



SESAR Solution PJ.03b-05 V3 SPR/INTEROP-OSED - Part IV - Human Performance Assessment Report

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Authoring & Approval

Authors of the document

Name/Beneficiary	Position/Title	Date
Franze Moderne	Project contributor / Human Factors specialist	18/07/2019
Jan Flasar (Honeywell)	PJ03b-05 contributor / Human Factors specialist	18/07/2019
François Salmon-Legagneur (Dassault Aviation)	PJ03b-05 contributor / Human Factors specialist	18/07/2019

Reviewers internal to the project

Name/Beneficiary	Position/Title	Date
Pierre Nieradka/Airbus	PJ03b-05 Solution leader	14/08/2019
Benoit Morizet (Airbus)	PJ03b-05 contributor	14/08/2019
Eric Hannouz (Airbus)	PJ03b-05 contributor	14/08/2019
Alexis Giunta (Alten SO for Airbus)	PJ03b-05 contributor	14/08/2019
PJ.19	PJ.19	14/08/2019
Natacha Morvan (Alten SO for Airbus)	PJ03b-05 contributor	14/08/2019
Martin Puskar (Honeywell)	PJ03b-05 contributor	14/08/2019

Approved for submission to the SJU By - Representatives of Beneficiaries involved in the Project

Name	Beneficiary	Position/Title	Date
Nicolas Leon	DSNA	Project Manager Project Content Integration Leader	19/08/2019
Pierre Nieradka	AIRBUS	PJ.03b-05 Solution Leader PJ03b EPMB Member	19/08/2019
Petr Hlousek	ANS CR (B4)	PJ03b EPMB Member	Silent approval
Ondrej Priboj Vladimira Canadyova	LPS SR (B4)	PJ03b EPMB Member	Silent approval
Jaroslav Niewiński	PANSA (B4)	PJ03b EPMB Member	Silent approval
François Salmon Legagneur	DASSAULT	PJ03b EPMB Member	19/08/2019
Stephen Straub Jan Rabold	DFS	PJ03b EPMB Member	Silent approval
Carlo Persiani	ENAV	PJ03b EPMB Member	Silent approval

Giovanni Riccardi			
Stéphane Dubuisson	EUROCONTROL	PJ03b EPMB Member	Silent approval
Roger Lane			
Susanne Buchholzer	FREQUENTIS	PJ03b EPMB Member	Silent approval
Tomas Kabrt	HONEYWELL	PJ03b EPMB Member	19/08/2019
Tereza Spalenkova			
Sarai Costa	INDRA	PJ03b EPMB Member	Silent approval
Ludmila Lapteva	ADP (SEAC2020)	PJ03b EPMB Member	Silent approval
Olivier Delain			
Gianluca Marrazzo	LEONARDO	PJ03b EPMB Member	Silent approval
Silvia Gusmano			
Cédric Rahatoka	THALES AIR SYS	PJ03b EPMB Member	Silent approval
Nathalie Pacaud			
Pascal Combe	THALES AVIONICS	PJ03b EPMB Member	Silent approval
Ana Martin	DLR (AT-ONE)	PJ03b EPMB Member	Silent approval
Juergen Teutsch	NLR (AT-ONE)	PJ03b EPMB Member	Silent approval
Ronald Grosmann			

Rejected By - Representatives of beneficiaries involved in the project

Name/Beneficiary	Position/Title	Date
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SAFE

TRAFFIC ALERTS FOR PILOTS FOR AIRPORT OPERATIONS

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Abstract

This document contains the Human Performance (HP) assessment report for the PJ03b-05 which consists of the HP assessment plan, the results of the HP activities conducted according to the HP assessment process, newly identified issues and the HP recommendations & requirements. It corresponds to the completion of the four steps of the Human Performance assessment process, namely:

- Step 1 – Understand the concept: Baseline, Solution and Assumptions,
- Step 2 – Understand the Human Performance Implications,
- Step 3 – Improve and Validate the concept and
- Step 4 – Collate findings & conclude on transition to next V-phase.

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1 Executive Summary

This document constitutes the Part IV of the OSED/SPR/INTEROP [2], collating findings on Human Performance activities performed in the project and described in the Human Performance Assessment Plan VALP Part IV [4].

