airport Stand Planner;

- When de-icing is required, the time needed to de-ice the aircraft and the bay allocated to the aircraft (in case of remote de-icing) are provided by the De-icing Agent;

The timing information related to a flight is provided by the airport's CDM platform, which is under the responsibility of the <u>CDM Project Manager.</u>

2.3.1.2.5 Constraints

For all three automation modes links to an AODB and to available surveillance data (including airport map information e.g. constraints, restricted, construction area) are necessary. The quantity of information used for the three modes is different and depends on the level of automation and how to assist the ATCO in an appropriate way:

The section below defines the information which is necessary independently from the used mode:

- Time stamps, e.g. Actual Off Block Time (AOBT) for trajectory update (source AODB/FDPS/Information sharing platform);
- Availability of an accurate airport map to be displayed on the ATCO HMI;
- Possibility to generate a route and display it on the map of the HMI;
- Communication interface to send route information to partner systems; and
- Standard ground movement procedures

The section below defines the information which is additionally necessary for the different modes. The next mode always comprises the information of the predecessor mode:

1. Manual Mode:
   - No additional information is necessary.
2. Semi-Automatic Mode:
   - Information about constraint, restricted and construction areas.
3. Automatic Mode:
   - Runway in use;
   - Weather (i.e. Low Visibility Procedures in use or not);
   - Stand/Runway (Outbound);
   - Runway/Stand (Inbound);
   - Continuously up-to-date information about the position and identity of each mobile on the movement area and aircraft approaching to land;
   - Prioritisation rules for individual aircraft (State aircraft, emergency flight) and time restrictions (TSATs from A-CDM);
   - Areas of responsibility and intermediate/holding corresponding to the clearance limits where jurisdiction is to be handed over from one controller to another;
   - Stands requiring push-back and those which do not, as well as possible push-back or push-pull points for each stand (which may depend on aircraft type);
   - Engine run up time and procedure;
   - De-icing type (on position or remote) and allocated de-icing area in case of remote de-icing;
   - Taxi procedures (remote holding);
   - Constraints (e.g. taxiways/segments unsuitable for certain types of aircraft, one-way usage);
   - Downlinked runway exits for EBS-equipped aircraft;
   - Expected de-icing time from the De-icing Manager; and
   - Estimated taxi speeds per taxiway segment (different speeds can be assigned to individual portions of taxiway for taxi time calculation purposes)

The overall system must be capable to analyse all processes/modules, e.g. interface to the surveillance data or AODB to warn the ATCO/technical support if a technical failure lead to a loss of functions. In such a case it might be necessary to downgrade the system/initiate fall back procedures.

A surveillance data integrity monitoring has to check the quality of the A-SMGCS surveillance functionality, e.g. coverage, accuracy and compare it to defined quality boundaries, so the ATCO may be warned of system corruption which might be more critical than a module breakdown when the trust of the ATCO to the system is high.

Due to the need of routing updates according to the actual traffic situation at the airport, an interface to the multi-sensor data fusion is needed.

2.3.2 Provision of Cleared Route to Mobiles by voice (R/T)

2.3.2.1 Operational Characteristic

A flight due to depart from an airport, or an aircraft that has just landed, must obtain instructions from ATC in order to proceed from/to its stand to/from the runway or between any two points on the airport surface.

R/T communications will be used for establishing first contact with the Flight Crew or Vehicle Driver and in other cases such as: mobiles not data linked equipped, data link failure, runway clearances, time-critical communication or emergency situations.

R/T should also be preferred to D-TAXI for the provision of taxi-in/-out/revised clearances at airports where slower exchanges between Tower Controllers and Flight Crews would create an operational issue.

2.3.2.2 Roles and Responsibilities

2.3.2.2.1 ATCO (Apron Manager, Tower Ground Controller and Runway Controller)

When a mobile is ready to start its movement on the aerodrome surface, the ATCO checks on his CWP whether the planned route defined for this mobile corresponds to the movement he intends for this mobile.

In case a change to this planned route is required, the ATCO inputs a new route using the A-SMGCS routing and planning function on his CWP.

Once the correct route is entered into the A-SMGCS, the ATCO provides the corresponding clearance to the Flight Crew or Vehicle Driver via R/T, and updates the electronic flight strip of this mobile to indicate it has received a taxi clearance. It is the ATCO's responsibility to maintain the status of the flight strips consistent with the clearances given via R/T, as inconsistencies may lead to undesired alerts triggered by the Surface Safety Nets Conformance Monitoring function.

2.3.2.2.2 Flight Crew

After having read back the taxi instruction received from ATC, the Flight Crew is responsible for verifying the route and crosschecking it against airport maps (either on paper or in electronic format) they have on board. If the aircraft is equipped with a manual taxi route function, the Flight Crew inputs the taxi clearance into the aircraft system.

In case they cannot comply with the route provided by the ATCO (e.g. for technical reasons), they inform the ATCO via R/T and request a new taxi route.

After having received a clearance they can comply with, the Flight Crew steers their aircraft along the route provided by the ATCO.

2.3.2.2.3 Vehicle Driver

After having read back the taxi instruction received from ATC, the Vehicle Driver is responsible for verifying the route and crosschecking it against airport maps (either on paper or in electronic format) he has on board.

In case he cannot comply with the route provided by the ATCO (e.g. for technical reasons), he informs the ATCO via R/T and requests a new taxi route.

After having received a clearance he can comply with, the Vehicle Driver steers his vehicle along the route provided by the ATCO.

2.3.2.2.4 Constraints

The provision of cleared route to mobiles by R/T is identical to today operations in electronic environment and no new constraint results from its use in SESAR surface management concept.

2.3.3 Provision of Planned and Cleared Route to Mobiles by Data Link

2.3.3.1 Operational Characteristic

The guidance service supported by data link provides electronic communications between the Flight Crew, Vehicle Driver and Air Traffic Service Operations during ground operations, and before the aircraft is approaching the airport.

The list of the basic taxi operations doesn't include any operation occurring close / on runways as they have been confirmed to be handled via voice.

The taxi route received by D-TAXI is automatically displayed as text on the cockpit's Data Link Cockpit Display Unit (DCDU) and as a graphical path on the AMM. Through the manual taxi routing function, the Flight Crew can still input a taxi route received by R/T into the aircraft system and have it graphically displayed on the AMM, typically at larger airports where such clearances are recommended to be provided by R/T.

Regarding vehicles operations, it is important to highlight that the provision of instructions / clearances via data link (PROCEED/TOW instructions and revised PROCEED/TOW are the ones investigated so far) is not standardized yet as for aircraft. Therefore, the implementation of data link for vehicles requires further investigations which are recommended to be carried out during SESAR 2020 horizon.

2.3.3.2 Roles and Responsibilities

This section details roles and responsibilities for each actor involved in the management of data link communications. In detail, the main actors are Flight Crew (aircraft) and Vehicle Driver (vehicle) from on-board side, Tower Clearance Delivery and Tower Ground Controllers from ATC side. They all are active actors in the electronic dialogue associated with data link communications. Initiation of dialogues is either the responsibility of the Flight Crew or the Vehicle Driver or Tower Clearance Delivery / Ground controller.

Focusing on the implementation of D-TAXI service, it is important to highlight that the provision of both expected taxi-in and taxi-out routing information will be automatically provided by the ATC system upon Flight Crew request. For the departing aircraft equipped with data link, the expected taxi-out routing information could be automatically sent as appendix to the departure clearance.

2.3.3.2.1 ATCO (Apron Manager, Tower Clearance Delivery / Ground Controller)

From ATC side, the provision of planned and cleared route to mobiles by data link requires that the ATCO shall issue all the implemented messages by making an input on the CWP. About the taxi instruction, when a mobile is ready to start its movement on the aerodrome surface, the ATCO checks on his CWP whether the planned route defined for this mobile corresponds to the movement he intends for this mobile. In case a change to this planned route is required, the ATCO inputs a new route using the A-SMGCS routing and planning function on his CWP. Once the correct route is entered into the A-SMGCS, the ATCO inputs a taxi clearance on the electronic flight strip associated to the concerned mobile. This automatically generates a data link message that is uplinked to the mobile.

For all the issued instructions / clearances, the ATCO shall, then, monitor the status of that communication to check the reply provided from Flight Crew.

It is important to highlight that the implementation of data link service is not expected to impact on the responsibilities of the Tower Runway Controller who will manage the traffic via voice based on the current procedures. All the time critical instructions including the ones concerning surface movements close to runways shall be handled via R/T..

2.3.3.2.2 Flight Crew

The Flight Crew is responsible for verifying the route and crosschecking it against airport maps (either on paper or in electronic format) they have on board. If they agree with the route provided by the ATCO, they acknowledge it by composing a WILCO (or ROGER in the case of a planned route) message and sending it to the ATCO.

In case they cannot comply with the route provided by the ATCO (e.g. for technical reasons), they inform the ATCO by composing an UNABLE message, possibly specifying the reason, and sending it to the ATCO.

After having received a clearance they can comply with, the Flight Crew steers their aircraft along the route provided by the ATCO.

2.3.3.2.3 Vehicle Driver

The Vehicle Driver is responsible for verifying the route and crosschecking it against airport maps (either on paper or in electronic format) he has on board. If he agrees with the route provided by the ATCO, he acknowledges it by composing a WILCO message and sending it to the ATCO.

In case he cannot comply with the route provided by the ATCO (e.g. for technical reasons), he informs the ATCO by composing an UNABLE message and sending it to the ATCO.

After having received a clearance he can comply with, the Vehicle Driver steers his vehicle along the route provided by the ATCO.

2.3.3.2.4 Constraints

The constraints mentioned in this section refer to the elements composing both Ground and On-board domains.

The D-TAXI ground domain includes the D-TAXI ATSU system, the Tower Clearance and Ground controllers (and Apron at some airports) and associated HMIs, a processing function for D-TAXI messages, and a connection with the ground communication network.

The D-TAXI Aircraft domain includes Flight Crew, HMI and aircraft system, consisting of a connection with the air-ground communications network, various aircraft subsystems and a processing function for the messages exchanges, requests, and responses.

The same considerations can be done also for the implementation of data link service for vehicles. In detail, that data link for vehicles domain includes Vehicle Driver, HMI and vehicle system, consisting of a connection with the ground communications network, various vehicle subsystems, and a processing function for the message exchanges, requests, and responses. In addition, it is important to highlight the operational constraint represented by the absence of official standardization. That's why it is strongly recommended to establish a close coordination with the concerned standardization bodies RTCA SC-214 / EUROCAE WG-78.

In case the aircraft is equipped with an AMM able to display the taxi route received by D-TAXI, interoperability of ground and aircraft systems is required to prevent the risk of incorrect translation of the ATCO's clearance onto the aircraft's AMM. Even though the taxi path displayed on the AMM is only intended to improve the flight crew's situational awareness and is not legally the taxi clearance provided by the ATCO, any discrepancy between the taxi path on the AMM and the taxi clearance would be a source of confusion, if not a safety issue. This can be mitigated by the use of AMDBs by both ground and cockpit systems, which will ensure that the information they exchanged is structured in the same manner, even though it would not guarantee it is identical.

2.3.4 Airfield Ground Lighting (AGL)

2.3.4.1 Operational Characteristic

In the future, individual guidance via AGL is expected to be used on a 24/7 basis in all weather conditions.

The implementation of individual guidance via AGL will have an impact on the roles and responsibilities involved in providing guidance as well as on the roles receiving the instructions.

In principle, wherever individual guidance via AGL will be implemented, the standard operational procedures for taxi-in and taxi-out will be based on controlled lighting systems. Therefore, the whole integrated guidance network needs to be constructed with sufficient technical and procedural redundancy that guarantees high availability and reliability.

In order to avoid operational limitations due to the use of AGL, the selection process of the end devices, e.g. the TCLs, shall always take the climatologic environment and typical lighting conditions of the specific aerodrome into account. It can be assumed that accumulating AGL guidance service degradations will not be acceptable in terms of business case calculation and future resource planning.

In principle, individual guidance via AGL reduces ATCO workload, but increases the dependence of the airport process on the availability of a complex Operational and technical system.

2.3.4.2 Roles and Responsibilities

2.3.4.2.1 ATCO (Tower Ground Controller, Tower Runway Controller)

The Tower Ground and Tower Runway Controllers are responsible for monitoring that all movements on the manoeuvring area comply with the clearances issued.

In case an aircraft deviates from the route indicated by the AGL, the controller has to inform the Flight Crew immediately by R/T communication as an additional safety net accompanying the reaction of the guidance network. Related information may also be provided to the other mobiles involved, if applicable.

Depending on the selected decision-making mode available in the Centralised Service, the controller will have to enter, accept, or monitor guidance instructions with the ultimate possibility to take influence whenever needed.

In case of AGL service degradation, the controller is responsible for taking appropriate action.

2.3.4.2.2 Flight Crew

Flight Crews are responsible for following the cleared taxi route indicated by the AGL and the guidance function shall provide reliable and intuitive information to the pilots to support their navigation accordingly. Previous research projects have identified switchable TCLs to be a very effective way to provide guidance on the airport surface. Whenever AGL is used in combination with other guidance means (e.g. CDS), Flight Crews identified coherence and synchrony of the information major requirements.

2.3.4.2.3 Vehicle Driver

For the description of the role and responsibilities of vehicle drivers, a differentiation between different vehicle classes is inevitable:

- **TOW TUG DRIVERS:**
  Tow tug drivers will be guided via AGL when they are actively towing an aircraft on the airport surface. In short, they are guided via AGL whenever they are moving on a taxiway centre line.
  The tow tug driver is responsible to follow the guidance information provided via AGL. They are also responsible for indicating any inability to act according to received AGL instructions.
- **FOLLOW-ME CAR DRIVERS:**
  Follow-me car drivers will be guided via AGL when guiding an aircraft or a vehicle on the taxiway centre line.
  The driver is responsible to follow the guidance information provided via AGL. Drivers are also responsible for indicating any inability to act according to received AGL instructions.
- **AIRPORT OPERATIONS SERVICE VEHICLES**
  Service vehicles will only be guided via AGL in LVP and when intentionally and unavoidably (for their specific task) operating on the taxiway centre line.
  The driver is responsible to follow the guidance information provided via AGL. Drivers are also responsible for indicating any inability to act according to received AGL instruction.
- **FIRE SERVICE VEHICLES**

In LVP and in complex traffic situations, individual guidance via AGL may help the fire service to identify the shortest way to the incident area. The use of AGL for this purpose is subject to local procedures.

2.3.4.2.4 Constraints

No general technical constraints potentially rendering the AGL unavailable or inoperable are currently known. Some problems known in the past are now solved, e.g. the issue of snow coverage of TCLs.

Operational constraints may arise from the absence of official phraseology and standardization. Depending on the lamp technology used at a specific airport (LEDs or halogen lights), an incompatibility of the TCLs to the EVS may occur: LEDs emit cold light, while the EVS technology needs high temperature lights for the vision sensors. This constraint can be solved with the additional installation of an IR emitter.

2.3.5 Virtual Block Control

2.3.5.1 Operational Characteristic

Virtual Block Control by means of Virtual Stop Bars (VSBs) is expected to be performed during Visibility Condition 3.

Regarding the airport surface, no great changes are envisaged as:

- the VBS_{IHP} are linked to intermediate holding positions which are already reported (through surface markings and visual aids) on the airport surface;
- the VSB_{NIHP} are NOT linked to any intermediate holding positions already existing on the airport surface. With regard to them, no extra ground infrastructures / equipment is needed.

The introduction of the VSB_{NIHP} has an impact on airborne side, as they could be issued only to the data link equipped aircraft with an Airport Moving Map (AMM) available on-board. However, the availability of an on-board Airport Moving Map is considered useful also when only VBS_{IHP} are used as it will allow an increase of flight crew's situational awareness.

2.3.5.2 Roles and Responsibilities

2.3.5.2.1 ATCO (Tower Ground Controller)

During visibility conditions 3, a virtual procedural block control is implemented under the main responsibility of the Tower Ground Controller which issues a taxi clearance including a clearance limit corresponding to a specific VSB. In detail:

- VSB_{IHP} – Tower Ground Controller can change the status of the VSB directly on the HMI. The corresponding clearance limit is communicated to the flight crew via voice;
- VSB_{NIHP} – Tower Ground Controller inputs it into the ground HMI. Its position and current status (according to the ATCO's clearance) is automatically sent to the on-board AMM. The corresponding clearance limit is communicated to the flight crew via voice or via data link.

Therefore, Tower Ground Controller is responsible for providing the appropriate spacing by monitoring that each block is occupied by only one aircraft.

2.3.5.2.2 Flight Crew

Flight crews are responsible to adhere to the assigned taxi clearances. In particular, referring to aircraft equipped with an AMM, flight crews shall check the coherence of the received instructions and the VSBs status on AMM.

2.3.5.2.3 Constraints

The main technical constraint that is impacting the full implementation and efficiency gain of the virtual block control is the availability of an on-board moving map displaying both VBS_{IHP} and VSB_{NIHP} .

The future possibility to have the majority of the aircraft suitably equipped together with the use of ASMGCS surveillance to replace ATCO visual observation will provide the maximum benefit.

3   Requirements

This section collects all the safety and performance requirements derived from the assessment illustrated in the Appendix A. The requirements identifiers are set accordingly to the rules defined in the Requirements and V&V Guidelines document [2].

Some of the requirements contain values for probabilities, reaction times and distances. It should be emphasised here that in general these values are roughly estimated.

Based on the documents RTCA SC-214 [36] and [37] of EUROCAE WG-78 safety and performance requirements has been derived. These EUROCAE documents are the baseline for this SESAR SPR document. The 06.07.03 project follows these SC-214/WG78 activities to ensure that SESAR met operational benefits in terms of safety and performance.

Both safety and performance requirements are allocated to the operational services identified in the P06.07.02 - D46 OFA04.02.01 Final OSED [35]. However, regarding this aspect it is important to highlight that no services are currently listed in the P06.02 Airport DOD. Therefore, the following subservices have been defined by the OFA04.02.01 concerning the Routing and Planning and Guidance service:

- Route generation integrated with planning information including:
  - ATCO HMI requirements;
  - Route Optimisation requirements
- Provision of Cleared Route to Mobiles by Voice (R/T),
- Provision of planned and cleared route to mobiles by Data Link
- Airfield Ground Lighting (AGL) Service
- Virtual Block Control (VBC) by means of Virtual Stop Bars (VSB) in low visibility conditions

Identifiers of former operational requirements from 06.07.02, 06.07.03 and 06.08.07 have been adapted to suit the numbering scheme adopted in this OFA SPR.

Furthermore, requirements concerning the watch dog functionality of the VBC service are not traced to any OSED requirement as they could represent an input for further elaboration of the VSB related operational concept during SESAR 2020 horizon.