The Human Performance (HP) Assessment Process is the HP approach being adopted in SESAR to ensure HP issues are identified and addressed at the PJ03b-05 level.

The overall aim of this HP assessment was to evaluate the impact of introducing the Operational Improvement (OI) steps linked to the solution “Airport Safety Nets”:

- AUO-0605 “Traffic Alerts for Pilots during Runway Operations” and
- AUO-0615 “Traffic Alerts for Pilots during Taxiway Operations”

The information derived is captured in the HP log in the “Solution & Concept Information” tab, “Maturity” tab, “Change&Argument Identification” tab and “Issue-Objective-Outcome” tab, see Appendix D.

The HP Report is an input to the OSED [2] for all that concerns Human Performance related topics that are identified to contribute or impact the solution.

The HP Report includes:

- The Step 1 of the Human Performance Assessment: Understand the ATM concept
- The Step 2: Understand the HP implication.
- The Step 3: Improve and Validate the concept
- The Step 4: Collate findings & conclude on transition to next V-phase

2 Introduction

2.1 Purpose of the document

The HP report presents at this stage the outcomes of all steps tasks related to HP Assessment Process aiming at:

Step 1:

- Understand the ATM system against which the assessment has to be performed (i.e. the reference), the ATM needs and constraints (with a special consideration of the needs of ATM actors), the ATM change proposed by the Solution (i.e. the solution scenario(s)) and, the assumptions on which the Solution is based (i.e. context of implementation);
- Ensure that the descriptions of reference, solution(s) and assumptions are complete and consolidated;
- Understand potential interactions of the proposed solution(s) with other Solutions' proposals;
- Confirm the HP maturity of the Solution, if necessary.

Step 2:

- Understand the proposed change in terms of relevant HP arguments;
- Identify HP issues and benefits associated with the HP arguments;
- Define HP validation objectives, expected evidence and relevant scenarios;
- Plan the HP activities to be carried out as part of the next step.

Step 3:

- Perform the HP activities as outlined in the HP assessment plan;
- Analyse and document the HP activities and their outcomes;
- Formulate recommendations and requirements for further concept and system development;
- Update the HP Log and contribute to SESAR documentation.

Step 4:

- Assess whether sufficient evidence has been gathered;
- Conclude on transition to next V-phase;
- Produce the HP assessment report and if necessary support the development of the HP case;
- Manage the HP recommendations and requirements.

The information derived is captured in the HP log in the ("Solution & Concept Information" tab, "Maturity" tab, "Change&Argument Identification" tab and "Issue-Objective-Outcome" tab, see Appendix D**Error! Reference source not found.**).

The HP Report is an input to the OSED [2] for all that concerns Human Performance related topics that are identified to contribute or impact the solution.

2.2 Intended readership

This document is mainly intended to be read by project PJ03b-05 partners concerned by “Traffic Alerts for Pilots” and its validation.

It is also of interest at the level of PJ03b “Airport Safety Nets”, and also at the level of PJ03a “Integrated Surface Management”.

2.3 Scope of the document

This document constitutes the Part IV of the OSED/SPR/INTEROP [2], collating findings on Human Performance activities performed in the project.

The overall aim of this HP assessment was to evaluate the impact of introducing the Operational Improvement (OI) steps linked to the solution “Airport Safety Nets”:

- AUO-0605 “Traffic Alerts for Pilots during Runway Operations” and
- AUO-0615 “Traffic Alerts for Pilots during Taxiway Operations”.

This report is based on the results obtained in the frame of the different HP activities conducted during the V2 phase, namely during the following V3 validation exercises:

- EXE02: RTS for mainline aircraft (Airbus)
- EXE03: RTS for business aircraft (Honeywell)
- EXE04: Flight Trials (Airbus/Honeywell)

2.4 Structure of the document

The HP Report includes:

- The Step1 of the Human Performance Assessment: Understand the ATM concept
- The Step2: Understand the HP implication.
- The Step 3: Improve and Validate the concept
- The Step 4: Collate findings & conclude on transition to next V-phase

Note: when the information already exists in a SESAR document (OSED [2][2], VALP [3] and [4] or in the HP Log Appendix D), the HP Report may only refer to it.