3.1   Requirements for Route generation integrated with planning information service

3.1.1   Safety Requirements for Route generation integrated with planning information service

[REQ]

Identifier	REQ-06.07.02-SPR-0001.0010
Requirement	The status of the A-SMGCS Routing and Planning function shall be continuously monitored.
Title	Connection with the supervision function
Status	<Validated>
Rationale	Continuous monitoring of the A-SMGCS Routing and Planning function status allows detecting any possible failure (partial or total loss).
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGHM.0014	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0017	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

| <ALLOCATED_TO> | <Functional block> | Surface Routing | N/A |

[REQ]

Identifier	REQ-06.07.02-SPR-0001.0020
Requirement	A failure (partial or total loss) of the A-SMGCS Routing and Planning function shall be properly notified on the Controller HMI.
Title	Alert notification on the controller HMI
Status	<In Progress>
Rationale	The alert will be useful to notify the failure of the A-SMGCS Routing and Planning function to the controller who has to apply the foreseen backup procedures
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGHM.0014	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0001.0040
Requirement	The A-SMGCS Routing and Planning function shall allow reverting to backup procedures
Title	Revert to backup procedures
Status	<Validated>
Rationale	Reverting to backup procedures will allow limiting the operational effects of the hazard.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGHM.0002	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0001.0050
Requirement	The A-SMGCS Routing and Planning function shall allow manual intervention by the control authority at any time
Title	Manual intervention
Status	<Validated>
Rationale	Manual Intervention during Automatic Operation has to be permitted at any time to facilitate an increase in the safety level
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGHM.0002	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	<Partial>
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0001.0060
Requirement	Tower Controllers shall be properly trained to familiarize with all capabilities of the A-SMGCS Routing and Planning function (e.g. evaluate parameters and modify and create new manually planned routes)
Title	Tower Controllers training: A-SMGCS Routing and Planning function capabilities
Status	<Validated>
Rationale	Proper training sessions will ensure that the controllers involved have an effective knowledge of the A-SMGCS Routing and Planning function resulting in an increase in the safety level
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGTR.0001	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0001.0070
Requirement	Tower Controllers shall be trained to properly interact with the HMI objects related to the A-SMGCS Routing and Planning function
Title	Tower Controllers training: HMI interactions
Status	<Validated>
Rationale	Training sessions focusing on the interactions with the HMI will allow the controllers to acquire a complete knowledge of all the procedures required to perform the manual tasks.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGTR.0001	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0001.0080
Requirement	ATCOs Coordination procedures shall be established for planned routes that require transferring taxiing a/c between two areas of responsibility
Title	A/C taxi transfer
Status	<Validated>
Rationale	Establishment of proper controller coordination procedures will allow taxiing aircraft to be safely transferred between different areas of responsibility.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGGE.0009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGGE.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGGE.0011	<Partial>

<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0001.0090
Requirement	The A-SMGCS Routing and Planning function shall warn the operator in case manual route update overrides aerodrome layout rules
Title	Rules override warning
Status	<Validated>
Rationale	Provision of specific warning in case manual route update overrides aerodrome layout rules will support the controllers to build a reliable picture about ground surface movements.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGED.0008	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0001.0091
Requirement	The A-SMGCS Routing and Planning function may ask the operator for validation and responsibility acceptance for accepting the proposed override within a two steps process (override input and override acceptance)
Title	Rules override validation
Status	<Validated>
Rationale	Double acknowledgment in case of overriding airport layout rules will allow checking that the controller is full aware/responsible of his/her decision.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGED.0008	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0001.0110
Requirement	All the planned taxi routes proposed by the Routing and Planning service shall be aligned with the actual operational situation described by current and scheduled operational constraints.
Title	Actual operational situation
Status	<Validated>
Rationale	For safety reasons, it is important to take into account the actual operational situation (e.g. runway configuration/stand change, taxiway closure)
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGGE.0019	<Partial>

<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGAU.0020	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

Table 2: Safety Requirements capture

3.1.2 Performance Requirements for Route generation integrated with planning information service

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0010
Requirement	Manual input format by ATCO and other authorized users to the A-SMGCS Routing and Planning function shall follow common standards as defined by ICAO and EUROCAE.
Title	Input format
Status	<Validated>
Rationale	Manual input by ATCO shall be simple and intuitive to use and follow a common standard.
Category	<Performance>
Validation Method	<Fast Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGED.0009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGED.0016	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGED.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGED.0013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGAR.0003	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0002.0001	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0020
Requirement	Only ATCO and authorised users shall be able to manually input data to the A-SMGCS Routing and Planning function
Title	Input data personnel
Status	<Validated>
Rationale	Data shall be inputted only by authorised users to mitigate the probability human errors and the related consequences.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGGE.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGHM.0008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGHM.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGAU.0020	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0001	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0002	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0030
Requirement	Automated controls of data shall be implemented in input data cells validating data format and range
Title	Input data validation tools

Status	<Validated>
Rationale	Data shall be validated in format and range to prevent human errors.
Category	<Performance>
Validation Method	<Fast Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGHM.0008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGHM.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGAU.0020	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0001	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0002	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0003	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0004	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0005	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0006	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0007	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0008	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0009	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0010	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0011	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0012	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0013	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0040
Requirement	Manually input data shall include a source identifier
Title	Input data identifier
Status	<In Progress>
Rationale	Input data shall be identified with its source to provide a better control of controller's work and be capable to predict further conflicts it may incur into.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0001	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0002	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0003	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0004	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0005	<Partial>

<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0006	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0007	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0008	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0009	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0010	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0011	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0012	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0013	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0050
Requirement	The Routing and Planning function shall recalculate routes upon receiving an update in a surface constraint
Title	Surface constraints update
Status	<Validated>
Rationale	Reaction time in front of an unexpected surface constraint is critical for a correct and agile update of the planned routes. The different modes of operation (automatic, semi-automatic, or manual) may behave differently.
Category	<Performance>
Validation Method	<Fast Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGGE.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGGE.0019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGGE.0015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGAU.0020	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0180
Requirement	The A-SMGCS Routing and Planning function shall be able to recalculate and update a planned route in less than 0.5 seconds
Title	Route recalculation
Status	<Validated>
Rationale	The ATCO needs the rapid the reaction of the function. Parameters used in validations varied under 0,5 seconds
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGGE.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGAU.0016	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGAU.0020	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0002.0001	<Partial>

<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0250
Requirement	The A-SMGCS Routing and Planning function shall recognise the tow truck and the a/c as a single unit from the moment they are coupled.
Title	A/C –tow truck coupling
Status	<Validated>
Rationale	It will reduce the amount of vehicles on ground identified by the A-SMGCS Routing and Planning function and thus the amount of calculated routes.
Category	<Performance>
Validation Method	<Fast Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGGE.0016	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0270
Requirement	Both the taxi distances and taxi times achieved by manually readjusted routes, as well as the system taxi distances and taxi times shall be recorded.
Title	Post-flight taxi comparison
Status	<In Progress>
Rationale	It will provide the ability to perform analytical calculations regarding the most important metrics defining the routing problem (taxi time and taxi distance).
Category	<Performance>
Validation Method	<Fast Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGGE.0022	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGIN.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.08.04-OSED-2010.0050	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0310
Requirement	The required time to perform a recalculation of the planned route of the mobile and its effect on all the other mobiles shall not exceed 0.5 seconds
Title	Time processing
Status	<Validated>
Rationale	Time Processing relates to the required time to perform a recalculation of the planned route of the mobile and its effect on all the other mobiles upon reception of a new start point, end point, TOBT, TLDT, a new constraint, a new focus area or the rejection by the ATCO of a certain planned route. Parameters used in validations varied under 0,5 seconds
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGAU.0019	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0320
Requirement	The Route Generation Integrated With Planning Information service shall be available at least a <percentage parameter[7] to be defined [%] > of the time
Title	Availability of the Route Generation Integrated With Planning Information service
Status	<In Progress>
Rationale	This is an indication of the ability of the system to provide usable service. Availability is expressed in terms of the probability of the system being available at the beginning of the intended operation.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGAU.0001	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0330
Requirement	The probability of an integrity failure of the Route Generation Integrated With Planning Information service shall not exceed <probability parameter[8] to be defined>
Title	Integrity of the Route Generation Integrated With Planning Information service
Status	<In Progress>
Rationale	A minimum probability of an integrity failure of the service guarantees a safe and reliable running of the system and builds the user's confidence in the service.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGAU.0001	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0340
Requirement	The Route Generation Integrated With Planning Information service shall be able to handle all the planned routes even if the movement area reaches its capacity limit.

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[7] Ad hoc percentage interval is expected to be defined in the next iteration of the SPR.
[8] Ad hoc probability interval is expected to be defined in the next iteration of the SPR.

Title	Capacity limit of the Provision of Routing Information to mobiles service
Status	<In Progress>
Rationale	Capacity relates to the maximum numbers of aircraft for which all the service performance parameters can be provided. Capacity will depend upon the particular environment characteristics (i.e. traffic densities, area of coverage required).
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGAU.0001	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

Table 3: Performance Requirements capture

3.2 Requirements for Provision of Cleared Route to Mobiles by voice (R/T)

3.2.1 Safety Requirements for Provision of Cleared Route to Mobiles by voice (R/T)

[REQ]

Identifier	REQ-06.07.02-SPR-CLRT.0001
Requirement	In R/T environment, the ATCO shall be able to input into the system each issued instruction / clearance.
Title	Entering of Instructions
Status	<Validated>
Rationale	In order to ensure controllers work with the updated system according to the issued clearances / instructions.
Category	<Safety>
Validation Method	<Live Trial>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0014	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0016	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-CLRT.0002
Requirement	EFS status[9] of mobiles shall be the same as the respective clearances / instructions provided by ATCOs.
Title	EFS status aligned with ATCO clearance
Status	<Validated>
Rationale	In order to avoid discrepancies between mobiles operations and their status displayed on the EFS.
Category	<Safety>
Validation Method	<Live Trial>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0014	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0016	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-CLRT.0003
Requirement	In case of discrepancies between mobiles operations and their status on the EFS, the ATCO should be notified through an alert displayed on the HMI.
Title	Discrepancies between mobiles operation and mobiles status
Status	<Validated>
Rationale	In order to notify the hazard to the controllers.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0006	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

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[9] The EFS status indicates the current status of the flight according to the clearances / instructions issued by ATCOs.

Identifier	REQ-06.07.02-SPR-CLRT.0004
Requirement	The ATCO shall be able to see the clearances / instructions inputted into the system on the EFS.
Title	Clearances on the EFS
Status	<Validated>
Rationale	In order to be always aware of the current mobiles status.
Category	<Safety>
Validation Method	<Live Trial>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0006	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-CLRT.0005
Requirement	When operating via voice, the ATCO shall be able to input into the EFS system only the clearances / instructions following current mobiles status.
Title	Entering of instructions following current mobile status – R/T operations
Status	<Validated>
Rationale	In order to avoid that the ATCOs could input wrong clearances / instructions (e.g. the ATCO cannot input a taxi-out instruction before push-back)
Category	<Safety>
Validation Method	<Live Trial>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0014	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0016	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-CLRT.0006
Requirement	In case ATCO inputs a wrong clearance/instruction for a mobile respect to its status, the ATCO should be notified through an alert displayed on the HMI.

Title	Discrepancies between clearance/instructions and mobiles status
Status	<In Progress>
Rationale	In order to notify the hazard to the controllers.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0006	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

3.2.2 Performance Requirement for Provision of Cleared Route to Mobiles by voice (R/T)

[REQ]

Identifier	REQ-06.07.02-SPR-CLRT.0008
Requirement	EFS transition time from a status to another one shall be less than 0.1 sec
Title	EFS transition time
Status	<Validated>
Rationale	To ensure real time coherency between EFS status and the clearances issued
Category	<Performance>
Validation Method	<Live Trial>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0006	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-CLRT.0007
Requirement	The probability that the EFS system doesn't update its status after controllers input shall be less than <percentage parameter to be defined>
Title	EFS response probability
Status	<In Progress>
Rationale	To be sure that the Electronic Flight Strips are always and timely aligned with the clearances issued by the controllers.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0001	<Partial>

<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0006	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

3.3 Requirements for Provision of planned and cleared route to mobiles by data link

Based on the documents RTCA SC-214 [36] and [37] of EUROCAE WG-78 the following safety and performance requirements has been derived. EUROCAE WG-78 develops standards to define the safety, performance and interoperability requirements for Air Traffic Services supported by data communications. These EUROCAE documents are the baseline for this SESAR SPR document. The 06.07.03 project follows these SC-214/WG78 activities to ensure that SESAR met operational benefits in terms of safety and performance.

Requirements in this section cover three different SESAR Solutions, which are presented together in a single operational service as they all relate to communications between Tower Controllers, Flight Crews and Vehicle Drivers, and are thus strongly linked from an operational perspective. These Solutions are:

- D-TAXI application for CPDLC service (#23);
- Manual taxi routing (#26); and
- Improved vehicle guidance.

3.3.1 Safety Requirements for Provision of planned and cleared route to mobiles by data link

Some of the following requirements come from EUROCAE WG 78 [36],[37].

It is worth noting that EUROCAE WG78 doesn't define datalink messages for vehicle system.

3.3.1.1 Aircraft-related requirements

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0024
Requirement	The ATCO shall input in the HMI ground system the clearances given to the aircraft to start-up, push-back, taxi-out, taxi-in
Title	Entering of Static and Initial Taxi Clearances
Status	<Validated>
Rationale	To avoid hazardous situation. To operate D-TAXI start-up, push-back, taxi-out, taxi-in requests
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0010	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0003
Requirement	The ATCO shall be able to provide to the HMI ground system the aircraft information relative to the assigned Runway and the holding point.
Title	Providing aircraft information
Status	<Validated>
Rationale	To avoid hazardous situation. To provide aircraft information regarding the Runway and holding point
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0007	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0006
Requirement	The D-TAXI system shall inform the ATCO when clearances are successfully received
Title	Clearance was sent successfully
Status	<Validated>
Rationale	To avoid hazardous situation in case clearances were not successfully sent.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0102	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0007
Requirement	The D-TAXI System shall inform the ATCO when clearances are not successfully received.
Title	Clearance was not sent successfully
Status	<Validated>
Rationale	To avoid hazardous situation in case clearances were not successfully sent.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0102	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0015
Requirement	Data link messages shall be transmitted only to the designated aircraft
Title	Transmitting messages
Status	<Validated>
Rationale	To avoid hazardous situation if the message is transmitted to a not designated aircraft
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0027	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0026
Requirement	In case an uplink message sent by ATCO receives no reply by the Flight Crew, the clearance field on the on-board HMI shall be displayed in an ALERT status after the expiration of the operational timers
Title	FC On-board Warning status related to an open uplink dialogue
Status	<Validated>
Rationale	Pilots need to know when an open data link dialogue related to uplink message is in WARNING status.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0506	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0028
Requirement	In case an uplink message sent by ATCO receives no reply by the Flight Crew a Time Out shall be displayed on the on-board HMI after ALERT status
Title	FC On-board time out status related to an open uplink dialogue
Status	<Validated>
Rationale	Pilots need to know when an open data link dialogue related to uplink message has timed out
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0502	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A

<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0030
Requirement	In case an uplink message sent by ATCO receives no reply by the Flight Crew, the concerned EFS shall be displayed in a Time Out status at the same time of the on-board clearance field.
Title	Ground Time out status related to an open uplink dialogue with FC
Status	<Validated>
Rationale	ATCO's need to know when an open data link dialogue with FC has timed out
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0502	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0032
Requirement	The ATCOs HMI shall provide to the D-TAXI System the clearances given to the aircraft to start-up, push-back, taxi-out, taxi-in.
Title	Clearance providing between HMI and system 1
Status	<Validated>
Rationale	To avoid hazardous situation when the clearances are provided to the system
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0200	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0201	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0202	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0204	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0206	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0207	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0300	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0301	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0302	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0304	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0305	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0306	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0308	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0400	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0401	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0402	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0404	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0406	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0033
Requirement	The ATCOs HMI shall provide to the D-TAXI System the taxi revisions given to the aircraft.
Title	Taxi Revisions providing between HMI and system 1
Status	<In Progress>
Rationale	To avoid hazardous situation when the taxi revisions are provided to the system
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0200	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0201	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0202	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0204	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0206	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0207	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0300	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0301	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0302	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0304	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0305	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0306	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0308	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0400	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0401	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0402	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0404	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0406	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0034
Requirement	No update of the expected route shall be sent after Start-Up/route clearance is uplinked
Title	Expected route uplink
Status	<In Progress>
Rationale	To avoid ATCO and Flight Crew confusion, it should not be possible to send an expected route when an aircraft has been already cleared to start-up or taxi
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0027	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0035
Requirement	The Tower Controller shall be warned if a datalink message which is incoherent with the current state of the related flight is received
Title	Incoherent message warning
Status	<In Progress>
Rationale	To avoid ATCO confusion, he/she needs to know if a received datalink message is incoherent with the state of a given aircraft
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0200	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0300	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0400	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0141
Requirement	The Flight Crew shall be notified in case of loss of data link service.
Title	FC On-board indication of detection of loss of CPDLC Service
Status	<Validated>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour (see SR-AC-CPDLC-04 of [43]).
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0143
Requirement	The Flight Crew shall be notified when a CPDLC connection for a given aircraft-ATSU pair is established.
Title	Aircraft CPDLC connection 1
Status	<Validated>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour (see SR-AC-CPDLC-01 of [43]).
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0026	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

| <ALLOCATED_TO> | <Functional block> | Aircraft and Vehicle Datalink Management | N/A |

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0145
Requirement	The Flight Crew shall be notified when aircraft system rejects a CPDLC connection request initiated by the controller.
Title	Aircraft CPDLC connection 2
Status	<Validated>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour (see SR-AC-CPDLC-02 of [43]).
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0026	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0147
Requirement	The Flight Crew shall be notified when the aircraft system rejects a CPDLC connection request initiated (logon) by them.
Title	Request reject FC notification
Status	<Validated>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour (see SR-AC-CPDLC-03 of [43]).
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0026	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0149
Requirement	The Flight Crew shall be notified when a data link message cannot be successfully transmitted.
Title	Unsuccessfully transmitting FC notification
Status	<Validated>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour (see SR-AC-CPDLC-06 of [43]).
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0701	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0702	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0703	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0704	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0705	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0706	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0707	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0708	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0709	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0710	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0711	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0155
Requirement	In case a downlink message sent by the Flight Crew receives no reply by the Tower Controller, the clearance field on the on-board HMI shall be displayed in a Time Out status using the same timer value as the EFS.
Title	Aircraft On-board Time out status related to an open downlink dialogue
Status	<Validated>
Rationale	Pilots need to know when an open data link dialogue related to a downlink has timed out.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0502	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0157
Requirement	The Flight Crew shall be able to see the status of data link
Title	communication status information to pilot
Status	<Validated>
Rationale	To check the status of data link communication.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0508	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Displays and controls	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0159
Requirement	A means to provide the history of data link messages shall be provided to the Flight Crew
Title	History of data link messages for pilot

Status	<Validated>
Rationale	To check all the data link messages exchanged with the ATCO.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0508	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Displays and controls	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0161
Requirement	The Flight Crew shall be able to identify the acknowledgment related to each data link message
Title	Acknowledge of messages for pilot
Status	<Validated>
Rationale	To check whether the data link messages have been really sent / received to / by ATCO.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0508	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Displays and controls	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0130
Requirement	The Tower Controller shall be notified when a CPDLC connection for a given aircraft-ATSU pair is established.
Title	ATSU indication to the controller
Status	<Validated>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0026	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0131
Requirement	The Tower Controller shall be notified when the aircraft system rejects a CPDLC connection request initiated by the ground system or the Tower Controller.

Title	ATSU display the indication provided by the aircraft system
Status	<Validated>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0026	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0163
Requirement	The Tower Controller shall be notified when the aircraft system rejects a CPDLC connection request initiated by the Flight Crew.
Title	CPDLC connection with aircraft 2
Status	<Validated>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0026	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0135
Requirement	The ATSU shall transmit messages to the designated aircraft system.
Title	ATSU transmitting messages
Status	<Validated>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0027	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0151
Requirement	In case a downlink message sent by the Flight Crew receives no reply by the Tower Controller, the clearance field on EFS shall be displayed in an

	ALERT status after the expiration of the Operational timers
Title	Ground warning status related to an open downlink dialogue with aircraft
Status	<Validated>
Rationale	ATCO needs to know when an open data link dialogue related to downlink is in WARNING status.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0502	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0153
Requirement	In case a downlink message sent by the Flight Crew receives no reply by the Tower Controller, a Time Out shall be displayed on the EFS after ALERT status.
Title	Ground Time out status related to an open downlink dialogue with aircraft
Status	<Validated>
Rationale	ATCO needs to know when an open data link dialogue related to a downlink has timed out.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0502	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0140
Requirement	The Flight Crew shall execute clearances, received in a concatenated message, in the same order as displayed to the flight crew.
Title	Flight Crew executes clearances
Status	<In Progress>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0715	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0716	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0721	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0725	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

3.3.1.2 Vehicle-related requirements

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0010
Requirement	The Tower Controller shall input in the HMI ground system the clearances (and related revisions) given to the vehicle to PROCEED and TOW.
Title	Entering of Clearances Case 2
Status	<In Progress>
Rationale	To avoid hazardous situation. To operate Data Link PROCEED and TOW requests and revision. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0002.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLVH.0601	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLVH.0607	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLVH.0612	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLVH.0618	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0020
Requirement	The Tower Controller shall be able to provide to the HMI ground system the vehicle information relative to its assigned route
Title	Providing vehicle information
Status	<In Progress>
Rationale	To avoid hazardous situation. To provide vehicle information regarding the Runway and holding point. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0004.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0001.0007	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0030
Requirement	The data link system shall inform the Tower Controller when clearances sent to vehicles are successfully received
Title	Clearance was sent successfully to vehicle
Status	<In Progress>
Rationale	To avoid hazardous situation in case clearances were not successfully sent.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0102	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0040
Requirement	The data link system shall inform the Tower Controller when clearances sent to vehicles are not successfully received.
Title	Clearance was not sent successfully to vehicle
Status	<In Progress>
Rationale	To avoid hazardous situation in case clearances were not successfully sent.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0102	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0050
Requirement	In case an uplink message sent by the Tower Controller receives no reply by the Vehicle Driver the clearance field on the on-board HMI shall be displayed in an ALERT status after the expiration of the Operational timers
Title	Vehicle On-board Warning status related to an open uplink dialogue
Status	<In Progress>
Rationale	Vehicle drivers need to know when an open data link dialogue related to uplink message is in WARNING status. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0027.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0506	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0060
Requirement	In case an uplink message sent by the Tower Controller receives no reply by the Vehicle Driver a Time Out shall be displayed on the on-board HMI after WARNING status
Title	Vehicle driver On-board time out status related to an open uplink dialogue
Status	<In Progress>

Rationale	Vehicle drivers need to know when an open data link dialogue related to uplink message has timed out. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0029.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0502	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0070
Requirement	In case an uplink message sent by the Tower Controller receives no reply by the Vehicle Driver the concerned EFS shall be displayed in a Time Out status at the same time of the on-board clearance field.
Title	Ground Time out status related to an open uplink dialogue with Vehicle Drivers
Status	<In Progress>
Rationale	ATCOs need to know when an open data link dialogue with vehicle has timed out. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0031.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0502	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DVLH.0080
Requirement	The ground HMI shall provide to the Data Link System the clearances (and the related revisions) given to the vehicle to proceed and tow.
Title	Clearance providing between HMI and system 2
Status	<In Progress>
Rationale	To avoid hazardous situation. To operate Data Link PROCEED and TOW requests and revision. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0023.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0104	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

| <ALLOCATED_TO> | <Functional block> | Aircraft and Vehicle Datalink Management | N/A |

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0090
Requirement	Vehicle Drivers shall be notified in case of loss of data link service.
Title	Vehicle On-board indication of detection of loss of data link service
Status	<In Progress>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour (see SR-AC-CPDLC-04 of [43]). This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0142.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DVLH.0004	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0100
Requirement	Vehicle Drivers shall be notified when vehicle system rejects a data link connection request initiated by the Tower Controller.
Title	Vehicle data link connection 2
Status	<In Progress>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour (see SR-AC-CPDLC-02 of [43]). This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0146.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0026	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0110
Requirement	Vehicle Drivers shall be notified when vehicle system rejects a data link connection request initiated (logon) by them.
Title	Request reject Vehicle driver notification
Status	<In Progress>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour (see SR-AC-CPDLC-03 of [43]). This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0148.

Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0026	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0120
Requirement	Vehicle Drivers shall be notified when a data link message cannot be successfully transmitted.
Title	Unsuccessfully transmitting Vehicle Driver notification
Status	<In Progress>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour (see SR-AC-CPDLC-06 of [43]). This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0150.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLVH.0727	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0130
Requirement	In case a downlink message sent by the Vehicle Driver receives no reply by the Tower Controller the clearance field on the on-board HMI shall be displayed in a Time Out status using the same timer value of the EFS.
Title	Vehicle On-board Time out status related to an open downlink dialogue
Status	<In Progress>
Rationale	Vehicle Drivers need to know when an open data link dialogue related to a downlink has timed out. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0156.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0502	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0140

Requirement	The Vehicle Driver shall be able to see the status of the data link communication
Title	Communication status information for Vehicle Driver
Status	<In Progress>
Rationale	To check the status of data link communication. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0158.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0508	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0150
Requirement	A means to provide the history of data link messages shall be provided to the Vehicle Driver
Title	History of data link messages for Vehicle Driver
Status	<In Progress>
Rationale	To check all the data link messages exchanged with the ATCO. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0160.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0508	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0160
Requirement	The Vehicle Driver shall be able to identify the acknowledgment related to each data link message
Title	Acknowledge of messages for Vehicle Driver
Status	<In Progress>
Rationale	To check whether the data link messages have been really sent / received to / by ATCO. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0162.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0508	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0170
Requirement	The Tower Controller shall be notified when the vehicle system rejects a data link connection request initiated by the Vehicle Driver.
Title	Data link connection with vehicle 2
Status	<In Progress>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0164.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0026	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0180
Requirement	In case a downlink message sent by the Vehicle Driver receives no reply by the Tower Controller, the clearance field on EFS shall be displayed in an ALERT status after the expiration of the Operational timers
Title	Ground warning status related to an open downlink dialogue with vehicle
Status	<In Progress>
Rationale	ATCO needs to know when an open data link dialogue related to downlink is in WARNING status. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0152.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0502	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLVH.0190
Requirement	In case a downlink message sent by the Vehicle Driver receives no reply by the Tower Controller, a Time Out shall be displayed on the EFS after ALERT status.
Title	Ground Time out status related to an open downlink dialogue with vehicle
Status	<In Progress>
Rationale	ATCO needs to know when an open data link dialogue related to a downlink has timed out. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0154.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0502	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

3.3.1.3 Requirements applicable to all mobiles

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0008
Requirement	The data link system shall provide an alert to the Tower Controller when the sending of Downlink or Uplink messages is not possible.
Title	Alert to ATCO
Status	<In Progress>
Rationale	To avoid hazardous situation in case clearances were not successfully sent. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0008.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGHM.0014	<Partial>
<SATISFIES>	<Information Exchange Requirement>	IER-06.07.02-OSED-0002.0003	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0009
Requirement	When the Tower Controller decides to cancel a given clearance, he/she shall inform the ground HMI System about this cancelation.
Title	Information flow between ATCO and HMI
Status	<Validated>
Rationale	To avoid hazardous situation. The HMI system should know about the cancelation. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0009.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0100	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0200	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0010
Requirement	The ground HMI system shall inform the data link clearances system about the cancelled clearance
Title	Information flow between HMI and System
Status	<In Progress>
Rationale	To avoid hazardous situation. The data link system should know about the cancelation. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0010.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0100	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0200	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0011
Requirement	The Tower Controller shall contact the mobile via R/T if logical acknowledgment ("Message received") is missing.
Title	Contact the mobile in case of message not received
Status	<Validated>
Rationale	To avoid hazardous situation in case logical acknowledgment is missing. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0011.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0102	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0201	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0202	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0204	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0206	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0207	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0301	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0302	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0304	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0305	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0306	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0308	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0401	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0402	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0404	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0406	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0407	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0410	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0012
Requirement	When no confirmation of reception of an uplink message from the mobile is received, the Tower Controller shall be able to send again the same uplink data link message only if the answer of the mobile is not time critical.
Title	Sending the message again the mobile in case of no reaction of mobile
Status	<Validated>
Rationale	To avoid hazardous situation in case the mobile doesn't confirm the receiving of the message. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0012.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0102	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0201	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0202	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0204	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0206	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0207	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0301	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0302	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0304	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0305	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0306	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0308	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0401	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0402	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0404	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0406	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0407	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0410	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0013
Requirement	The Tower Controller shall contact the mobile via R/T if the answer of the mobile is time critical
Title	Contact the mobile in case of no reaction of mobile
Status	<Validated>
Rationale	To avoid hazardous situation in case the answer by mobile is time critical. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0013.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0102	<Partial>

<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0201	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0202	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0204	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0206	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0207	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0301	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0302	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0304	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0305	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0306	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0308	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0401	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0402	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0404	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0406	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0407	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0410	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0014
Requirement	The Tower Controller shall contact the mobile via R/T in case no data link connection can be initiated.
Title	Contact the mobile in case no data link connection service
Status	<Validated>
Rationale	To avoid hazardous situation if data link is not available. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0014.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0026	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0102	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0016
Requirement	The Tower Controller shall be able to see the status of data link communication on a dedicated diagnostic window
Title	Communication on a diagnostic window for Tower Controller
Status	<Validated>
Rationale	To check the status of data link communication. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0016.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0500	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0017
Requirement	The Tower Controller shall be able to retrieve all the history of data link messages for a given mobile
Title	History of data link messages for Tower Controller
Status	<Validated>
Rationale	To check all the data link messages exchanged with the pilot / vehicle driver. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0017.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0508	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0018
Requirement	The Tower Controller shall be able to see the acknowledgment related to each data link message on the diagnostic window
Title	Acknowledge of messages for Tower Controller
Status	<Validated>
Rationale	To check whether the data link messages have been really sent / received to / by pilot or vehicle driver. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0018.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0500	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0025
Requirement	The Tower Controller shall input in the HMI ground system the clearances concerning revisions.
Title	Entering of revised clearances
Status	<In Progress>
Rationale	To avoid hazardous situation. To operate revisions through data link. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0025.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLVH.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLVH.0007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0010	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0101
Requirement	Data link messages shall be transmitted only to the designated ATSU.
Title	Transmitting of messages to the designated recipient
Status	<Validated>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour (see SR-AC-CPDLC-13 of [37]). This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0101.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0025	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0144
Requirement	The Flight Crew / Vehicle Driver shall be notified when a data link connection for a given mobile-ATSU pair is established.
Title	Mobile data link connection 1
Status	<In Progress>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour (see SR-AC-CPDLC-01 of [43]). This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0144.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0026	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0133
Requirement	The Tower Controller shall be notified in case of loss of data link service.

Title	Ground indication of detection of loss of data link service
Status	<Validated>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0133.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0026	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0134
Requirement	The Tower Controller shall be notified when a data link message cannot be successfully transmitted.
Title	ATSU message cannot be successfully transmitted.
Status	<In Progress>
Rationale	To avoid hazardous situation by maintaining operators' situation awareness and avoid inappropriate/unexpected behaviour. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0134.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0201	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0202	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0207	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0301	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0302	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0304	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0305	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0401	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0402	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0407	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0408	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0410	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0136
Requirement	When operating via data link, the Tower Controller shall be able to input into the EFS system only the clearances / instructions following current mobiles status.
Title	Entering of instructions following current mobile status – data link operations
Status	<Validated>
Rationale	In order to avoid that the ATCOs could input wrong clearances / instructions (e.g. the ATCO cannot input a taxi-out instruction before push-back). This requirement was previously identified as REQ-06.07.02-SPR-

	DTAX.0136.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0013	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-CLRT.0016	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

3.3.2 Performance Requirements for Provision of planned and cleared route to mobiles by data link

The performance requirements will be expressed in terms of Quality of Service (QoS) requirements. Their expression depends on the nature of the service (for example a data link receives throughput, response time, message loss rate requirements; a navigation service should receive accuracy, timeliness requirement). These QoS requirements will trace the Performance Indicator (PI) requirements expressed in the OSED. Demonstration that the full set of QoS requirements is sufficient to satisfy the related Performance Indicators will be provided. The demonstration should indicate how the combination of services, with their required quality of service satisfies the PIs of the Ops service.

Performance requirements are associated to quantitative values that can be measured (metrics). In case the performance requirement depends on the operational environment, this will be indicated and the corresponding environment will be identified.

Validation targets and Influence Diagrams, as provided by B.04.01 shall be used to trace contributions to performance. The project Benefit and Impact Mechanisms (under [15]) developed for the Validation Plan can help identify these performance contributions.

Guidance material detailing how to assess the different KPAs and to develop requirements to feed into the SPR document is provided by WP16.06.01 Safety ([11]).

3.3.2.1 Aircraft-related requirements

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0190
Requirement	The A-SMGCS Routing function shall be able to uplink the expected taxi route to the Flight Crew before TSAT (i.e. TSAT-10) for Taxi Out and before the Top of Descent for Taxi In.
Title	Request time-margin
Status	<Validated>
Rationale	Time-window should be set so as to let time to the crew for a briefing and have information similar to the following clearance. In this way taxi route

	modification requests are not issued after departure request (for outbound flights) or during final approach (for inbound flights).
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGAU.0002	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0230
Requirement	When A-SGMCS Routing function is not able to uplink the expected route to the A/C before TSAT-10 for Taxi Out and Top of Descent for Taxi In, the A-SMGCS shall uplink a message to make the Flight Crew aware of it.
Title	Expected taxi route uplink inability
Status	<In Progress>
Rationale	Notification of inability to uplink expected taxi route will increase flight crew awareness
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGAU.0002	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0240
Requirement	Any update of the expected taxi route shall be uplinked to the aircraft by the A-SMGCS Routing function in less than 10sec.
Title	Expected taxi route update
Status	<In Progress>
Rationale	To avoid excessive delay in flight crew reception of expected taxi route updates
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGAU.0002	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0350
Requirement	When it exists and pilots are expected to use it, the provision of Routing Information to mobiles service shall be continuously available during the

	whole phase (Taxi-In or Taxi Out)
Title	Availability of the Provision of Routing Information to mobiles service
Status	<In Progress>
Rationale	This is an indication of the ability to provide usable service. Availability is expressed in terms of the probability of being available at the beginning of the intended operation.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGGE.0031	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0370
Requirement	The Provision of Routing Information to mobiles service shall be able to handle all the planned routes even if the movement area reaches its capacity limit.
Title	Capacity limit of the Provision of Routing Information to mobiles service
Status	<Validated>
Rationale	This requirement aims to ensure that the service related to the provision of routing information can still be provided when the movement area reaches its capacity limit.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGGE.0031	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0201
Requirement	The probability that data link system sends a message (downlink and uplink) more than 5 sec after a "send" action has been done shall be kept to a minimum per taxi-event.
Title	Probability of too late entering the clearance
Status	<In Progress>
Rationale	This is needed to avoid delaying the following exchanges
Category	<Performance>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0102	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0216
Requirement	The HMI ground system of the Tower Controller shall allow to enter any D-TAXI instruction in less than 3s.
Title	Entering of clearances in a timely manner
Status	<In Progress>
Rationale	To avoid ATCO workload increase
Category	<Performance>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0201	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0301	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0401	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0217
Requirement	The HMI ground system shall provide the D-TAXI System with any clearance entered by the Tower Controller within 0.5 second
Title	Providing any clearance of the ATCO
Status	<In Progress>
Rationale	This value is nearly transparent to the user which is a criterion of efficiency..
Category	<Performance>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0201	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0301	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0401	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0219
Requirement	The aircraft system shall time stamp to within one second UTC each message when it is released for onward transmission.
Title	Aircraft system shall time stamp
Status	<In Progress>
Rationale	To have a time reference for the coming time-out.
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Communication	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0230
Requirement	The following parameters shall comply with ED-228A table 5-14 CPDLC Performance Requirements with RCP 130 configuration: Transaction time, Continuity, Availability, Integrity.
Title	Compliance with ED-228A
Status	<Validated>
Rationale	It is issued from the analysis developed by WG78 and reported in ED 228A Safety and Performance Requirements - Standard for Baseline 2 ATS Data Communications.
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0710	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0712	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0713	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DTAX.0240
Requirement	The allocation between concerned actors (ground and airborne) shall comply with ED-228A table 5-14 CPDLC Performance Requirements with RCP 130/A1 configuration.
Title	Time Allocation between actors
Status	<Validated>
Rationale	It is issued from the analysis developed by WG78 and reported in ED 228A Safety and Performance Requirements - Standard for Baseline 2 ATS Data Communications.
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0710	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0712	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0713	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

3.3.2.2 Vehicle-related requirements

N/A

3.3.2.3 Requirements applicable to all mobiles

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0360
Requirement	The probability for providing corrupted Routing Information to mobiles shall not exceed a <probability parameter[10] to be defined>.

---

[10] Ad hoc probability interval is expected to be defined in the next iteration of the SPR.

Title	Integrity of the Provision of Routing Information to mobiles service
Status	<In Progress>
Rationale	A minimum probability of integrity of the service guarantees a safe and reliable running of the system and builds the user's confidence in the service. Integrity is characterized by the corruption rate of messages sent to the aircraft. A 10-5 would be a minimum the expected integrity and keep the service at a level comparable of voice
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RGGE.0031	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Routing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-0002.0380
Requirement	The time for transmitting the messages shall be less than tr/2 (10 seconds)
Title	Time for transmitting messages
Status	<In Progress>
Rationale	This requirement aims to ensure and define the time for transmitting the messages which can then be validated
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0009	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0200
Requirement	The probability that the Tower Controller is not able to input an uplink message (when he / she wants to) should be less than $1.6x10^{-4}$ per taxi-event.
Title	Probability of no entering the clearance
Status	<In Progress>
Rationale	If ATCO does not succeed in sending a message, he/she will be obliged to revert to voice which could cause delay. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0200.
Category	<Performance>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0102	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0203
Requirement	The probability of not detecting that a message (uplink or downlink) has not been successfully sent shall be less than 1.6×10^{-4} per sent message.
Title	Probability undetected message
Status	<In Progress>
Rationale	An undetected erroneous message can cause misunderstanding between the crew and ATCO. According to the kind of message, it can generate delays: e.g. an erroneous taxi clearance leading to a taxiway used by other aircraft. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0203.
Category	<Performance>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0102	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0218
Requirement	Data link service shall be established within 3 seconds to be available for operational use.
Title	Data link service established in sufficient time
Status	<In Progress>
Rationale	To have a quick connection and avoid delaying the following preparation steps. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0218.
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DLNK.0101	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-DLNK.0220
Requirement	The ATSU shall time stamp to within one second UTC each message when it is released for onward transmission.
Title	ATSU time stamp
Status	<In Progress>
Rationale	To have a time reference for the coming time-out. This requirement was previously identified as REQ-06.07.02-SPR-DTAX.0220.
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0009	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aircraft and Vehicle Datalink Management	N/A

3.4 Requirements for Airfield Ground Lighting Service

3.4.1 Safety requirements for AGL Centralised Service

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0002
Requirement	The probability that the centralized service calculates the longitudinal distance between two mobiles under a defined minimum shall be less than 1.0×10^{-4} per taxi-event.
Title	Longitudinal Distance between two mobiles
Status	<In Progress>
Rationale	To avoid hazardous situation the centralized service will be responsible for ensuring the required separation between two or more mobiles in the manoeuvring area of an airport. In order to guarantee these safety gaps the centralized service will deactivate a number of the taxiway centreline lights behind a mobile. This safety gap represents the longitudinal distance.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLD.0002	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0003
Requirement	The probability of incorrectly activated stop bar lights shall be not greater than 1.0×10^{-4} per taxi-event.
Title	Incorrectly activated stop bars
Status	<In Progress>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0013	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0004

Requirement	The probability of incorrectly activated taxiway centre line lights shall be not greater than 1.0×10^{-4} per taxi-event.
Title	Incorrectly activated centre line lights
Status	<In Progress>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLS.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLA.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLA.0002	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0005
Requirement	The translation of a switching command from the centralized service into illuminated lights shall be no longer than 3 seconds.
Title	Translation from CS into the Lights
Status	<Validated>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0002	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0006
Requirement	The probability of incongruent display between CWP and lights shall be less than 1.0×10^{-4} per taxi event.
Title	Incongruent display between CWP and lights
Status	<In Progress>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0007	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0007
Requirement	The probability of incongruent display between CKDS/VDS and lights shall be less than 1.0×10^{-4} per taxi event
Title	Incongruent display between CKDS/VDS and lights
Status	<In Progress>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLS.0002	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0008
Requirement	The probability that the system does not detect when a mobile has passed a segment shall be less than 1.0×10^{-4} per taxi event.
Title	No detection of passing segment
Status	<In Progress>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLD.0009	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0009
Requirement	The probability that the lights do not turn off after rollover of a mobile shall be less than 1.0×10^{-4} per taxi event.
Title	Turn off after rollover
Status	<In Progress>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0010	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0010
Requirement	The probability that the lights do not turn on in front of a mobile shall be less than 1.0×10^{-4} per taxi event.
Title	Turn off in front of mobile
Status	<In Progress>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0010	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0011
Requirement	The indicated taxi route shall be unambiguous for the pilot/vehicle driver in case of obscured vision due to the taxiway layout.
Title	Unambiguous Taxi Route
Status	<In Progress>
Rationale	To avoid hazardous situation the unambiguous taxi route can be enabled by the functionality of increasing the light intensity of the AGL.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0002	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0013
Requirement	The current status of the AGL for all cleared taxi routes shall be unmistakable indicated by the HMI.
Title	Unmistakable HMI
Status	<Validated>
Rationale	To avoid hazardous situation. In order to display a route unmistakable on the HMI, at least the following features shall be included: ▪ display of the planned route for a selected mobile movement ▪ clear indication of the mobile's clearance limit ▪ display of all activated taxiway centreline lights
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLA.0001	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0014
Requirement	The current status of the AGL for all stop bars shall be unmistakable indicated by the HMI.
Title	Clear representation of traffic
Status	<Validated>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLA.0002	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0015
Requirement	The current status of the AGL (including cleared taxi routes and stop bars) in one AoR shall be clearly distinguished from indications in another AoR on the HMI.
Title	Clear representation of Routes
Status	<In Progress>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLA.0013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLA.0014	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0018
Requirement	HMI shall provide TCL status (on/off, failure, maintenance, TWY closed)
Title	Providing TCL status
Status	<In Progress>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLS.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLS.0007	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0019
Requirement	HMI shall provide Stop bar light status (on/off, failure, maintenance)
Title	Providing Stop bar light status
Status	<In Progress>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0003	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0020
Requirement	HMI shall provide Routing Information Display Status (indication, failure, maintenance).
Title	Providing Routing Information Display
Status	<In Progress>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0003	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

3.4.2 Performance Requirements for AGL Centralized Service

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0001
Requirement	A malfunction of the centralized service leading to the system being unserviceable shall not greater than 1.0×10^{-8}. .
Title	CS availability
Status	<In Progress>
Rationale	As the centralized service is responsible for the separation of moving mobiles it is crucial that the system runs reliable during the operational hours.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0003	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

3.4.3 Safety Requirements for AGL Ground Service

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0021
Requirement	The probability of incorrect activated lights (green or red) by the Ground Service shall be not greater than 1.0×10^{-4}
Title	Incorrect activated lights
Status	<In Progress>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0002	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0022
Requirement	The probability of undetected incorrect activated lights shall be less than 1.0×10^{-4}
Title	Undetected incorrect activated lights
Status	<In Progress>
Rationale	To avoid hazardous situation. This requirement relates to the fact that incorrect activated lights by the AGL system remains undetected
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0002	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0024
Requirement	In order to keep lights clear of ice and snow, newly implemented lights shall be able to melt snow.
Title	AGL in snowy conditions
Status	<In Progress>
Rationale	This requirement guarantees that the AGL is still visible to flight crews and vehicle drivers if the aerodrome surface is covered by snow.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0001	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A

3.4.4 Performance Requirements for AGL Ground Service

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0027
Requirement	The probability of a Ground Service malfunction leading to the system being unserviceable shall not be greater than 1.0×10^{-8}.
Title	GS availability
Status	<In Progress>
Rationale	As the separation of moving mobiles will be done by the AGL, it is crucial that the Ground Service runs reliable during the operational hours.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0003	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A

3.4.5 Safety requirements for AGL Communication service

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0025
Requirement	The probability of incongruent communication between centralised service and ground service shall be less than 1×10^{-9}
Title	Incongruent communication between centralised service and ground service
Status	<In Progress>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0001	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0026
Requirement	The probability of a communication breakdown shall be less than 1×10^{-4}
Title	Communication breakdown
Status	<In Progress>
Rationale	To avoid hazardous situation.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0001	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A

3.4.6 Performance Requirements for AGL Communication Service

[REQ]

Identifier	REQ-06.07.02-SPR-AGLS.0028
Requirement	The probability of a Communication Service malfunction shall not be greater than 1.0×10^{-8}.
Title	Communication Service availability
Status	<In Progress>
Rationale	As AGL is also used as guidance means for tow movements in the night hours it is required that the Communication Service is available during the operational hours.
Category	<Safety>
Validation Method	<Live Trial><Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-AGLG.0001	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.01.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Ground Lighting Management	N/A

3.5 Requirements for Virtual Block Control service

3.5.1 Safety requirements for Virtual Block Control

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0010
Requirement	The status of the VSB function shall be monitored
Title	Monitoring of VSB status
Status	<Validated>
Rationale	Continuous monitoring of the VSB function status allows detecting any possible failure (partial or total loss). The former ID for this requirement was REQ-06.08.07-SPR-0001.0010
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0008	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Guidance	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0020
Requirement	Any failure (partial or total loss) of the VSB function shall be notified on the Controller HMI.
Title	HMI notification of VSB function failure
Status	<In Progress>
Rationale	The alert will be useful to notify the failure of the VSB function to the controller who has to apply the foreseen backup procedures. The former ID for this requirement was REQ-06.08.07-SPR-0001.0020
Category	<Safety>
Validation Method	<Real Time Simulation>

Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0008	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Guidance	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0030
Requirement	VSB_{NIHP} shall be established by ANSPs (depending on local needs) and published on AIPs and / or airport charts
Title	VSB_{NIHP} publication
Status	<In Progress>
Rationale	Publication of VSB_{NIHP} on AIPs and / or airport charts will support FC during navigation to by giving them the opportunity to cross check ATCOs clearances. Moreover, it will ease the recovery process in case of contingency situations. VP-719 activities focused on the implementation of Virtual Block Control by means of Virtual Stop Bars linked to already existing intermediate holding positions (i.e. VSBIHP). The use of more "dynamic" VSBs not linked to any intermediate holding positions is expected to be further investigated during SESAR 2020 horizon. . The former ID for this requirement was REQ-06.08.07-SPR-0001.0030
Category	<Safety>
Validation Method	<Expert Group (Judgement Analysis)>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0003	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aerodrome Flight Data Processing	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0040
Requirement	An alert shall be displayed on the controller HMI in case two aircraft are in the same block.
Title	Control block occupancy
Status	<In Progress>
Rationale	For safety reasons, only one aircraft shall be present in one control block. Any violation of this procedure shall be notified. The former ID for this requirement was REQ-06.08.07-SPR-0001.0040.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0002	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA01.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Guidance	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

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Identifier	REQ-06.07.02-SPR-VBCL.0060
Requirement	The AMM function shall display both Virtual Stop Bars linked to the intermediate holding positions (i.e. VSB_{IHP}) and the ones not linked to any intermediate holding positions (VSB_{NIHP}).
Title	VSBs display on the AMM
Status	<In Progress>
Rationale	Graphical display of VSB on the on-board moving map will support FC during navigation especially in low visibility conditions. That's particularly true in case of VSB_{NIHP} which are not indicated with a proper ground lighting system. That requirement has been set as "in progress" as VSBsNIHP were not investigated during VP-719. The former ID for this requirement was REQ-06.08.07-SPR-0001.0060
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0014	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Displays and controls	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0070
Requirement	In case of unauthorized crossing of VSB cleared limit position, an alert shall be notified on the Controller HMI.
Title	VSB violation alert
Status	<Validated>
Rationale	To avoid hazardous situations. The former ID for this requirement was REQ-06.08.07-SPR-0001.0070
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0009	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA01.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Guidance	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0080
Requirement	VSBs shall switch to the GO status (i.e. GREEN colour) .when an aircraft has been cleared to the next (following) Virtual Stop Bar.
Title	VSB switching to the GO status after crossing authorization
Status	<Validated>
Rationale	VSB switching as further evidence of the clearance issued. The former ID for this requirement was REQ-06.08.07-SPR-0001.0080.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance

<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0017	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Guidance	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0090
Requirement	Once the aircraft completely crosses the cleared VSB, it shall switch back to STOP status (i.e. RED colour)
Title	VSB switching back to the STOP status after aircraft crossing
Status	<Validated>
Rationale	To avoid hazardous situation as unauthorized VSB crossing. The former ID for this requirement was REQ-06.08.07-SPR-0001.0090
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0017	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Guidance	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0100
Requirement	The VSB corresponding to the cleared limit position shall be displayed in STOP status (i.e. RED colour)
Title	Display of the VSB cleared limit position
Status	<Validated>
Rationale	Stop status can be seen a further confirmation of the cleared limit position. The former ID for this requirement was REQ-06.08.07-SPR-0001.0100.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0017	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Guidance	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0110
Requirement	A failure (partial or total loss) of the VSB function on the AMM shall be notified to the FC.
Title	On-board VSB function failure notification
Status	<In Progress>
Rationale	The monitoring of the service status is required to maintain SA and increase safety. The former ID for this requirement was REQ-06.08.07-SPR-0001.0110.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0027	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Displays and controls	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0120
Requirement	Virtual Stop Bars linked to the Intermediate Holding Positions (i.e. VSB_{IHP} shall be displayed with a different symbology respect to the Virtual Stop Bars not linked to any intermediate holding positions (i.e. VSB_{NIHP})
Title	VSB symbology
Status	<In Progress>
Rationale	There is need for both ATCOs and FC to clearly distinguish the two different types of virtual stop bars. That requirement has been set as "in progress" as VSBsNIHP were not investigated during VP-719. The former ID for this requirement was REQ-06.08.07-SPR-0001.0120
Category	<Safety>
Validation Method	<Expert Group (Judgement Analysis)>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0018	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0130
Requirement	In case of a mismatch of information between what is displayed on the Airport Moving Map and what has been issued via data link, the pilot shall remain in STOP status and contact the ATCO via voice
Title	Mismatch between AMM display and data link clearance: safety procedures
Status	<In Progress>
Rationale	Before proceeding in case of mismatch between AMM display and the data link clearance issued by the ATCO, FC shall contact ATCOs to request clarification via voice. The former ID for this requirement was REQ-06.08.07-SPR-0001.0130.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0014	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0140
Requirement	The Watch Dog function shall be applied only when the aircraft has already received the stop instruction
Title	Watch dog functionality
Status	<In Progress>
Rationale	Watch Dog functionality is expected to provide controllers with possibility to

	monitor traffic that is supposed to hold position, e.g. after a stop bar violation has occurred. Watch dog functionality was not investigated during VP-719. Therefore, even if the functionality was positively assessed during V2 VP-092, we cannot set its status as "Validated" as it has not achieved V3 maturity level. The former ID for this requirement was REQ-06.08.07-SPR-0001.0140.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0150
Requirement	The Watch Dog function shall be applied when the aircraft speed is under 3 kt.
Title	Watch dog functionality: aircraft speed of application
Status	<In Progress>
Rationale	To avoid hazardous situations without waiting until the aircraft is completely stopped. Watch dog functionality was not investigated during VP-719. Therefore, even if the functionality was positively assessed during V2 VP-092, we cannot set its status as "Validated" as it has not achieved V3 maturity level. The former ID for this requirement was REQ-06.08.07-SPR-0001.0150.
Category	<Safety>
Validation Method	<Expert Group (Judgement Analysis)>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0160
Requirement	The Watch Dog's alarm shall go off when the aircraft speed is greater than 3 kt
Title	Watch dog alarm
Status	<In Progress>
Rationale	To avoid false alarms. The former ID for this requirement was REQ-06.08.07-SPR-0001.0160. Watch dog functionality was not investigated during VP-719. Therefore, even if the functionality was positively assessed during V2 VP-092, we cannot set its status as "Validated" as it has not achieved V3 maturity level.
Category	<Safety>
Validation Method	<Expert Group (Judgement Analysis)>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA01.02.01	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0170
Requirement	The System Design Assurance Level (DAL) shall be of level C or better.
Title	System Design Assurance Level (DAL)
Status	<In Progress>
Rationale	Based on the severity allocated to the operational hazards, the system shall be certified to Design Assurance Level C or better. The former ID for this requirement was REQ-06.08.07-SPR-0001.0170
Category	<Safety>
Validation Method	<Expert Group (Judgement Analysis)>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0007	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Guidance	N/A
<ALLOCATED_TO>	<Functional block>	Displays and controls	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0180
Requirement	Integrity failure of controller display shall be not greater than a certain value (to be defined).
Title	Integrity failure of controller display
Status	<In Progress>
Rationale	This requirement refers to the max probability that a failure of the controller display remains undetected. The former ID for this requirement was REQ-06.08.07-SPR-0001.0180.
Category	<Safety>
Validation Method	<Expert Group (Judgement Analysis)>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0007	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Guidance	N/A
<ALLOCATED_TO>	<Functional block>	Displays and controls	N/A

3.5.2 Performance requirements for Virtual Block Control

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0190
Requirement	For the CWP HMI the 95% accuracy of VSB positions shall be less than <TBD parameter [m]>
Title	Virtual Stop Bar position: CWP HMI accuracy
Status	<In Progress>
Rationale	To let the system work properly, it is important to ensure a high level of accuracy of all ATC relevant information to be correctly displayed on the ATCOs' HMI with respect to the aerodrome layout and geographic locations, VP-719 investigated the implementation of Virtual Block Control by means of Virtual Stop bars linked to already existing intermediate holding positions (i.e. VSBIHP) . Therefore, being already noted positions, VSB positions were checked off-line before the execution of the simulation and both the OPL and the SME confirmed their accuracy. The former ID for this

	requirement was REQ-06.08.07-SPR-0002.0010.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0006	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Controller HMI Management	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0200
Requirement	For the AMM, the 95% accuracy of virtual stop bar position shall be less than <tbd parameter [m]>
Title	Virtual Stop Bar position: AMM Accuracy
Status	<In Progress>
Rationale	To let the system work properly, it is important to ensure a high level of accuracy of all map information to correctly display the virtual stop bar location with respect to the aerodrome layout and geographic locations. VP-719 investigated the implementation of Virtual Block Control by means of Virtual Stop bars linked to already existing intermediate holding positions (i.e. VSBIHP) . Therefore, being already noted positions, VSB positions were cross-checked between airborne and ground platforms off-line before the execution of the simulation and both the OPL and the SME confirmed their accuracy. The former ID for this requirement was REQ-06.08.07-SPR-0002.0020.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0028	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Displays and controls	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0210
Requirement	The false alert of the Watch Dog tool shall not be greater than a <tbd parameter [movement]>
Title	Watch dog reliability
Status	<In Progress>
Rationale	To let controllers be confident in the alerts notification, the Watch Dog tool shall ensure a high level of reliability in order to provide controllers with alerts notification only in case of real violation. Watch dog functionality was validated during V2 VP-092 executed at Amsterdam on the NLR NARSIM simulator. However, it was not validated during V3 VP-719, so the status could still be set as "In-progress". The former ID for this requirement was REQ-06.08.07-SPR-0002.0030.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA01.02.01	N/A

<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0220
Requirement	The Watch Dog tool shall be able to perform a self-diagnosis to check its current status within a <tbd parameter [s]>
Title	Watch Dog tool self-diagnosis
Status	<In Progress>
Rationale	Self-diagnosis performed by watch dog tool allows detecting any possible failure. Watch dog functionality was validated during V2 VP-092 executed at Amsterdam on the NLR NARSIM simulator. However, it was not validated during V3 VP-719, so the status could still be set as "In-progress". The former ID for this requirement was REQ-06.08.07-SPR-0002.0040.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA01.02.01	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0230
Requirement	New Virtual Stop Bar created by ATCOs shall be displayed on the on-board Airport Moving Map within a <tbd parameter [s]>
Title	Uplink time of new Virtual Stop Bar
Status	<In Progress>
Rationale	To ensure safe VBC it is important that FC and ATCO work with the same information. The Virtual Block Control investigated during VP-719 was based on the use of Virtual Stop Bars linked to already existing intermediate holding positions (i.e. VSBIHP). Therefore, the exercise didn't focus on the implementation of a full dynamic virtual block control which envisages the on-line positioning of "new" virtual stop bars and which is expected to be further investigated during SESAR 2020 horizon. The former ID for this requirement was REQ-06.08.07-SPR-0002.0050.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0012	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.02.02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Displays and controls	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0240
Requirement	Virtual Stop Bar violation shall be detected with a probability of <parameter to be defined [%]>
Title	Detection of virtual stop bar violation
Status	<Validated>

Rationale	To avoid hazardous situation. Virtual Stop Bars violations were detected but the associated probability cannot be defined. The former ID for this requirement was REQ-06.08.07-SPR-0002.0060.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0009	<Full>
<APPLIES_TO>	<Operational Focus Area>	OFA01.02.01	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Guidance	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0250
Requirement	The false alert in case of virtual stop bar violation shall not be greater than a <tbd parameter [movement]>
Title	Virtual stop bar violation reliability
Status	<In Progress>
Rationale	To let controllers be confident in the alerts notification, alerting of virtual stop bar violation shall ensure a high level of reliability in order to provide controllers with alerts notification only in case of real violation. The former ID for this requirement was REQ-06.08.07-SPR-0002.0070.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0011	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.02.01	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Surface Guidance	N/A

[REQ]

Identifier	REQ-06.07.02-SPR-VBCL.0260
Requirement	The accuracy of surveillance data shall be less than <a parameter to be defined [m]>
Title	Accuracy of surveillance data
Status	<In Progress>
Rationale	In order to avoid false alerts of both Virtual Stop Bar and Watch Dog functionalities. The former ID for this requirement was REQ-06.08.07-SPR-0002.0080.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-VBCL.0011	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA01.02.01	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Functional block>	Aerodrome Surveillance	N/A

3.6 Information Exchange Requirements (IER)

This section collects the safety and performance requirements on the information exchanges. They are the same IER as identified in the corresponding P06.07.02 D76 Second Integrated Surface Management Interim OSED [35] but completed with the required safety and performance requirements. Therefore, the same Name and Identifier used in the P06.07.02 D76 Second Integrated Surface Management Interim OSED have been kept to guarantee proper traceability.

For a number of IERs, neither the validation activities nor the Operational Performance Assessment conducted by OFA04.02.01 have enabled defining a Maximum Time of Delivery. In those cases, this information has been indicated as '<TBD>' (to be defined) in the following table.

[IER]

Identifier	Name	Content Type	Frequency	Safety Criticality	Confidentiality	Maximum Time of Delivery	Interaction Type	Free
IER-06.07.02-OSED-0001.0001	Airport layout	<Data>	Ad hoc upon airport layout update	<Major>	<Public>	<TBD>	<One-way>	The data exchange is between the AMDB provider and the Tower Clearance Delivery Controller or the Tower Ground Controller
IER-06.07.02-OSED-0001.0002	Taxiway preferred directions	<Data>	Ad hoc upon taxiway preferred directions update	<Major>	<Public>	<TBD>	<One-way>	The data exchange is between the Airport Air Traffic Services Provider and the Tower Clearance Delivery Controller or the Tower Ground Controller
IER-06.07.02-OSED-0001.0003	Default taxi routes	<Data>	Ad hoc upon standard routes update	<Minor>	<Public>	<TBD>	<One-way>	The data exchange is between the Airport Air Traffic Services Provider and the Tower Clearance Delivery Controller or the Tower Ground Controller
IER-06.07.02-OSED-0001.0004	Aircraft type	<Data>	Ad hoc upon aircraft type update	<Major>	<Public>	<TBD>	<One-way>	The data exchange is between the Aircraft operator and the Tower Clearance Delivery Controller
IER-06.07.02-OSED-0001.0005	Runway exit	<Data>	Ad hoc upon runway exit update	<Minor>	<Public>	<TBD>	<One-way>	The data exchange is between the Flight crew and the Tower Clearance Delivery Controller and Tower Ground Controller
IER-06.07.02-OSED-0001.0006	Allocated stand	<Data>	Ad hoc upon allocated stand update	<Minor>	<Public>	<TBD>	<One-way>	The data exchange is between the Stand Planner and the Tower Clearance Delivery Controller or the Tower Ground Controller
IER-06.07.02-OSED-0001.0007	Runway holding point	<Data>	Ad hoc upon runway holding point update	<Minor>	<Public>	<TBD>	<One-way>	The data exchange is between the Airport Tower Supervisor and the Tower Clearance Delivery Controller
IER-06.07.02-OSED-0001.0008	Runway configuration	<Data>	Ad hoc upon runway configuration	<Major>	<Public>	<TBD>	<One-way>	The data exchange is between the Airport Tower Supervisor and the Tower Clearance Delivery Controller

Identifier	Name	Content Type	Frequency	Safety Criticality	Confidentiality	Maximum Time of Delivery	Interaction Type	Free
			update					or the Tower Ground Controller
IER-06.07.02-OSED-0001.0009	Taxiway configuration	<Data>	Ad hoc upon taxiway configuration update	<Major>	<Public>	<TBD>	<One-way>	The data exchange is between the Airport Tower Supervisor and the Tower Clearance Delivery Controller or the Tower Ground Controller
IER-06.07.02-OSED-0001.0010	LVPs in use	<Data>	Ad hoc upon LVPs update	<Minor>	<Public>	<TBD>	<One-way>	The data exchange is between the Airport Tower Supervisor and the Tower Clearance Delivery Controller or the Tower Ground Controller
IER-06.07.02-OSED-0001.0011	TSAT	<Data>	Ad Hoc upon TSAT update	<Minor>	<Public>	<TBD>	<One-way>	The data exchange is between the Airport Tower Supervisor and the Tower Clearance Delivery Controller
IER-06.07.02-OSED-0001.0012	Allocated bay	<Data>	Ad Hoc upon allocated bay update	<Minor>	<Public>	<TBD>	<One-way>	The data exchange is between the De-icing Agent and the Tower Clearance Delivery Controller
IER-06.07.02-OSED-0001.0013	Expected de-icing time	<Data>	Ad hoc upon expected de-icing time update	<Minor>	<Public>	<TBD>	<One-way>	The data exchange is between the De-icing Agent and the Tower Clearance Delivery Controller
IER-06.07.02-OSED-0001.0014	Target report	<Data>	Continuous monitoring	<Major>	<Public>	<TBD>	<One-way>	Current position of mobiles is required for the routing function to generate planned routes for ground movements or to handle route changes by the ATCO
IER-06.07.02-OSED-0001.0015	Route deviation alert	<Data>	Whenever a route deviation is verified.	<Major>	<Public>	<TBD>	<One-way>	A route deviation alert received by conformance monitoring function will trigger a new route calculation to ensure that the mobile reaches its planned destination.
IER-06.07.02-OSED-0001.0016	TLDTs	<Data>	Ad hoc upon TLDT update	<Minor>	<Public>	<TBD>	<One-way>	Time information received by AMAN or Coupled AMAN/DMAN is required to avoid conflicting situation (i.e. route optimisation process).
IER-06.07.02-OSED-0001.0017	EOBT	<Data>	Ad hoc upon EOBT update	<Minor>	<Public>	<TBD>	<One-way>	Time information obtained from flight plan is required to avoid conflicting situation (i.e. route optimisation process).
IER-06.07.02-OSED-0001.0019	Scheduled runway configuration change	<Data>	Ad hoc upon planned runway configuration update	<Minor>	<Public>	<TBD>	<One-way>	The data exchange is between the Airport Tower Supervisor and the Tower Clearance Delivery Controller or the Tower Ground Controller
IER-06.07.02-OSED-0001.0020	Mobile Id	<Data>	Ad hoc upon track creation	<Major>	<Public>	<TBD>	<One-way>	Identification of mobiles is required by the routing function to allocate routes to the various mobiles on the aerodrome surface at a given time