2.5 Acronyms and Terminology

Term	Description
Human Factors (HF)	HF is used to denote aspects that influence a human's capability to accomplish tasks and meet job requirements. These can be external to the human (e.g. light & noise conditions at the work place) or internal (e.g. fatigue). In this way, "Human Factors" can be considered as <i>focussing on the variables that determine Human Performance</i> .
Human Performance (HP)	HP is used to denote the human capability to successfully accomplish tasks and meet job requirements. In this way, "Human Performance" can be considered as <i>focussing on the observable result of human activity in a work context</i> . Human Performance is a function of Human Factors (see above). It also depends on aspects related to Recruitment, Training, Competence, and Staffing (RTCS) as well as Social Factors and Change Management.
HP activity	An HP activity is an evidence-gathering activity carried out as part of Step 3 of the HP assessment process. An HP activity can relate to, among others, task analyses, cognitive walkthroughs, and experimental studies.
HP argument	An HP argument is an HP claim that needs to be proven through the HP Assessment Process.
HP assessment	An HP assessment is the documented result of applying the HP assessment process to the SESAR Solution-level. HP assessments provide the input for the HP case.
HP assessment process	The HP assessment process is the process by which HP aspects related to the proposed changes in SESAR are identified and addressed. The development of this process constitutes the scope of Project 16.04.01. It covers the conduct of HP assessments on the Solution-level as well as the HP case building over larger clusters of Solutions.
HP benefit	An HP benefit relates to those aspects of the proposed ATM concept that are likely to have a positive impact on human performance.
HP case	An HP case is the documented result of combining HP assessments from Solutions into larger clusters (SESAR Projects, deployment packages) in SESAR.
HP issue	An HP issue relates to those aspects in the ATM concept that need to be resolved before the proposed change can deliver the intended positive effects on Human Performance.
HP impact	An HP impact relates to the effect of the proposed solution on the human operator. Impacts can be positive (i.e. leading to an increase in Human Performance) or negative (leading to a decrease in Human Performance).
HP recommendations	HP recommendations propose means for mitigating HP issues related to a specific operational or technical change. HF recommendations are proposals that require additional analysis (i.e. refinement and validation). Once this additional

	analysis is performed, HF recommendations may be transformed into HF requirements.
HP requirements	HP requirements are statements that specify required characteristics of a solution from an HF point of view. HP requirements should be integrated into the DOD, OSED, SPR, or specifications. HF requirements can be seen as the stable result of the HF contribution to the Solution, leading to a redefinition of the operational concept or the specification of the technical solution.

Table 1: Terminology

Acronym	Definition
ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATM	Air Traffic Management
ATSA-SURF	Enhanced Traffic Situational Awareness on the Airport Surface
CDTI	Cockpit Display of Traffic Information
FT	Flight Trial
FTS	Fast time Simulation
HMI	Human Machine Interface
ICAO	International Civil Aviation Organization
INTEROP	Interoperability Requirements
KPA	Key Performance Area
LAHSO	Land And Hold Short Operations
LVP	Low-Visibility Procedures
OFA	Operational Focus Areas
OI	Operational Improvement
OSED	Operational Service and Environment Definition
RTO	Rejected Take-Off
RTS	Real Time Simulation
SAFE	SESAR PJ03b - Airport Safety Nets
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

SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking
SPR	Safety and Performance Requirements
SURF-A	SURFace Alerts
SURF-IA	Enhanced Traffic Situational Awareness on the Airport Surface with Indications and Alerts. SURF IA is the RTCA application.
SURF-ITA	Surface Indications and Traffic Alerts. SURF-ITA is the SESAR application
VALP	Validation Plan