Identifier	Name	Content Type	Frequency	Safety Criticality	Confidentiality	Maximum Time of Delivery	Interaction Type	Free
IER-06.07.02-OSED-0002.0001	Planned route	<Data>	Ad Hoc upon planned route update	<Minor>	<Public>	<TBD>	<One-way>	The data exchange is between the Tower Clearance Delivery Controller and the Flight Crew, the Vehicle Driver, the Tower Apron Manager, the Tower Ground Controller and the Tower Runway Controller
IER-06.07.02-OSED-0002.0002	Estimated taxi time	<Data>	Ad hoc upon estimate taxi time update	<Minor>	<Public>	<TBD>	<One-way>	The estimated taxi time can be used by Tower Clearance Delivery Controller and DMAN to build accurate departure sequence and by Flight Crew to increase the situational Awareness.
IER-06.07.02-OSED-0002.0003	Status of the Routing and Planning Service	<Data>	Ad hoc upon status of the Routing and Planning service update	<Major>	<Public>	<TBD>	<One-way>	Status of routing and planning service has to be continuously monitored in order to display alerts on ATCO's HMI in case of failure.
IER-06.07.02-OSED-0002.0004	Remaining taxi time	<Data>	Ad hoc upon remaining taxi time update	<Minor>	<Public>	<TBD>	<One-way>	Remaining taxi time is useful to assess possible changes on the departure sequence or influence other tactical actions by the ATCOs.
IER-06.07.02-OSED-0002.0005	D-TAXI Push-Back Service	<Data>	Ad hoc	<Major>	<Public>	45 second	<Two-way dialogue>	The data exchange is between Tower Ground Controller and Flight Crew.
IER-06.07.02-OSED-0002.0006	D-TAXI Taxi Service	<Data>	Ad hoc	<Major>	<Public>	45 second	<Two-way dialogue>	The data exchange is between Flight Crew and Tower Ground Controller and Tower Runway Controller.
IER-06.07.02-OSED-0002.0007	AGL Switching Information	<Data>	Ad hoc	<Major>	<Public>	1 second	<One-way>	The data exchange is between A-SMGCS and Airfield Ground Lighting system
IER-06.07.02-OSED-0002.0008	AGL Operating Status	<Data>	Ad hoc	<Major>	<Public>	1 second	<One-way>	The data exchange is between Airfield Ground Lighting system and A-SMGCS.
IER-06.07.02-OSED-0002.0009	D-TAXI Cleared Route Service	<Data>	Ad hoc	<Major>	<Public>	45 second	<Two-way dialogue>	The data exchange is between Tower Ground Controller and Flight Crew or vehicle driver
IER-06.07.02-OSED-0002.0010	D-TAXI Start-Up Service	<Data>	Ad hoc	<Major>	<Public>	45 second	<Two-way dialogue>	The data exchange is between Flight Crew and Tower Clearance Delivery Controller
IER-06.07.02-OSED-0002.0011	Virtual Stop Bar positions	<Data>	Ad hoc upon VSB positions update	<Major>	<Public>	<TBD>	<One-way>	VSBs position shall be properly updated to ensure that a safe virtual control block is executed
IER-06.07.02-OSED-0002.0012	Virtual Stop Bar status	<Data>	Ad hoc upon VSB status update	<Major>	<Public>	<TBD>	<One-way>	VSBs status shall be properly updated to ensure that a control block is occupied by only one aircraft

Table 4: IER layout

4 References and Applicable Documents

4.1 Applicable Documents

This SPR complies with the requirements set out in the following documents:

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

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

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

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

4.2 Reference Documents

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

[5] ED-78A GUIDELINES FOR APPROVAL OF THE PROVISION AND USE OF AIR TRAFFIC SERVICES SUPPORTED BY DATA COMMUNICATIONS.[11]

[6] ICAO Manual on Global Performance of the Air Navigation System – Doc 9883

[7] AIR NAVIGATION SYSTEM SAFETY ASSESSMENT METHODOLOGY, Ed. 2.0, ref. AF.ET1.ST03.1000-MAN-01, 30 April 2004

[8] B.04.01, Refined Performance Framework Cycle 3, D41, 01.01.00, 25/11/2014,
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

[9] B.4.3 Architecture Description Document

[10] SESAR Definition Phase, Deliverable 3 – The ATM Target Concept, v2.0 dated 4th September 2007

[11] SESAR Safety Reference Material
https://extranet.sesarju.eu/Programme%20Library/Forms/Procedures%20and%20Guidelines.aspx

[12] SESAR Security Reference Material
https://extranet.sesarju.eu/Programme%20Library/Forms/Procedures%20and%20Guidelines.aspx

[13] SESAR Environment Reference Material
https://extranet.sesarju.eu/Programme%20Library/Forms/Procedures%20and%20Guidelines.aspx

[14] SESAR Human Performance Reference Material
https://extranet.sesarju.eu/Programme%20Library/Forms/Procedures%20and%20Guidelines.aspx

[15] SESAR Business Case Reference Material
https://extranet.sesarju.eu/Programme%20Library/Forms/Procedures%20and%20Guidelines.aspx

[16] **P06.05.01** Methodology criteria to identify and analyze KPIs and Performance drivers, Edition 00.01.00, dated 30th September 2010

[17] **P06.05.01** Identification of Key Performance Areas and Focus Areas, Edition 00.01.01, dated 27th May 2010

[18] **P06.05.01** Identify Airport KPIs and Performance Drivers for the Capacity KPA/Focus Areas, Edition 00.01.00, dated 30th September 2010

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[11] *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).*

[19]**P06.05.01** Identify Airport KPIs and Performance Drivers for the Efficiency KPA/Focus Areas, Edition 00.01.00, dated 30th September 2010

[20]**P06.05.01** Identify Airport KPIs and Performance Drivers for the Predictability KPA/Focus Areas, Edition 00.01.00, dated 30th September 2010

[21]**P06.05.01** Identify Airport KPIs and Performance Drivers for the Environmental Sustainability KPA/Focus Areas, Edition 00.01.00, dated 30th September 2010

[22]**P06.07.02** Preliminary SPR for advanced surface Routing – D36, Edition 00.02.00, dated 19th March 2014

[23]**Second Contribution to P06.07.02 D77 OFA04.02.01,** Edition 00.00.01, dated 04th June 2014

[24]**P06.07.02** Preliminary SPR, Edition 00.01.00, dated 30th March 2012

[25]**P16.06.01**, SESAR Safety Reference Material, Edition 00.03.00, dated 12th December 2014
https://extranet.sesarju.eu/WP_16/Project_16.06.01/Other%20Documentation/Forms/AllItems.aspx?RootFolder=%2fWP_16%2fProject_16%2e06%2e01%2fOther%20Documentation%2fSRM%20-%20D26%20-%20Dec%202014&FolderCTID=0x012000598219846A592C4C8A8AF0621A1D8C8E&View=%7bFA50413D-D4C8-47BF-8383-46D6D276B227%7d

[26] **P16.06.01**, Guidance to Apply SESAR Safety Reference Material, Edition 00.01.02, dated 7th February 2012
https://extranet.sesarju.eu/WP_16/Project_16.06.01/Project%20Plan/SESAR%20Safety%20Reference%20Material/16%2006%2001-D06-Guidance%20to%20Apply%20the%20SESAR%20Safety%20Reference%20Material%20-00-01-02.doc

[27] **P12.01.07**, SESAR1 Airport Technical Architecture Description, D30, , Edition 00.02.00, dated 17TH June 2016
https://extranet.sesarju.eu/WP_12/Project_12.01.07/Project%20Plan/12.01.07%20-%20D30%20-%20SESAR1%20Airport%20TAD.docx

[28] Definition of A-SMGCS Implementation Levels (EUROCONTROL), Edition 1.1, dated 9th November 2005

[29]**P06.02**-D122 Airport Detailed Operational Description (DOD) Step 1, Edition 00.01.01, dated 31st March 2015
Airport DOD Step 1 Update 2014

[30]EUROCONTROL A-SMGCS Levels 1 & 2 Preliminary Safety Case, Edition 2.0, dated November 2006

[31]ICAO Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual, First Edition, 2004

[32]EUROCONTROL Safety Regulatory Requirement (ESARR) 4 – Risk assessment and mitigation in ATM, Edition v1.0, dated 5th April 2001

[33]**P06.07.02** Integrated Surface Management Safety Assessment Report (SAR), Edition 00.01.01

[34]**P06.07.03** Preliminary OSED and Preliminary Operational Procedures development Phase 2 D22, Edition 00.01.01, dated 11th November 2013

[35]**P06.07.02**-D46 OF04.02.01 (Integrated Surface Management) Final OSED, Edition 00.01.01

[36]RTCA SC-214 / EUROCAE WG-78 -PU-10 SPR-I Chapter 4 CPDLC Feb 1 2012

[37]RTCA SC-214 / EUROCAE WG-78 -PU-10 SPR-I Chapter 5 CPDLC, dated 16th September 2013
http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/atc_comms_services/sc214/current_docs/version_l_m/media/PU-10_M_SPR_Chapter5_CPDLC_16Sept2013.docx

[38]EUROCAE, Safety and Performance Standard for Baseline 2 ATS Data Communications (Baseline 2 SPR standard), ED-228, March 2014

[39]**P06.08.07** Safety and Performance Requirements (SPR) -Domain-3 Step-1 V2, Edition 00.01.02, dated 25th October 2013

[40]**P06.08.07** Operational Service and Environment Definition (OSED) for Domain 3, Edition 02.00.04, dated 3rd May 2013
https://extranet.sesarju.eu/WP_06/Project_06.08.07/Project%20Plan/Deliverables/SESAR-JU_P06.08.07_D07_Final_OSED_V2-Step1-(v02.00.04).doc

[41] **P06.07.03** – D09 – V2 Step 1 Validation Report Edition 00.02.00 12 July 2012

[42] **P06.07.03** – A-SMGCS Guidance Safety Assessment Report (SAR) Edition 00.00.01 Internal working document

[43] 06.07.03, Preliminary Validation Exercises Phase 2 (D-TAXI - ECTL - NATMIG), D64, 00.01.00, 07/09/2015
https://extranet.sesarju.eu/WP_06/Project_06.07.03/Project%20Plan/D64-VALR%20Preliminary%20Validation%20Exercises%20Phase%202%20(D-TAXI-ECTL-NATMIG)/DEL06_07_03-D64-V2%20Validation%20Report%20Step%201.docx

[44] 06.07.03, Preliminary Validation Report Phase 2 (EXE-06.07.03-VP-092), D27, 00.01.00, 23/11/2015
https://extranet.sesarju.eu/WP_06/Project_06.07.03/Project%20Plan/D27%20-%20Preliminary%20Validation%20exercises%20Phase%202%20(VSB%20-%20ENAV)/DEL-06%2007%2003-D27-EXE%20092%20VALR.docx

[45] 06.03.01, VP759 - Validation Report,D153, 00.01.01, 07/03/2016
https://extranet.sesarju.eu/WP_06/Project_06.03.01/Project%20Plan/WA3%20-%20Integrated%20Validation%20for%20Runway%20Throughput%20and%20Surface%20Management/VP-759/VP759_VALR/06.03.01%20D153%20VALR%20EXE%20VP-759.docx

[46] 06.03.01, Consolidated DEL Release 5 Validation Report with 06.09.02 T1031, D149, to be issued

[47] 06.07.02, OFA04.02.01 (Integrated Surface Management) Interim SPR, D77, 00.01.00, 05/08/2015
https://extranet.sesarju.eu/WP_06/Project_06.07.02/Project%20Plan/06.07.02-D77-OFA04.02.01%20(Integrated%20Surface%20Management)%20Interim%20SPR.docx

[48] 06.07.02, Preliminary Validation Report, D18, 00.01.01, 15/04/2013,
https://extranet.sesarju.eu/WP_06/Project_06.07.02/Project%20Plan/06.07.02-D18-Preliminary%20Validation%20Report.doc

[49] 06.07.02, Preliminary Validation Report for advanced surface routing (FTS exercises), D42, 00.00.04, to be issued

[50] 06.03.01, Consolidated DEL Release 5 Validation Report with 06.09.02 T1031, D149, 00.01.00, 02/09/2016
https://extranet.sesarju.eu/WP_06/Project_06.03.01/Project%20Plan/WA3%20-%20Integrated%20Validation%20for%20Runway%20Throughput%20and%20Surface%20Management/R5%20Integrated%20exercises%20VALR/DEL06_03_01_D149_Consolidated%20DEL%20Release%205%20Validation%20Report%20(with%2006%2009%2002%20T1031).docx

[51] 06.07.03, OFA04.02.01 (Integrated Surface Management) Final INTEROP, D28, Edition 00.01.00, 16th September 2016

[52] 09.49 Batch 1, 2 & 3 - Consolidated functional airborne architecture, D04, Edition 00.01.00, 30th October 2015
https://extranet.sesarju.eu/WP_09/Project_09.49/Project%20Plan/T09.49.004/9%2049-D04_Batch1-2-3_Consolidated_functional_Airborne_Architecture_00%2001_00.docx

Appendix A   Assessment / Justifications

A.1 Functional Model

N/A in this document.

This section was shifted and described in the Integrated Surface Management Safety Assessment Report (SAR) [33]

A.2 Safety and Performance Assessments

A.2.1 Safety Assessment

This section was shifted and described in the Integrated Surface Management Safety Assessment Report (SAR) [33].

The safety assessment has been performed following the general approach presented by P16.06.01 and promoted in the SESAR Safety Reference Material (SRM) [25] which is broader than SAM [7] or ED78A [5] which are concerned only with failure of the System and not with what the system is required to do in the first place (i.e. its functionality and performance). In the Integrated Surface Management Safety Assessment Report (SAR) [33] the whole safety assessment process covers both success and failure viewpoints:

- Success approach refers to the pre-existing hazards which by definition exist in the operational environment before any form of deconfliction has taken place. It means that the pre-existing hazards are not caused by the system but they are those expected to be eliminated or, at least, mitigated by introducing the system. In other words, this first step aims at identifying the benefits which should be provided by the system under the normal condition.
- Failure approach concerns with the failure of the change introduced and not with what the change is required to do in the first place. Therefore this phase includes the abnormal operating conditions under which the system has to operate in degraded mode.

The Integrated Surface Management Safety Assessment Report (SAR) [33] has been produced on the basis of the guidelines provided by P16.06.01 and illustrated in the SESAR Safety Reference Material (SRM) [25], Main scope of the SAR is to describe all the safety assurance activities constituting the whole safety process. However, at this stage review of the success approach is considered as starting point to update the whole safety assessment. Therefore, the details of the updated success approach can be found in the SAR [33].

Regarding the Failure approach, it deals solely with the system-generated hazards, caused by the failures of the A-SMGCS Routing and Planning and Guidance function. The assessment related to the failure approach is the core activity to carry out a complete Operational Safety Assessment Process. The main aim is to identify and report Safety Objectives and Safety Requirements associated with the operational use of the Routing and Planning and Guidance function. For this purpose, both EUROCAE ED-78A [5] and EUROCONTROL SAM [7] methodologies have been taken as reference. An incremental approach is being followed, in coordination with P16.06.01, to adapt the content of the here described failure approach to the SESAR SRM.

The entire process adopted to perform the Operational Safety Assessment is well illustrated in the "bow-tie" model shown in thefigure below.
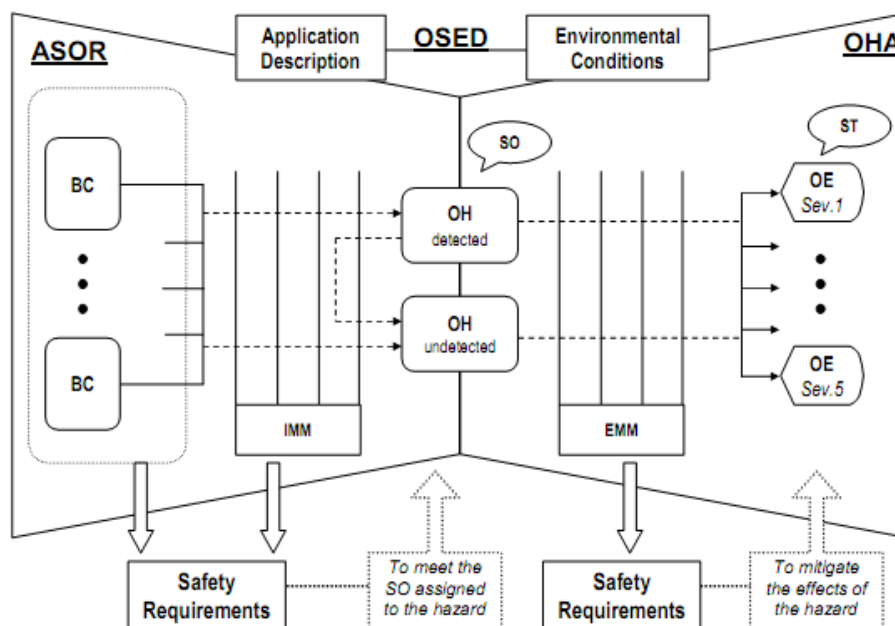

Figure 4: Operational Safety Assessment Process

As already highlighted, a clear picture of the services provided by the function and of the environment in which the function is expected to operate, as described in the OFA04.02.01 Final OSED [35], has to be considered as the basis for the assessment. Figure 4 provides a schematic illustration of the activities to be carried out for a complete safety assessment:

1. Operational Hazard Assessment (OHA) whose scope is to set Safety Objectives (SO) for each identified Operational Hazard (OH) in order to mitigate the effects of the hazard.
2. Allocation of Safety Objectives and Requirements (ASOR) whose aim is to identify the Basic Causes (BC) which can lead to the OH and, then, to define Safety Requirements (SR) to ensure that the safety objectives are met.

Both OHA and ASOR produce their outcomes starting from the identification of the Operational Hazard (OH) for the application under assessment.

All these aspects regarding the application of the Assessment are reported in the Integrated Surface Management Safety Assessment Report (SAR) [33]

A.2.1.1.1 OHA / SAM-FHA

The Operational Hazard Assessment (OHA) allows analysing the identified Operational Hazards (OH) associated to the A-SMGCS Routing and Planning and Guidance function. OHA is closely related to the system definition and aims to assess how safe the system needs to be. It is important to highlight that, at this stage, we will consider just a qualitative assessment.
The OHA process includes four steps:

Step 1. Hazard identification which focuses on the failure of the system, also in combination and interactions with other systems in the environment of operations. Detection of what can go wrong is the main scope of this first step.
Step 2. Hazard effects identification in order to establish what are the potential consequences on operations taking into account also potential barriers which could act as mitigation means.
Step 3. Effects severity classification.
Step 4. Safety objectives specification to determine their acceptability in terms of hazard's maximum frequency of occurrence, derived from the severity and the maximum frequency of the hazard's effects. In other words, how safe the system needs to be.

Setting of safety objectives is based on the identification of the worst credible case (WCC) and of the related severity according to the following Severity Classification Scheme (SCS).