Table 2. Acronyms

3 The Human Performance Assessment Process: Objective and Approach

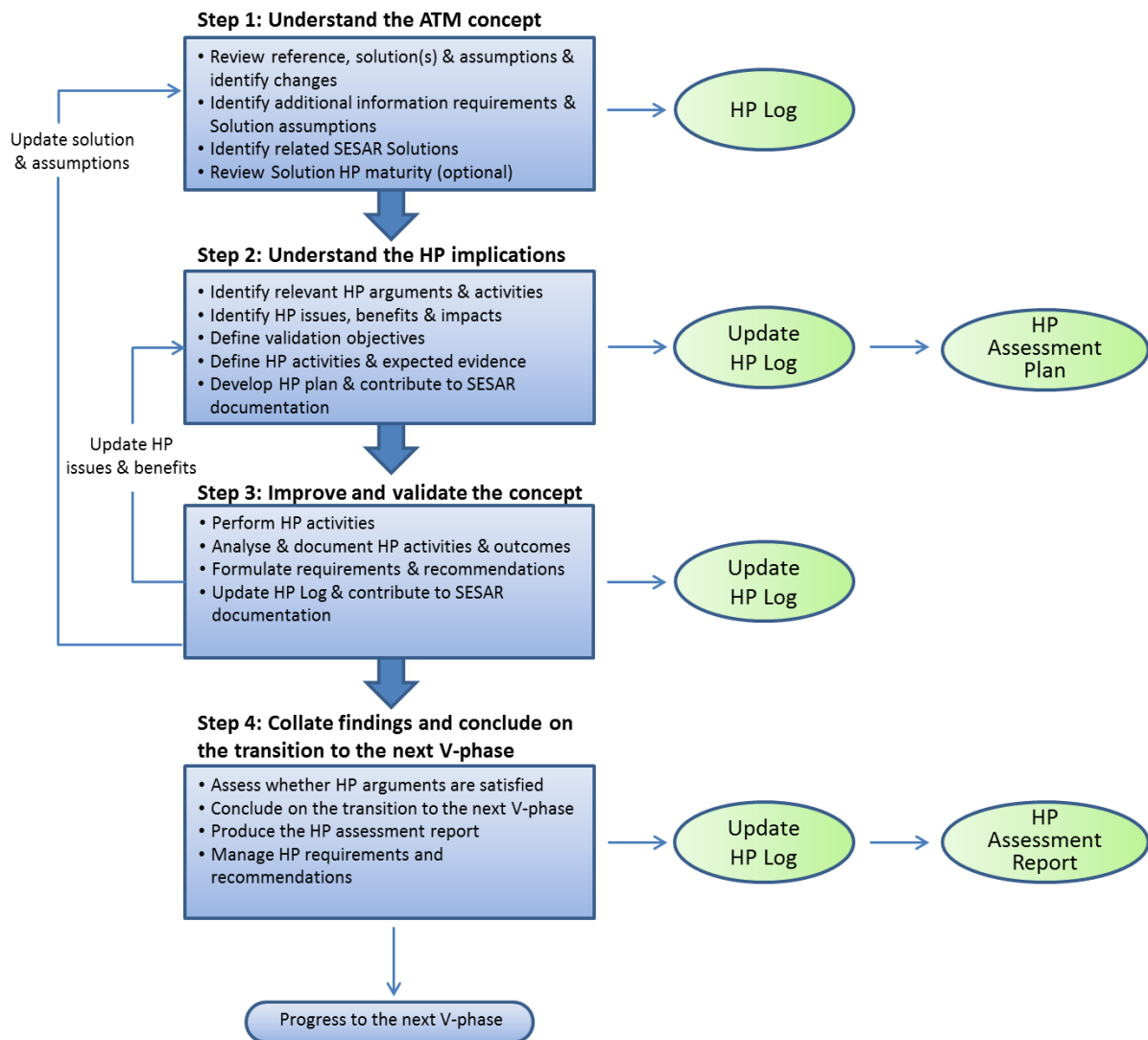


Figure 1: Steps of the HP assessment process

4 Human Performance Assessment

4.1 Step 1 Understand the ATM concept

4.1.1 Description of reference scenario

The reference scenarios were the same as solution scenarios with the current operating method for runway and taxiway operations (i.e. operations are controlled by ATC, but flight crew may detect a traffic conflict through out-of-the-window). The solution scenarios are representative of typical situations that may occur and where incidents are observed on runway or taxiway.

For more details on the current operating method, refer to [2] OSED/SPR/INTEROP Section 3.3.1.