Severity Class	1 [Most Severe]	2	3	4	5 [Least Severe]
Effects on operations	Accidents	Serious Incidents	Major Incidents	Significant Incidents	No Immediate effects on safety
SEVERITY INDICATORS SET 1: EFFECTS ON AIR NAVIGATION SERVICE					
Effect on Air Navigation Service within the area of responsibility	Total Inability to provide or maintain safe service	Serious inability to provide or maintain safe service	Partial inability to provide or maintain safe service	Ability to provide or maintain safe but degraded service	No safety effect on service
ATCO and/or Flight Crew Working Conditions	Workload, stress or working conditions are such that they cannot perform their tasks at all	Workload, stress or working conditions are such that they are unable to perform their tasks effectively	Workload, stress or working conditions such that their ability is significantly impaired	Workload, stress or working conditions are such that their abilities are slightly impaired	No effect
Effect on ground ATM system and/or Aircraft Functional Capabilities	Total loss of functional capabilities	Large reduction of functional capabilities	Significant reduction of functional capabilities	Slight reduction of functional capabilities	No effect
ATCO and/or Flight Crew ability to cope with adverse operational and environment conditions	Unable to cope with adverse operational and environment conditions	Large reduction of the ability to cope with adverse operational and environmental conditions	Significant reduction of the ability to cope with adverse operational and environmental conditions	Slight reduction of the ability to cope with adverse operational and environmental conditions	No effect
Effect on barrier model	Inability for any "prevention", "resolution" nor "recovery" of conflict situation	Inability for any "prevention" and/or "resolution" of conflict situation, however "recovery" possible	Inability for "prevention" of conflict situation, "resolution" partially impaired	"prevention" of conflict situation impaired	No effect
SEVERITY INDICATORS SET 2: EXPOSURE					
Exposure time	The presence of the hazard is almost permanent. Reduction of safety margins persists even after recovering from the immediate problem	Hazard may persist for a substantial period of time	Hazard may persist for a moderate period of time	Hazard may persist for a short period of time such that no significant consequences are expected	Too brief to have any safety-related effect
Number of aircraft exposed area of responsibility	All aircraft in the area of responsibility	All aircraft in several ATC sectors	Aircraft within a small geographic area or an area of low density	Single aircraft	No aircraft effected
SEVERITY INDICATORS SET 3 : RECOVERY					
Annunciation, Detection and Diagnosis	Undetected misleading indication	Ambiguous indication. Not easily detected. Incorrect diagnosis likely	May require some interpretation. Detectable. Incorrect diagnosis possible.	Clear annunciation. Easily detected, reliable diagnosis	Clear annunciation. Easily detected and very reliable diagnosis
Contingency measures (other systems or procedures) available	No existing contingency measures available. Operators unprepared. Limited ability to intervene	Limited contingency measures, providing only partial replacement functionality. Operators not familiar with procedures or may need to devise a new procedure at the time	Contingency measures available, providing most of required functionality. Fall back equipment usually reliable. Operator intervention required, but a practised procedure within the scope of normal training	Reliable, automatic, comprehensive contingency measures	Highly reliable, automatic, comprehensive contingency measures
Rate of development of the hazardous condition, compared to the time necessary for annunciation, detection, diagnosis and application of contingency measures	Sudden. It does not allow recovery	Fast	Similar	Slow	Plenty of time available

Table 5: SAM Severity Classification Scheme

Once the severity of the hazard effects has been fixed it is needed to establish the maximum frequency at which a hazard can be tolerated to occur. Both qualitative Safety Objective Classification Scheme (SOCS) and Risk Classification Scheme (RCS) have been applied on the basis of what is defined in the SAM documents.

Severity Class of the Worst Credible hazard effect (as for ESARR 4)	Maximum acceptable frequency of hazard occurrence (Safety Objective)	Definition of these qualitative categories
1	EXTREMELY RARE	Such an effect is not expected to happen throughout the system lifetime
2	RARE	It is not expected to have such an effect more than exceptionally and in some specific circumstances throughout the system lifetime
3	OCCASIONAL	This effect may happen sometimes throughout the system lifetime
4	LIKELY	This effect will certainly happen several times throughout the system lifetime
5	NUMEROUS	This effect will certainly happen often throughout the system lifetime

Table 6: Qualitative Safety Objective Classification Scheme (SOCS)

A qualitative risk classification scheme allows linking the severity of the worst credible effect of the hazard to the corresponding maximum frequency of occurrence.

Figure 5: Qualitative Risk Classification Scheme (RCS)

Hazards reflect the potential failures related to the services provided by the A-SMGCS routing and planning and Guidance function.

The process applied for setting proper safety objectives envisages the identification of mitigation barriers between hazard and its effects. The severity assigned to each operational hazard effect depends on the effectiveness of the barriers identified. It means that the severity could increase when the barriers are not satisfied. This approach permits the identification of cases which are more reasonable to experience during the operational lifetime of the system (i.e. the so called Worst Credible Case – WCC). As explained in the SAM documents, the safety objectives have to be allocated only to the WCC.

For the V2 activities the established Safety Objectives are just qualitative statements that define the maximum frequency or probability at which a hazard can be tolerated to occur. Several meetings with the involvement of the operational staff (i.e. ATCOs) allowed us to identify both operational effects and related severity classes.

The detailed analysis is reported in the Integrated Surface Management Safety Assessment Report (SAR) [33].

A.2.1.1.2 ASOR / SAM-PSSA

This section provides a summary of the process applied to allocate safety objectives and requirements. The scope of the PSSA process is to assess whether the proposed architecture is able to achieve an acceptable level of safety by meeting the safety objectives identified through the FHA.
The main outcome of the PSSA is the apportionment of Safety Objectives into Safety Requirements allocated to the system elements, i.e. a specification of the risk level to be achieved by the system elements.
PSSA consists of two core activities:

- Evaluate the proposed design architecture (s) to assess whether and how it contributes to the hazards. The architecture covers the whole environment, including people, procedures and equipment. The architectures taken as reference is showed in the P12.01.07 Technical Architecture Description document which is still a draft.
- Derive safety requirements from safety objectives. It could be considered as a risk mitigation means required to reduce the risk (s) to an acceptable level. Three options are taken into account:
  - Eliminate the hazard
  - Reduce severity of effects
  - Reduce frequency of occurrence of effects.

Development of fault tree diagrams has a twofold objective:

- Show how combinations of faults lead to the most critical hazards;
- Link the identified hazards to failure causes.

As defined above, the whole process applied to allocate safety objectives and requirements is fully described in the Integrated Surface Management Safety Assessment Report (SAR) [33]

A.2.1.1.3 Hazards analysis

This section should provide an overview of the analysis carried out to define both safety objectives and safety requirements for each identified operational hazard.

Corresponding event trees diagrams are reported in the Integrated Surface Management Safety Assessment Report (SAR) [33] to show the potential operational consequences of each hazard and to allocate the related effects severity and safety objectives. The process adopted to identify the barriers for mitigating the severity of the hazard effects takes into account both systems and people involved in the system environment in which the A-SMGCS Routing and Planning and Guidance function will operate.

Once the effects severity of each operational hazard is fixed and the related safety objectives are set, the Allocation of Safety Objectives and Requirements (ASOR) process will allow, through fault tree diagrams, the identification of the corresponding Basic Causes (BC) and, then, the definition of Safety Requirements (SR) to ensure that the safety objectives are met. Security risk assessment

A.2.2 Security Risk assessment

N/A for that version of the SPR document

A.2.3 Environment impact assessment

N/A for that version of the SPR document

A.2.4 OPA

A.2.4.1 Introduction

The purpose of the Operational Performance Assessment (OPA) is to make an evaluation of working effectiveness and suitability of a system through test methods. This evaluation will be done developing potential issues that would appear in the Key Performance Areas (KPAs)/Key Performance Indicators (KPIs) defined in the Strategic Guidance of SESAR Programme [10] and ICAO 9883 HP [6].

This OPA is aimed at:

- Identification of defects
- Measurement of the adequacy of the outputs
- Assessment of the reliability of the operations

In order to achieve these objectives the OPA is organized around two different methodologies which will produce independent and complementary requirements and recommendations as an outcome.

- On the one side, a list of Performance Indicators is defined, as well as a list of Performance Scenarios in which the indicators will be assessed. To this end two approaches have been carried out focused respectively on:
  - ATM performances (see section A.2.4.2) – This assessment is done through the analysis of Validation Results collected from the different validation exercises conducted in OFA04.02.01. The focus of this analysis is on Routing and Planning function and its aim is to determine operational requirements which improve this function performance towards the final performance targets in terms of Key Performance Areas (KPAs) established by B4.1. Main objective is to define performance requirements to meet the expected contribution to overall ATM performance;
  - Service performances (see section A.2.4.3) – This assessment is done according to expert judgement and takes into account the whole set of services provided by the Routing and Planning and Guidance function.
- On the other end, a set of performance issues is derived by analysing the functional model described in section A.1. Performance issues will lead to performance mitigations, which will be eventually formally expressed as requirements.

The analysis and results of the different validation exercises will be taken into account in the definition of the operational concept in future V-phases (e.g., Final OSED).

A.2.4.2 ATM performances

A.2.4.2.1   Performance Indicators definition

SESAR Programme Strategic Guidance [10] and P06.05.01-T005/T006 Methodology criteria to identify and analyse KPI and Performance Drivers [16] establish the existence of 11 KPAs classified into 3 blocks according to their scope, as illustrated in Figure 3. On the basis of the analysis performed by

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P06.05.01 [17], Capacity, Efficiency, Flexibility, Predictability and Environmental Sustainability are considered the most important ones for Airport Operations projects.

Figure 6: SESAR Performance Areas (KPA)

Among these, project P06.02 Validation Strategy provided the OI Steps and their impact on the previously mentioned KPAs. According to this document and more specifically to the OI Steps AO-0205, AO-0206, AO-0222, AO-0223, AUO-0308, AUO-0603-A and AO-0215, only Capacity, Efficiency and Predictability should be considered as Key Performance Areas for the A-SMGCS Routing and Planning and Guidance function.

Moreover, on the same document, the High Level objectives of each KPA are defined for each OFA. For the 'Integrated Surface Management' OFA, the Environmental Sustainability is specifically defined and justified to 'Demonstrate the reduction of gaseous and particulate emissions through reduced changes in thrust and holding', thus implying a reduction on fuel consumption. This idea is reinforced by B4.1 proposed targets, where this OFA had the objective of (slightly) reducing taxi-in/out fuel consumption, although it specified the difficulty on measuring this parameter. Therefore, the traceable parameter 'Burned Fuel on taxi-in/out movements', related to the Fuel Efficiency indicator, would not only impact on the Efficiency KPA but also on the Environmental Sustainability, and therefore this last one should be added in the OPA.

Finally, Cost Effectiveness has also been included as the fifth KPA for the A-SMGCS Routing and planning and guidance function as this project is clearly focused on increasing predictability values thus decreasing Tower controller's workload, increasing their productivity resulting in a decrease of the ANSP costs. Therefore, a positive impact on the Predictability KPA implies a reduction on costs and a positive impact on the Cost Effectiveness KPA.

Therefore, the Key Performance Indicators have been classified into these 5 different KPAs:

- Capacity
- Efficiency
- Predictability

- Environmental Sustainability
- Cost Effectiveness

It is also important to remark that different KPIs will often be a trade-off between effects for different KPAs.

The current KPI identification is not binding for the OPA, meaning that not all identified KPIs will be addressed either quantitatively or qualitatively.

4.2.1.1.1 Capacity

According to P06.05.01-T005/T006 Identify Airport KPIs and Performance Drivers for the Capacity KPA/Focus Areas [18], Capacity KPA includes the Focus Areas which, in turn, include the KPIs detailed in the following table:

KPA	Focus Areas	KPIs	
Capacity	Airport Capacity	Runway Capacity Shortage	Landing Capacity
			Take Off Capacity
			Total (Mix OPS) Capacity
		Ground Movement Capacity Shortage	**Inbound Taxiing Capacity**
			Outbound Taxiing Capacity
			Total (Mix OPS) Taxiing Capacity
		Apron Capacity Shortage	
	Local Airspace Capacity	TMA Capacity Shortage	Climb Traffic Capacity
			Approach Traffic Capacity
			Total (Mix OPS) Traffic Capacity
	Network Capacity	En-Route Capacity Shortage	En-Route Traffic Capacity

Table 7: Capacity KPA – Focus Areas and KPIs

The contribution of A-SMGCS Routing and planning function to Capacity KPA is located on the Ground Movement Capacity Shortage KPI, involving Inbound, Outbound and thus Total (Mix OPS) Taxiing operations.

In order to assess the Operational Performance of OFA04.02.01 in the field of Capacity KPA, the following measurable parameters have been identified in different validation exercises::

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Term	Definition	KPI Assessed
Inbound total number of mobiles managed by the A-SMGCS Routing and Planning function	This is the quantity of mobiles (aircraft) that the A-SMGCS Routing and Planning function is able to process, for inbound operations	Inbound Taxiing Capacity (Ground Movement Shortage)
Outbound total number of mobiles managed by the A-SMGCS Routing and Planning function	This is the quantity of mobiles (aircraft) that the A-SMGCS Routing and Planning function is able to process, for outbound operations	Outbound Taxiing Capacity (Ground Movement Shortage)
Global number of mobiles managed by the A-SMGCS Routing and Planning function	This is the quantity of mobiles (aircraft) that the by the A-SMGCS Routing and Planning function is able to process, for all taxiing operations	Total (mix OPS) Taxiing Capacity (Ground Movement Shortage)
Airport (taxiway) capacity	The ATC system allows controllers to manage high level traffic	Inbound and Outbound Taxiing Capacity

Table 8: Capacity KPA – parameters under assessment

4.2.1.1.2 Efficiency

According to P06.05.01-T005/T006 Identify Airport KPIs and Performance Drivers for the Efficiency KPA/Focus Areas [19], Efficiency KPA includes the Focus Areas which, in turn, include the KPIs detailed in the following table:

KPA	Focus Areas	KPIs	
Efficiency	Temporal	Flight Delay	Arrival

Efficiency		Departure
	TMA Delay	Arrival
		Departure
	Runway Delay	Landing
		Take-Off
	Ground Movement Delay	**Taxi-in**
		Taxi-out
	Apron Turn-Around Delay	
Infrastructural Efficiency	TMA Efficiency	Arrival
		Departure
	Runway Efficiency	Arrival
		Departure
	Ground Movement Efficiency*	**Arrival**
		Departure
	Apron Efficiency	

Table 9: Efficiency KPA – Focus Areas and KPIs

Ground Movement Efficiency is related to the imbalance between available (practical/declared) and theoretical (maximum possible) capacity.

The contribution of OFA04.02.01 to Efficiency KPA is located on the Ground Movement Delay KPI, involving Taxi-in and Taxi-out, as well as in Ground Movement Efficiency KPI, involving Arrival and Departure.

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In order to assess the Operational Performance of Surface Management functionalities in relation to the Efficiency KPA, the following measurable parameters are proposed:

Term	Definition	KPI Assessed
Taxi time	Actual taxi time per movement	Ground Movement Delay
Taxi length	Actual taxi length per movement	Ground Movement Delay
Number of predicted conflicts	Traffic conflicts predicted by Routing function	Ground Movement Delay
Surface In and Out Operations	Taxi time variability and start and stop times during taxi	Ground Movement Efficiency
Average Delay (in minutes) for taxi-in operations	This is the average delay (expressed in minutes) of all aircraft planned for a given time interval, focusing on taxi-in operations	Ground Movement Delay (Taxi-in)
Average Delay (in minutes) for taxi-out operations	This is the average delay (expressed in minutes) of all aircraft planned for a given time interval, focusing on taxi-out operations	Ground Movement Delay (Taxi-out)
Start/stop cycles in taxi-in	This is the number of start/stop cycles that one mobile (specially aircraft) does in taxi-in operation	Ground Movement Efficiency (Arrival)
Start/stop cycles in taxi-out	This is the number of start/stop cycles that one mobile (specially aircraft) does in taxi-out operation	Ground Movement Efficiency (Departure)
Taxi-in imbalance in capacity	This is the imbalance between available and theoretical capacity for taxi-in operations	Ground Movement Efficiency (Arrival)
Taxi-out imbalance in capacity	This is the imbalance between available and theoretical capacity for taxi-out operations	Ground Movement Efficiency (Departure)

Table 10: Efficiency KPA – parameters under assessment

4.2.1.1.3 Predictability

According to P06.05.01-T005/T006 Identify Airport KPIs and Performance Drivers for the Predictability KPA/Focus Areas [20], Predictability KPA includes the Focus Areas which, in turn, include the KPIs detailed in the following table:

KPA	Focus Areas	KPI
Predictability	**Flight Operation Variability**	**Arrival Predictability**
		Turnaround Predictability
		Departure Predictability
		Block to Block Variability
	Knock-On Effect	A/C Changes (No. or %)
		Flight Cancellation (No. or %)
	Service Disruption Effect	**Arrival Predictability (Disrupted Conditions)**
		Turnaround Predictability (Disrupted Conditions)
		Departure Predictability (Disrupted Conditions)

Table 11: Predictability KPA – Focus Areas and KPIs

The contribution of OFA04.02.01 to Predictability KPA is located on the Flight Operation Variability Focus Area, through its KPIs Arrival and Departure Predictability. Obviously, there also is an equivalent contribution to Service Disruption Effect through the equivalent KPIs to the previous ones.

Regarding to Predictability KPA, the Operational Performance of OFA04.02.01 can be measured using the following parameters:

Term	Definition	KPI Assessed
Accuracy of planned taxi times	Difference between actual taxi time and planned taxi time	Arrival and Departure predictability
Surface Movement, Business Trajectory Predictability	Taxi in/out Times Variability; Average and Standard deviation Taxi time accuracy	Block to Block Variability

Adherence to pre-calculated target times, taxi-in	This is the total amount of aircraft arriving on time (as planned) related to total flights planned, expressed in percentage. For taxi-in operations	Arrival Predictability and Block to Block variability (Flight Operation Variability)
Adherence to pre-calculated target times, taxi-out	This is the total amount of aircraft departing on time (as planned), related to total flights planned, expressed in percentage. For taxi-out operations	Departure Predictability and Block to Block variability (Flight Operation Variability)
Adherence to pre-calculated target times in a Service Disruption, taxi-in	This is the total amount of aircraft arriving on time (as planned) during a Service Disruption, related to total flights planned, expressed in percentage. For taxi-in operations	Arrival Predictability in Disruption Conditions (Service Disruption Effect)
Adherence to pre-calculated target times in a Service Disruption, taxi-out	This is the total amount of aircraft arriving on time (as planned) during a Service Disruption, related to total flights planned, expressed in percentage. For taxi-out operations	Departure Predictability in Disruption Conditions (Service Disruption Effect)

Table 12: Predictability KPA – parameters under assessment

4.2.1.1.4 Environmental Sustainability

According to P06.05.01-T005/T006 Identify Airport KPIs and Performance Drivers for the Environmental Sustainability KPA/Focus Areas [21], Environmental Sustainability KPA includes the Focus Areas which, in turn, include the KPIs detailed in the following table:

KPA	Focus Areas	KPI
Environmental Sustainability	Noise	Noise contours
		Noise impact
		Number of movements within specified noise categories

		Number of movements per time period	
		Noise levels at specific points	
		Deviations from flight track tolerance bands	
		Taxiing noise levels at specific points	
		Noise levels at specific points from aircraft at stand	
		Noise levels at specific points from ground running/engine testing	
	Air Quality and Climate Effects	Concentration of air pollutants (NO, NO2, CO, SO2, dust, PAH)	
	Global Emissions	Emissions in relation to traffic units or passenger during flight in the TMA	
		Emissions in relation to traffic units or passenger	Emissions during approach operations
			Emissions during taxi-in operations
			Emissions during taxi-out operations
			Emissions during climb out operations
		Amount of emissions during the engine test runs	
		APU emissions during turnaround	
		Emissions through airside vehicles and ground equipment	

Table 13: Environmental Sustainability KPA – Focus Areas and KPIs

The contribution of OFA04.02.01 to Environmental Sustainability KPA is located on the Air Quality and Global Emissions Focus Area, involving Emissions through airside vehicles and Emissions in relation to traffic units or passenger during taxi-in and taxi-out KPIs. There is also a contribution to the KPI of Concentration of air pollutants included in the Air Quality and Climate Effects Focus Area.