4.1.2 Description of solution scenarios

The Alerts might occur either:

- On the runway → implementations SURF-A and SURF-ITA
- On the taxiways → implementation TWY-ITA

For the different implementations, several solution scenarios were identified:

SURF-A & SURF-ITA scenarios:

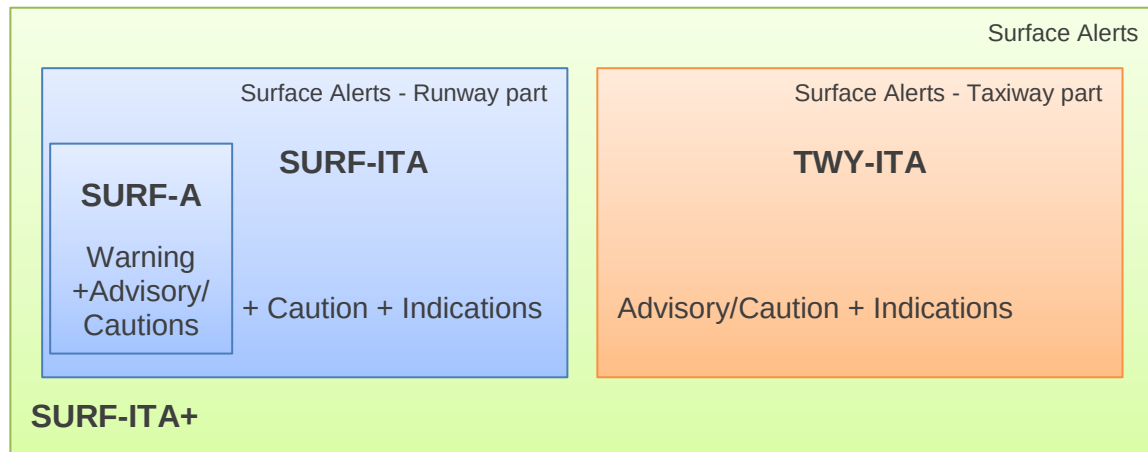
- Ownship on approach.
- Ownship at landing and roll.
- Ownship entering/crossing the runway.
- Ownship at take-off.
- Ownship taxiing on a runway.

TWY-ITA:

- Ownship with traffic ahead on single or intersecting taxiways
- Ownship with traffic from left/right on single or intersecting taxiways
- Ownship with traffic from behind on single or intersecting taxiways.

For details on the use-cases with MEGA tool diagrams, refer to [2] OSED/SPR/INTEROP Section 3.3.2.4.

The following diagram shows the different possible implementations:



Runway SURF-A is the basic implementation with Warning alerts on ground.

Runway SURF-ITA is an optional version with a display of traffic in the cockpit and cautions alerts and indications.

TWY-ITA function will be implemented besides the runway part of Surface Alerts with the same requirements. Transition between runway and taxiway functions is defined by the Runway Engagement Zone.

4.1.3 Consolidated list of assumptions

Refer to [3] VALP assumptions Sections 4.4, 5.2.5, 5.3.5 and 5.4.5.

4.1.4 List of related SESAR Solutions to be considered in the HP assessment

The HP assessment should consider the solutions related to ground tools providing traffic alerts to controllers. See HP LOG, section Solution&Concept Info available in appendix A.

4.1.5 Identification of the nature of the change

Refer to Appendix D.

4.2 Step 2 Understand the HP implications

4.2.1 Identification of relevant arguments, HP issues & benefits and HP activities

Refer to Appendix D.

4.3 Step 3 Improve and validate the concept

4.3.1 Description of HP activities conducted

This section provides a summary of activity conducted within V3 phase to identify HP issues, benefits and impacts. For all solutions:

HP activity	By when
1.1 Real Time Simulation Mainline aircraft	RTS 2018
1.2 Real Time Simulation Business aircraft	RTS 2018
2. Stakeholder Workshop	Forum SAFE November 2017
3. Flight Trials	FT 2019

Table 3: Table of proposed HP activities and their priority

ACTIVITY 1.	Real Time Simulation
Description	HP support was provided to Exercise #02 and Exercise #03: Real time simulation (RTS) for mainline/business aircraft. It ensured that appropriate evidence was generated through these simulations, such that HP arguments and claims that was supported.
Arguments & issues to be addressed	Arg. 1.3; Arg. 1.3.2; Arg. 2.3; Arg. 1.2; Arg. 1.3.3. PJ03b-05_BEN_01; PJ03b-05_ISS_01; PJ03b-05_ISS_02; PJ03b-05_ISS_04; PJ03b-05_ISS_05.
HP OBJECTIVES	Assess usability of traffic alerts information for pilots' situation understanding and task performance. Assess timeliness of alerts to support pilots' decision making and recovery action performance. Assess the intelligibility of traffic alerts information. Assess efficiency to cooperate with ATC (pilots' perspective) in case of potential threat detected by on-board systems. [SURF-ITA/TWY-ITA] Assess the relevance of the CDTI information to successfully perform the task Assess impact of the alerts understanding on workload The list of objectives related to each activity can be found in Appendix A and in [3] VALP Section 5.2.3. (EXE-02) and Section 5.3.4 (EXE-03).

Required Evidence	The list of evidence related to each activity can be found in Appendix A and in [3] VALP Section 5.2.3 (EXE-02) and Section 5.3.4 (EXE-03)..
Tool selected out of the HP repository	N/A
Planning and Approach	The description on how the activity was conducted is described in [3] VALP Section 5.2.9 (EXE-2) and Section 5.3.9 (EXE-03).
Resources	The resources are described in [3] VALP Section 5.2.9.2 (EXE-2) and Section 5.3.9.2 (EXE-03).
Timeline	Q2-Q3 2018

Table 4: Description of Activity 1

ACTIVITY 2. Stakeholder Workshop	
Description	HP support was provided for the workshop organized by DSNA by providing input for SURF-A concept presentation and issues to discuss. The forum was intended to address (among others) how various ground-based and airborne alerts for controllers, pilots and drivers can coexist in the same airport environment.
Arguments & issues to be addressed	Arg. 1.1 ; 1.2 PJ03b-05_ISS_03 ; PJ03b-05_ISS_04
HP objectives	Assess clarity of responsibility and authority between air and ground for conflict resolution when alerts trigger on both sides and impact on task performance. Assess efficiency to cooperate with ATC in case of potential threat detected by on board systems. The list of objectives related to each activity can be found in Appendix A.
Required Evidence	Responsibilities between air and ground are defined, clear and consistent (not contradictory). Phraseology need is identified and its content is defined and clear for pilots and controllers. The list of evidence related to each activity can be found in Appendix A.
Tool selected out of the HP repository	N/A
Planning and Approach	The workshop was held on 15 & 16 November 2017 in DSNA premises.
resources	The attendance expected to discuss about safety nets issues were:

	▪ Airspace Users ▪ ANSPs representatives (ATCOs and experts in ground based safety nets); ▪ Airport Operators representatives; ▪ SESAR consortium members including SAFE Project members; ▪ SJU and transverse projects representatives; ▪ Regulation and Standardization bodies representatives; ▪ Industry representatives (experts in ground based safety nets).
Timeline	15 & 16 November 2017

Table 5: Description of Activity 2

ACTIVITY 3. Flight Trials	
Description	HP support was provided to Exercise #04: Flight Trials (FT) for mainline/business aircrafts. It was ensured that appropriate evidence can be generated through these Flight Trials, such that HP arguments and claims that was supported.
Arguments & issues to be addressed	Arg. 1.3; Arg. 1.3.2; Arg. 2.3; Arg. 1.3.3. PJ03b-05_BEN_01; PJ03b-05_ISS_01; PJ03b-05_ISS_02; PJ03b-05_ISS_05.
HP OBJECTIVES	Assess usability of traffic alerts information for pilots' situation understanding and task performance. Assess timeliness of alerts to support pilots' decision making and recovery action performance. Assess the intelligibility of traffic alerts information. [SURF-ITA/TWY-ITA] Assess the relevance of the CDTI information to successfully perform the task Impact of the alerts understanding on workload The list of objectives related to each activity can be found in Appendix A and in the VALP Section 5.4.3.
Required Evidence	The list of evidence related to each activity can be found in Appendix A and in the VALP Section 5.4.3.
Tool selected out of the HP repository	N/A
Planning and Approach	The description on how the activity was conducted is described in the VALP Section 5.4.9.