In case of Environmental Sustainability KPA, the following parameters are proposed for the assessment of the Operational Performance of Surface Operations:

Term	Definition	KPI Assessed
Average Fuel burned by aircraft, taxi-in	This is the average quantity of fuel burned by aircraft during taxi-in operations, expressed in relation to traffic units or passengers	Emissions in relation to traffic units or passenger during taxi-in operations (Global Emissions)
Average Fuel burned by aircraft, taxi-out	This is the average quantity of fuel burned by aircraft during taxi-out operations, expressed in relation to traffic units or passengers	Emissions in relation to traffic units or passenger during taxi-out operations (Global Emissions)
Average Fuel burned by airside vehicles and ground equipment	This is the average quantity of fuel burned by airside vehicles and ground equipment, expressed in relation to traffic units or passengers	Emissions through airside vehicles and ground equipment (Global Emissions)
Average fuel burnt (Kg per flight)	To assess if fuel burn and related pollutant emissions are reduced with the introduction of DMAN/Routing compared to reference operations	Emissions during taxi-in and taxi-out operations
Average fuel burn variation between reference and solution scenario (Kg per flight)	To assess if fuel burn and related pollutant emissions are reduced with the introduction of DMAN/Routing compared to reference operations	Emissions during taxi-in and taxi-out operations
Average CO2 (Kg per flight)	To assess if fuel burn and related pollutant emissions are reduced with the introduction of DMAN/Routing compared to reference operations	Emissions during taxi-in and taxi-out operations
Average CO2 variation between reference	To assess if fuel burn and related pollutant emissions are reduced with the introduction of	Emissions during taxi-in and taxi-out operations

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and solution scenario (Kg per flight)	DMAN/Routing compared to reference operations	

Table 14: Environmental Sustainability KPA – parameters under assessment

4.2.1.1.5 Cost Effectiveness

According to SESAR Programme Strategic Guidance [10], Cost Effectiveness KPA includes the Focus Areas which, in turn, include the KPIs detailed in the following table:

KPA	Focus Areas	KPIs	
Cost Effectiveness	ATM Cost Effectiveness	**Direct Cost of G2G ATM**	**Airspace Users Direct Costs**
			ANS Costs
			Airport Operator Direct Costs
		Indirect Cost of G2G ATM	Airspace Users Indirect Costs
			Airport Operator Indirect Costs

Table 15: Cost Effectiveness KPA – Focus Areas and KPIs

The contribution of A-SMGCS Routing and planning functions to Cost Effectiveness KPA is located on the Direct Cost of G2G ATM KPI, from ANS Costs through Airport Operator and Airspace Users Costs.

In order to assess the impact of this contribution of Routing and Planning functions to Cost Effectiveness KPA, there are proposed the following parameters:

Term	Definition	KPI Assessed
Cost per operation of ANS derived from taxiing operations	This is the cost of ANS services in relation to number of operations, derived from the routing and planning functionalities, including human costs and technical costs	ANS Costs (Direct Cost of G2G ATM)
Cost per operation for Airspace Users derived from taxiing	This is the cost of taxiing operations for the Airspace Users, expressed in	Airspace Users Direct Costs (Direct Cost

operations	relation to number of operations	of G2G ATM)
Cost per operation for Airport Operator derived from taxiing operations	This is the cost of ANS services for the Airport Operator in relation to number of operations, derived from the routing and planning functionalities	Airport Operator Direct Costs (Direct Cost of G2G ATM)

Table 16: Cost Effectiveness KPA – parameters under assessment

A.2.4.2.2   OFA 04.02.01 Indicators

In this chapter, metrics defined for each KPI identified in the preceding section are specified.

4.2.1.1.6 Capacity

KPI Assessed	Indicator	Definition
Inbound Taxiing Capacity	Inbound total number of mobiles managed by routing	# of mobiles managed for inbound operations
Outbound Taxiing Capacity	Outbound total number of mobiles managed by routing	# of mobiles managed for outbound operations
Total (Mix OPS) Taxiing Capacity	Global number of mobiles processed by routing	# of mobiles managed for global (mixed) operations

Table 17: Capacity KPIs indicators

Capacity indicators aim to assess the contribution of the A-SMGCS Routing and Planning function to the number of mobiles managed for both inbound and outbound taxi operations and ground movement of vehicles, which is expected to have an impact of 1% out of the overall improvement of airport capacity of the SESAR project, targeted at 8% for Step 1.

4.2.1.1.7 Efficiency

KPI Assessed	Indicator	Definition
Taxi-in Ground Movement Delay	Average Delay (in minutes) for taxi-in operations	∑ delay (minutes) for a given time (e.g. 1 day) / # aircraft managed during the given time (e.g. 1 day) (for taxi-in ops)
Taxi-out Ground Movement Delay	Average Delay (in minutes) for taxi-out operations	∑ delay (minutes) for a given time (e.g. 1 day) / # aircraft managed during the given time (e.g. 1 day) (for taxi-out ops)
Arrival Ground Movement Efficiency	Start/Stop cycles, taxi-in	∑ #start/stop cycles for a given time (e.g. 1 hour) / # aircraft managed during the given time (e.g. 1 hour) (for taxi-in ops)
Departure Ground Movement Efficiency	Start/Stop cycles, taxi-out	∑ #start/stop cycles for a given time (e.g. 1 hour) / # aircraft managed during the given time (e.g. 1 hour) (for taxi-out ops)
Arrival Ground Movement	Imbalance in capacity, taxi-in	declared (available) taxi-in capacity / maximum taxi-in capacity, expressed as %

Efficiency		
Departure Ground Movement Efficiency	Imbalance in capacity, taxi-out	declared (available) taxi-out capacity / maximum taxi-out capacity, expressed as %

Table 18: Efficiency KPIs indicators

Efficiency indicators aim to assess the contribution of the OFA04.02.01 to the average delay for both inbound and outbound aircraft operations, the average start-stop cycles for taxi in-out operations and the percentage of utilization of taxi movements, which would impact the overall decrease of delays of the SESAR project and the decrease of the fuel burned by aircraft (and therefore released particles to the environment) of around 2.5% out of the overall improvement of the SESAR project, targeted at -2.8% for Step 1.

4.2.1.1.8 Predictability

KPI Assessed	Indicator	Definition

Arrival predictability	Adherence to pre-calculated target times, taxi-in operations
	• In block predictability
	    t = AIBT-TIBT
	• On ground predictability
	    t =ALDT-TLDT
		# of aircraft arriving on time at their destination (|AXXT-TXXT|<x minutes) / Mean delay expressed as the difference between target and actual In-block or landing times.

Departure predictability	Adherence to pre-calculated target times, taxi-out operations
	• off-block predictability
	    t = AOBT-TOBT
	• take-off predictability
	    t =ATOT-TTOT
		# of aircraft arriving on time at their destination (|AXXT-TXXT|<x minutes) / Mean delay expressed as the difference between target and actual Off-block or Take-Off times.

Arrival Predictability (Disrupted Conditions)	Adherence to pre-calculated target times in service disruption, taxi-in	# of aircraft arriving on time (as planned) at their destination / # of aircraft managed (for taxi-in ops in service disruption)
Departure Predictability (Disrupted Conditions)	Adherence to pre-calculated target times in service disruption, taxi-out	# of aircraft arriving on time (as planned) at their destination / # of aircraft managed (for taxi-out ops in service disruption)
Block to Block Variability	Variance of the distribution of actual flight duration vs. planned flight duration.	Variance of the normal distribution of (ALDT – ATOT) - (TLDT – TTOT) for flights in a finite interval of time.

Table 19: Predictability KPIs indicators

Predictability indicators aim to assess the contribution of the OFA04.02.01 to the enhancement of average adherence to the expected target times for arrival (taxi-in) and departures (taxi-out) operations. High adherence levels to target times will allow increased predictability on taxiway demand and capacity estimations.

The A-SMGCS will contribute to the final target value of Arrival and Departure predictability. The relative improvement associated to the Routing and Planning function has not been yet determined, but is an objective for the further B4.1 Targets iterations. For now, it is known that the overall target of A/D Predictability corresponds to a 6 minutes time window interval (-3 min< t < 3min). The 95 % of flights have to comply with this performance figure (taken from WP 6.5.1 KPA Analysis Predictability [20]).

The Routing and Planning function is foreseen to decrease block-to-block variability around 10% out of the overall improvement of SESAR, targeted at 20% decrease for Step 1.

4.2.1.1.9 Environmental Sustainability

KPI Assessed	Indicator	Definition
Emissions during taxi-in operations	Average Fuel burned by aircraft, taxi-in	∑fuel burned by aircraft (Tn.) for a given time (e.g. 1 day) / # pax. for the given time (e.g. 1 day), for taxi-in ops
Emissions during taxi-out operations	Average Fuel burned by aircraft, taxi-out	∑fuel burned by aircraft (Tn.) for a given time (e.g. 1 day) / # pax. for the given time (e.g. 1 day), for taxi-out ops
Emissions through airside vehicles and ground equipment	Average Fuel burned by airside vehicles and ground equipment	∑fuel burned by airside vehicles and ground equipment (Tn.) for a given time (e.g. 1 day) / # pax. for the given time (e.g. 1 day)

Table 20: Environmental Sustainability KPIs indicators

Environmental Sustainability indicators aim to assess the contribution of the OFA04.02.01 to the average fuel burned by aircraft for both inbound and outbound aircraft operations, which would impact the overall decrease of the fuel burned by aircraft (and therefore released particles to the environment) of around 2.5% out of the overall improvement of the SESAR project, targeted at -2.8% for Step 1.

4.2.1.1.10   Cost Effectiveness

KPI Assessed	Indicator	Definition
ANS Costs	Cost per operation of ANS derived from taxiing operations	∑ costs of ANS services derived from taxiing ops for a given time(e.g. 1 year) (€) / # of operations in the given time (e.g. 1 year)
Airspace Users Direct Costs	Cost per operation for Airspace Users derived from taxiing operations	∑ costs for Airspace users derived from taxiing ops for a given time(e.g. 1 year) (€) / # of operations in the given time (e.g. 1 year)
Airport Operator Direct Costs	Cost per operation for Airport Operator derived from taxiing operations	∑ costs for Airport Operator derived from taxiing ops for a given time(e.g. 1 year) (€) / # of operations in the given time (e.g. 1 year)

Table 21: Cost effectiveness KPIs indicators

Cost Effectiveness indicators aim to assess the contribution of the OFA04.02.01 to the average taxi ANS derived costs in inbound and outbound aircraft operations, the cost per operation for airspace users derived from taxi operations, and the airport operator cost per operation derived from taxi operations. Although not being targeted to provide contributions on the overall impact of decreasing the ANS costs of the SESAR project, targeted at -6.3%% for Step 1, it is expected to contribute on it.

aircraft

founding members

A.2.4.3 Service related approach

A.2.4.3.1 Purpose

The purpose of this section is to provide the outcome of the Operational Performance Assessment (OPA) for all the services expected to be provided by the A-SMGCS Routing and Planning and Guidance function.

A.2.4.3.2 Route Generation Integrated With Planning Information service

Here is a schematic showing the boundaries of the system, and its interaction with other entities.
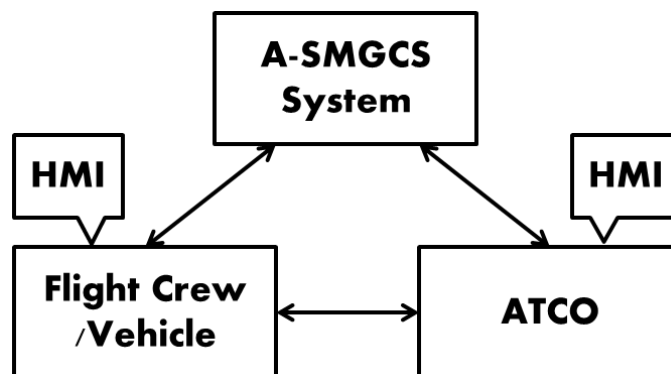
Figure 7: Overview of data flow between the system and the stakeholders involved

A.2.4.3.2.1 Performance Parameters Identification

4.2.1.1.11 Required Data Items

4.2.1.1.11.1 Required Data by the A-SMGCS to the system

The A-SMGCS gives the system the position of each aircraft on the surface. Therefore the requirements concerning the A-SMGCS apply (especially those on accuracy, update rate, integrity and availability), cf. document [14].

4.2.1.1.12 Performance Parameters

This section addresses the following performance parameters:

- Capacity
- Efficiency
- Predictability
- Environmental Sustainability
- Cost Effectiveness

4.2.1.1.13 Capacity

Term	Definition	KPI Assessed
Inbound total number of mobiles managed by the A-SMGCS Routing	This is the quantity of mobiles (aircraft) that the A-SMGCS Routing and Planning function is able to process, for inbound operations	Inbound Taxiing Capacity (Ground Movement Shortage)

and Planning function		
Outbound total number of mobiles managed by the A-SMGCS Routing and Planning function	This is the quantity of mobiles (aircraft) that the A-SMGCS Routing and Planning function is able to process, for outbound operations	Outbound Taxiing Capacity (Ground Movement Shortage)
Global number of mobiles managed by the A-SMGCS Routing and Planning function	This is the quantity of mobiles (aircraft) that the A-SMGCS Routing and Planning function is able to process, for all taxiing operations	Total (mix OPS) Taxiing Capacity (Ground Movement Shortage)
Airport (taxiway) capacity	The ATC system allows controllers to manage high level traffic	Inbound and Outbound Taxiing Capacity

Table 22: Capacity KPA parameters

4.2.1.1.14   Efficiency

Term	Definition	KPI Assessed
Taxi time	Actual taxi time per movement	Ground Movement Delay
Taxi length	Actual taxi length per movement	Ground Movement Delay
Number of predicted conflicts	Traffic conflicts predicted by Routing function	Ground Movement Delay
Surface In and Out Operations	Taxi time variability and start and stop times during taxi	Ground Movement Efficiency
Average Delay (in minutes) for taxi-in operations	This is the average delay (expressed in minutes) of all aircraft planned for a given time interval, focusing on taxi-in operations	Ground Movement Delay (Taxi-in)
Average Delay (in minutes) for taxi-out operations	This is the average delay (expressed in minutes) of all aircraft planned for a given time interval, focusing on taxi-out operations	Ground Movement Delay (Taxi-out)
Start/stop cycles in taxi-in	This is the number of start/stop cycles that one mobile (specially aircraft) does in taxi-in operation	Ground Movement Efficiency (Arrival)
Start/stop cycles in taxi-out	This is the number of start/stop cycles that one mobile (specially aircraft) does in taxi-out operation	Ground Movement Efficiency (Departure)
Taxi-in imbalance in capacity	This is the imbalance between available and theoretical capacity for taxi-in operations	Ground Movement Efficiency (Arrival)
Taxi-out imbalance in capacity	This is the imbalance between available and theoretical capacity for taxi-out operations	Ground Movement Efficiency (Departure)

Table 23: Efficiency KPA parameters

4.2.1.1.15   Predictability

Term	Definition	KPI Assessed
Accuracy of planned taxi times	Difference between actual taxi time and planned taxi time	Arrival and Departure predictability
Surface Movement, Business Trajectory Predictability	Taxi in/out Times Variability; Average and Standard deviation Taxi time accuracy	Block to Block Variability
Adherence to pre-calculated target times, taxi-in	This is the total amount of aircraft arriving on time (as planned) related to total flights planned, expressed in percentage. For taxi-in operations	Arrival Predictability and Block to Block variability (Flight Operation Variability)
Adherence to pre-calculated target times, taxi-out	This is the total amount of aircraft departing on time (as planned), related to total flights planned, expressed in percentage. For taxi-out operations	Departure Predictability and Block to Block variability (Flight Operation Variability)
Adherence to pre-calculated target times in a Service Disruption, taxi-in	This is the total amount of aircraft arriving on time (as planned) during a Service Disruption, related to total flights planned, expressed in percentage. For taxi-in operations	Arrival Predictability in Disruption Conditions (Service Disruption Effect)
Adherence to pre-calculated target times in a Service Disruption, taxi-out	This is the total amount of aircraft arriving on time (as planned) during a Service Disruption, related to total flights planned, expressed in percentage. For taxi-out operations	Departure Predictability in Disruption Conditions (Service Disruption Effect)

Table 24: Predictability KPA parameters

4.2.1.1.16   Environmental Sustainability

Term	Definition	KPI Assessed
Average Fuel burned by aircraft, taxi-in	This is the average quantity of fuel burned by aircraft during taxi-in operations, expressed in relation to traffic units or passengers	Emissions in relation to traffic units or passenger during taxi-in operations (Global Emissions)
Average Fuel burned by aircraft, taxi-out	This is the average quantity of fuel burned by aircraft during taxi-out operations, expressed in relation to traffic units or passengers	Emissions in relation to traffic units or passenger during taxi-out operations (Global Emissions)
Average Fuel burned by airside vehicles and ground equipment	This is the average quantity of fuel burned by airside vehicles and ground equipment, expressed in relation to traffic units or passengers	Emissions through airside vehicles and ground equipment (Global Emissions)
Average fuel burnt (Kg per flight)	To assess if fuel burn and related pollutant emissions are reduced with the introduction of DMAN/Routing compared to reference operations	Emissions during taxi-in and taxi-out operations
Average fuel burn	To assess if fuel burn and related pollutant	Emissions during taxi-in

variation between reference and solution scenario (Kg per flight)	emissions are reduced with the introduction of DMAN/Routing compared to reference operations	and taxi-out operations
Average CO2 (Kg per flight)	To assess if fuel burn and related pollutant emissions are reduced with the introduction of DMAN/Routing compared to reference operations	Emissions during taxi-in and taxi-out operations
Average CO2 variation between reference and solution scenario (Kg per flight)	To assess if fuel burn and related pollutant emissions are reduced with the introduction of DMAN/Routing compared to reference operations	Emissions during taxi-in and taxi-out operations

Table 25: Environmental Sustainability KPA parameters

4.2.1.1.17   Cost Effectiveness

Term	Definition	KPI Assessed
Cost per operation of ANS derived from taxiing operations	This is the cost of ANS services in relation to number of operations, derived from the routing and planning functionalities, including human costs and technical costs	ANS Costs (Direct Cost of G2G ATM)
Cost per operation for Airspace Users derived from taxiing operations	This is the cost of taxiing operations for the Airspace Users, expressed in relation to number of operations	Airspace Users Direct Costs (Direct Cost of G2G ATM)
Cost per operation for Airport Operator derived from taxiing operations	This is the cost of ANS services for the Airport Operator in relation to number of operations, derived from the routing and planning functionalities	Airport Operator Direct Costs (Direct Cost of G2G ATM)

Table 26: Cost Effectiveness KPA parameters

# A.2.4.3.2.2   Performance Requirements

Requirement ID	Performance Requirement
REQ-06.07.02-SPR-0002.0010	Manual input format by ATCO and other authorized users to the A-SMGCS Routing and Planning function shall follow common standards as defined by ICAO and EUROCAE.
REQ-06.07.02-SPR-0002.0020	Only ATCO and authorised users shall be able to manually input data to the A-SMGCS Routing and Planning function
REQ-06.07.02-SPR-0002.0030	Automated controls of data shall be implemented in input data cells validating data format and range

Requirement ID	Performance Requirement
REQ-06.07.02-SPR-0002.0040	Manually input data shall include a source identifier
REQ-06.07.02-SPR-0002.0050	The Routing and Planning function shall recalculate routes upon receiving an update in a surface constraint
REQ-06.07.02-SPR-0002.0180	The A-SMGCS Routing and Planning function shall be able to recalculate and update a planned route in less than a <time parameter to be defined [sec]>
REQ-06.07.02-SPR-0002.0190	The A-SMGCS Routing and Planning function shall be able to uplink the expected taxi route to the flight crew before TSAT (i.e. TSAT-10) for Taxi Out and by the Top of Descent for Taxi In.
REQ-06.07.02-SPR-0002.0230	When A-SGMCS Routing and Planning function is not able to uplink the expected route to the A/C before TSAT-10 for Taxi Out and Top of Descent for Taxi In, the A-SMGCS shall uplink a message to make the crew aware of it.
REQ-06.07.02-SPR-0002.0240	Any update of the expected taxi route shall be uplinked to the A/C by the A-SMGCS Routing and Planning function in less than 10sec.
REQ-06.07.02-SPR-0002.0250	The A-SMGCS Routing and Planning function shall recognise the tow truck and the a/c as a single unit from the moment they are coupled.
REQ-06.07.02-SPR-0002.0270	Both the taxi distances and taxi times achieved by manually readjusted routes, as well as the system taxi distances and taxi times shall be recorded.
REQ-06.07.02-SPR-0002.0310	The required time to perform a recalculation of the planned route of the mobile and its effect on all the other mobiles shall not exceed <time parameter to be defined [sec]>
REQ-06.07.02-SPR-0002.0320	The Route Generation Integrated With Planning Information service shall be available at least a <percentage parameter to be defined [%] > of the time
REQ-06.07.02-SPR-0002.0330	The probability of an integrity failure of the Route Generation Integrated With Planning Information service shall not exceed <probability parameter to be defined>
REQ-06.07.02-SPR-0002.0340	The Route Generation Integrated With Planning Information service shall be able to handle all the planned routes even if the movement area reaches its capacity limit.
REQ-06.07.02-SPR-0002.0350	The Provision of Routing Information to mobiles service shall be available at least a <percentage parameter to be defined [%] > of the time
REQ-06.07.02-SPR-0002.0360	The probability of an integrity failure of the Provision of Routing Information to mobiles service shall not exceed a <probability parameter to be defined>.
REQ-06.07.02-SPR-0002.0370	The Provision of Routing Information to mobiles service shall be able to handle all the planned routes even if the movement area reaches its capacity limit.
REQ-06.07.02-SPR-0002.0380	The time for transmitting the messages shall be less than tr/2 (10 seconds)

Table 27: System related approach – Performance requirements

A.2.4.3.3   Provision of Cleared Route to Mobiles by voice (R/T)

Here is a schematic description showing the boundaries of the system, and its interaction with other ATC entities.
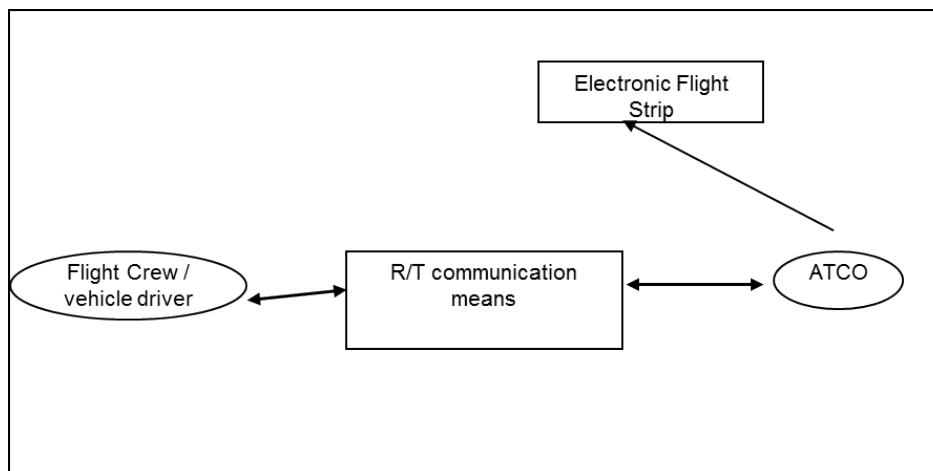
4.2.1.1.17.1.1 Figure 8: System Description – Provision of routing information to mobiles

A.2.4.3.3.1   Performance Indicators Identification

Required Data Items

Required Data by the controller to the system

Term	Definition
Clearance	The controller enters the clearance into the Electronic Flight Strip (EFS) system.

Performance Parameters

This section addresses the following groups of performance parameters:

Response time and response probability

Response Time

Term	Definition
EFS Response Time	The time between the input by the controllers and the system update.
EFS Response Probability	Probability is a measure or estimation of likelihood of occurrence of a response to an event. In this case the event refers to the clearance inputted by the controllers.

A.2.4.3.3.2   Performance Requirements

Requirement ID	Performance Requirement
REQ-06.07.02-SPR-CLRT.0008	EFS transition time from a status to another one shall be less than 0.1 sec
REQ-06.07.02-SPR-CLRT.0007	The probability that the EFS system doesn't update its status after controllers input shall be less than <percentage parameter to be defined>

A.2.4.3.4 Provision of planned and cleared route to mobiles by data link service

Here is a schematic picture showing the boundaries of the system, and its interaction with other ATC entities.
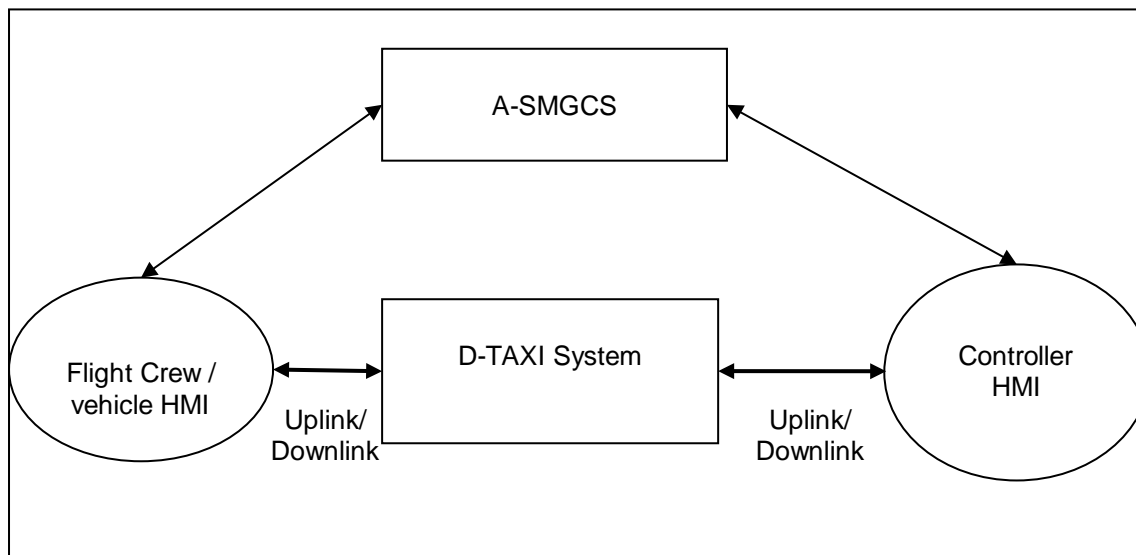
Figure 9: System description "D-TAXI"

A.2.4.3.4.1 Performance Parameters Identification

Required Data Items

Required Data by the controller to the system

Term	Definition
Clearance	The controller enters all the clearances via the D-TAXI System.

Required Data by the pilot to the system

Term	Definition
Messages	The pilot enters all messages via the D-TAXI System

Performance Parameters

This section addresses the following groups of performance parameters:

Response time and response probability
Integrity
Reliability
Capacity

Response Time

Term	Definition

Response Time	The time lagged between the input and the output signal which depends upon the value of passive components used.
Response Probability	Probability is a measure or estimation of likelihood of occurrence of an response event

Integrity

Term	Definition
Integrity	Integrity relates to the level of trust that can be placed in the information provided by the navigation system. It includes the ability of the navigation system to provide timely and valid warnings to users when the system must not be used for the intended operation or phase of flight.

Reliability

Term	Definition
Availability	This is an indication of the ability of the system to provide usable service. Availability is expressed in terms of the probability of the system being available at the beginning of the intended operation.

Capacity

Term	Definition
Capacity	Capacity relates to the maximum numbers of aircraft in the system for which all the service performance parameters have to be provided. Capacity will depend upon the particular environment characteristics (i.e. traffic densities, area of coverage required).

A.2.4.3.4.2   Performance Requirements

Requirement ID	Performance Requirement
REQ-06.07.02-SPR-DTAX.0200	The probability that the ATCO is not able to input an uplink message (when he / she wants) should be less than 1.6×10^{-4} per taxi-event.
REQ-06.07.02-SPR-DTAX.0201	The probability that data link system sends a message (downlink and uplink) more than 5 sec after a "send" action has been done shall be kept to a minimum per taxi-event.
REQ-06.07.02-SPR-DTAX.0203	The probability of not detecting that a message (uplink or downlink) has not been successfully sent shall be less than 1.6×10^{-4} per sent message
REQ-06.07.02-SPR-DTAX.0032	The ATCOs HMI shall provide to the D-TAXI System the clearances given to the aircraft to start-up, push-back, taxi-out, taxi-in
REQ-06.07.02-SPR-DTAX.0033	The ATCOs HMI shall provide to the D-TAXI System the taxi revisions given to the aircraft.
REQ-06.07.02-SPR-	The ground HMI shall provide to the D-TAXI System the clearances

Requirement ID	Performance Requirement
DTAX.0023	given to the vehicle to proceed and tow.
REQ-06.07.02-SPR-DTAX.0216	The HMI of the ATCO shall allow to enter any D-TAXI instruction in less than 3s
REQ-06.07.02-SPR-DTAX.0217	The ground HMI shall provide the D-TAXI System with any clearance entered by the ATCO within 0.5 second
REQ-06.07.02-SPR-DTAX.0218	Data link service shall be established within 3 seconds to be available for operational use.
REQ-06.07.02-SPR-DTAX.0219	The aircraft system shall time stamp to within one second UTC each message when it is released for onward transmission.
REQ-06.07.02-SPR-DTAX.0220	The ATSU shall time stamp to within one second UTC each message when it is released for onward transmission.
REQ-06.07.02-SPR-DTAX.0230	The following parameters shall comply with ED-228A table 5-14 CPDLC Performance Requirements with RCP 130 configuration: Transaction time, Continuity, Availability, Integrity
REQ-06.07.02-SPR-DTAX.0240	The allocation between concerned actors (ground and airborne) shall comply with ED-228A table 5-14 CPDLC Performance Requirements with RCP 130/A1 configuration.

Table 28: Performance Requirements D-TAXI

A.2.4.3.5 Airfield Ground Lighting Service

Here is a schematic description showing the boundaries of the system, and its interaction with other ATC entities.
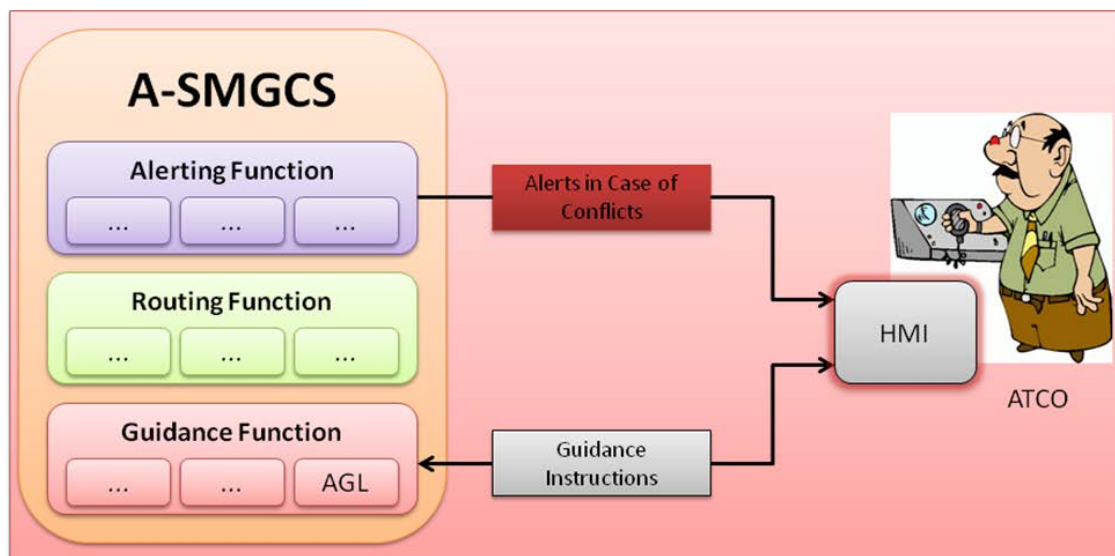

Figure 10: System Description "AGL"

A.2.4.3.5.1   Performance Parameters Identification

Required Data Items

Required Data by the A-SMGCS to the system

The A-SMGCS gives the system the position of each aircraft on the surface. Therefore the requirements concerning the A-SMGCS applies (especially those on Accuracy, Update rate, Integrity and availability), cf. document [14].

Performance Parameters

This section addresses the following groups of performance parameters:

    Integrity
        Reliability
            Capacity

Integrity

Term	Definition
Incorrect lights in action	This is the probability that light are in action when there was no clearance. For the system to work properly, it is necessary to keep this probability at the low level. But a false alarm in itself does not have consequences as critical as non-conflict detection. The controller should be able to check the situation, and realize the both aircraft are safe.
Error in aircraft identification	This is the probability that an a/c has taxied a green segment but

	the green lights remain in action.

Reliability

Term	Definition
Availability	This is an indication of the ability of the system to provide usable service. Availability is expressed in terms of the probability of the system being available at the beginning of the intended operation.

Capacity

Term	Definition
Capacity	Capacity relates to the maximum numbers of aircraft in the system for which all the service performance parameters have to be provided. Capacity will depend upon the particular environment characteristics (i.e. traffic densities, area of coverage required).

A.2.4.3.5.2   Performance Requirements

Requirement ID	Performance Requirement
REQ-06.07.02-SPR-AGLS.0001	A malfunction of the centralized service leading to the system being unserviceable shall not greater than 1.0×10^{-8}.
REQ-06.07.02-SPR-AGLS.0027	The probability of a Ground Service malfunction leading to the system being unserviceable shall not be greater than 1.0×10^{-8}.
REQ-06.07.02-SPR-AGLS.0028	The probability of a Communication Service malfunction shall not be greater than 1.0×10^{-8}.

A.2.4.3.6 Virtual Block Control service

Here is a schematic picture showing the system, and its interaction with other entities. The aim of this figure is just to show the logical flow of data among the different entities (elements marked in red are strictly related to the VSB that are not connected to any physical position on the aerodrome and that must be visible on the AMM). Details of flow data should be covered by technical projects.
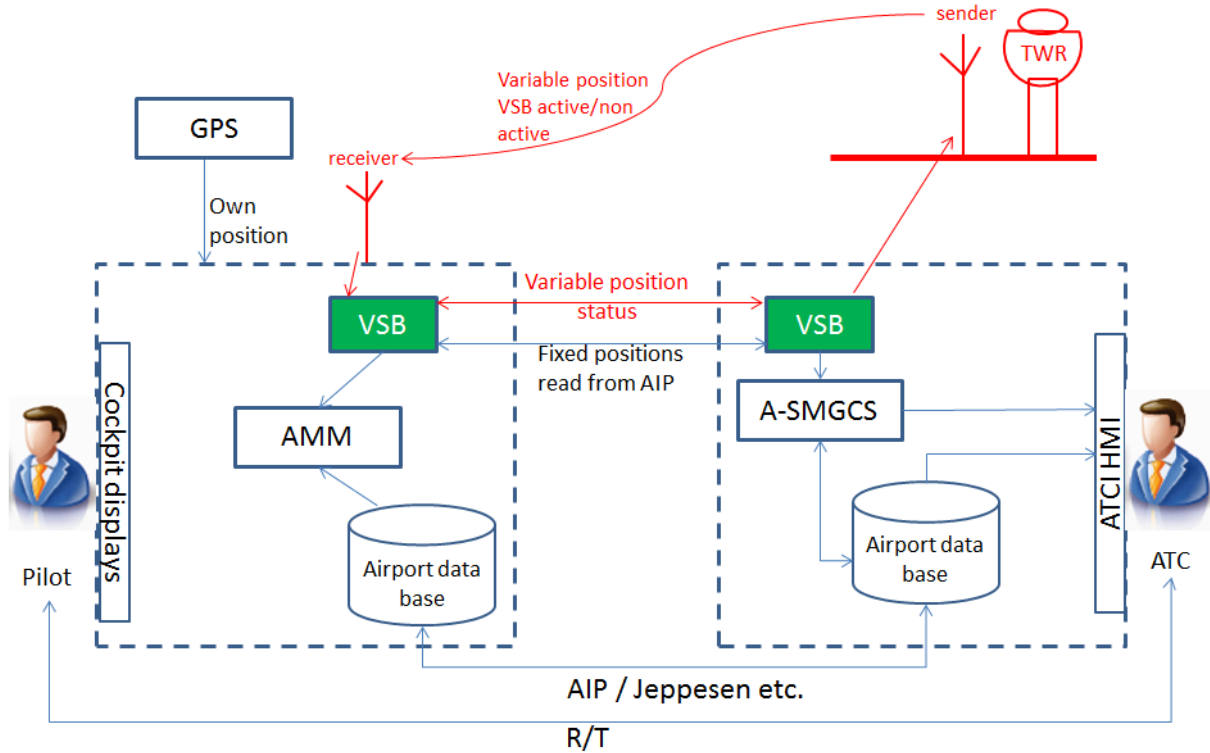

Figure 11: "Virtual Block Control" system – Logical interactions

In order to avoid misunderstanding, it is important to highlight that in this appendix the term "system" will be referred to the whole "VBC" system, including all the functions depicted in the picture above.

A.2.4.3.6.1   Performance Parameter Identification

In addition to the ATM related performances, further performance parameters, strictly related to the system under assessment, are addressed:

- integrity
- accuracy
- reliability

4.2.1.1.17.2   Integrity

Term	Definition
Integrity	Integrity relates to the level of trust that can be placed in the information provided by the navigation system. It includes the ability of the navigation system to provide timely and valid warnings to users when the system must not be used for the intended operation or phase of flight.

Watch Dog tool integrity	Watch Dog Tool has to be able to perform a self-diagnosis in order to check its current status. It should be able to send an alert in case that the system doesn't work properly.
CWP HMI integrity	ATC HMI has to be able to perform a self-diagnosis in order to check its current status. It should be able to send an alert in case that the system doesn't work properly.

Accuracy

Term	Definition
Accuracy	Accuracy is defined as the degree of conformance of an estimated or measured position at a given time to a specific reference value.
Virtual Stop Bar position: AMM Accuracy	To let the system work properly, it is important to ensure a high level of accuracy of all map information to correctly display the virtual stop bar location with respect to the aerodrome layout and geographic locations.
Virtual Stop Bar position: CWP HMI Accuracy	To let the system work properly, it is important to ensure a high level of accuracy of virtual stop bar presented on the ATCOs' HMI to ensure that each movement is seen in the correct position with respect to the aerodrome layout and other traffic.

Reliability

Term	Definition
Reliability	The probability that a system will perform a required function without a failure under stated conditions for a stated period of time
Watch Dog tool reliability	To let controllers be confident in the alerts notification, the Watch Dog tool shall ensure a high level of reliability in order to provide controllers with alerts notification only in case of real violation.
Alerting VSB system reliability	To let controllers be confident in the alerts notification, the alerting VSB function shall ensure a high level of reliability in order to provide controllers with alerts notification only in case of real violation.

A.2.4.3.6.2   Performance Requirements

Requirement ID	Performance Requirement
REQ-06.07.02-SPR-VBCL.0190	For the CWP HMI the 95% accuracy of VSB positions shall be less than <TBD parameter [m]>
REQ-06.07.02-SPR-VBCL.0200	For the AMM, the 95% accuracy of virtual stop bar position shall be less than <tbd parameter [m]>
REQ-06.07.02-SPR-VBCL.0210	The false alert of the Watch Dog tool shall not be greater than a <tbd parameter [movement]>
REQ-06.07.02-SPR-VBCL.0220	The Watch Dog tool shall be able to perform a self-diagnosis to check its current status within a <tbd parameter [s]>
REQ-06.07.02-SPR-VBCL.0230	New Virtual Stop Bar created by ATCOs shall be displayed on the onboard Airport Moving Map within a <tbd parameter [s]>

Requirement ID	Performance Requirement
REQ-06.07.02-SPR-VBCL.0240	Virtual Stop Bar violation shall be detected with a probability of <parameter to be defined [%]>
REQ-06.07.02-SPR-VBCL.0250	The false alert in case of virtual stop bar violation shall not be greater than a <tbd parameter [movement]>
REQ-06.07.02-SPR-VBCL.0260	The accuracy of surveillance data shall be less than <a parameter to be defined [m]>

Appendix B   Safety Requirements under investigation

The following table reports a list of Safety Requirements which have been identified in the Second Contribution to P06.07.02 D77 OFA04.02.01 [23] by experts judgment and will be analysed in the next iterations as they are not coded with an ID and their safety relevance has to be checked.

SR 1	The system shall be able to recognize and avoid incongruent textual and graphical displays.
SR 2	Issuing clearances via D/L should reduce pilot misunderstanding, with reduction of taxing mistakes and consequent controller remedial actions.
SR 3	The use of displays for D/L clearance issues combined with some light condition (glare, surface glaze,…) should not increase controller visual stress
SR 4	Pilots requests via D/L should reduce information sharing among tower team
SR 5	Clearances issued via D/L should reduce information sharing in tower team.
SR 6	Efforts needed to accomplish the cycle for issuing clearance and receiving read-back via D/L should not increase
SR 7	Controllers HMI should support adequately tower-pilot communications
SR 8	D/L HMI should increase information sharing and consequent situational awareness in controller team.
SR 9	Display arrangement in cockpit should fit pilot's needs/expectations.
SR 10	Display arrangement in tower should fit controller's needs/expectations.
SR 11	The system shall detect which lights are activated and in what colour (green or red).

SR 12	The system shall detect when a mobile has passed a segment.
SR 13	The system must be ensuring to turn off the lights after rollover.
SR 14	The system shall detect incongruent display between CWP and lights.
SR 15	The displayed taxi route must be unambiguous for the pilot.
SR 16	Controller's input options must be unmistakable.
SR 17	The displayed taxi route at HMI must be unmistakable for the controller.
SR 18	The HMI must be free of reflections and/or glare effects.

Table 29: List of Safety Requirements under investigation

-END OF DOCUMENT-