Resources	The resources are described in the VALP Section 5.4.9.2.
Timeline	Done in June 2019 – additional test in US 2019 for SURF-ITA and TWY-ITA

Table 6: Description of Activity 3 - Flight Trials

4.4 Step 4 Collate findings & conclude on transition to next V-phase

4.4.1 Summary of HP activities results & recommendations / requirements

Table 7 provides a summary of the HP argument and related issues / benefits along with the HP activities conducted during the V3 validation phase. It reports on the outcomes of HP issues that were included into the V3 HP assessment plan. For each argument and issue / benefit the results/evidence obtained from the activities conducted are briefly described along with the recommendations and / or requirements generated.

The status of each HP issue is also given. The status of an issue / benefit can either be ‘closed’, ‘open’, ‘cancelled’: An issue is considered ‘closed’ when the issue had been sufficiently answered or no additional activities relating to that issue are foreseen as necessary; An issue is considered as being ‘open’ when the issue has been either: partially addressed and more studies are needed or; the issue had been addressed by certain activities but as a result other related issues had arisen or; when no activity has been performed to date to address a specific issue. An issue is considered as being ‘cancelled’ when the activities conducted have shown the issue to be not relevant to the given concept under investigation.

The HP recommendations and requirements fall into one of several categories:

- System design
- OPS (operating methods / procedures)
- New objective
- Training
- Other

In addition, HP recommendations can relate to test and validation activities that need to be conducted in order to investigate issues/benefits and potential mitigation in more detail.

Issue ID	HP issue / Benefit	HP Issue / Benefit Status	HP/ Valid. Obj. ID	activity conducted	results / evidence	recommendations	requirements
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Arg. 1.3: Human actors can achieve their tasks (in normal & abnormal conditions of the operational environment and degraded modes of operation).

Depending on the use case and on the operational context (traffic density, low visibility conditions, equipment failure, etc.), traffic conflict situations understanding and subsequent	Open	OBJ-03b.05-V3-VALP-0010	Real Time Simulation Flight Trials	Pilots succeed in building a mental model of the situation upon content of the provided alerts.	SURF-A_September2018_Design_Recommendation_3	N/A
		OBJ-03b.05-V3-VALP-0070			SURF-A_September2018_Design_Recommendation_5 SURF-A_September2018_Design_Recommendation_6	

decision making may be complex to do upon alert triggering. It is expected that the alerting function support pilots' assessment of the situation and facilitate decision making in all situations and all contexts while enhancing safety.		OBJ-03b.05-V3-VALP-0140			SURF-A_September2018_Design_Recommendation_8 SURF-ITA 2018/2019 Recommendation_02	
				Pilots identified the appropriate recovery action in response to an alert in the majority of cases.	SURF-A_September2018_Design_Recommendation_2 SURF-IA_SALR-SESAR_WS_ACFT0_RTS2015_V3_Recommendation_04	N/A

Arg. 1.3.2: Tasks can be achieved in a timely manner.

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As a safety net, the alert system is designed to trigger in a last resort to cover ATC or pilots' error, it should not trigger in nominal operations (nominal aircraft separation and non-conflicting clearances), therefore triggering time is late and time to understand the situation and make a decision on the action to perform may be	Open	OBJ-03b.05-V3-VALP-0020	Real Time Simulation Flight Trials	Pilots successfully reacted in an acceptable time at the alert triggering depending on the situation. However, the timeliness was not adapted for solving the conflict in one use case, despite the appropriate recovery action done by pilots.	SURF-A_September2018_Design_Recommendation_1 SURF-A_September2018_Design_Recommendation_9 SURF-IA_SALR-SESAR_WS_ACFT0_RTS2015_V3_Design_Recommendation_01 SURF-IA_SALR-SESAR_WS_ACFT0_RTS2015_V3_Recommendation_09	N/A
		OBJ-03b.05-V3-VALP-0080				
		OBJ-03b.05-V3-VALP-0150				

short in certain situations. Additionally, the decision making can depend on the context then delay the recovery action. It has to be ensured that pilots may respond to the alerts in time in all the cases and contexts.							
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Arg. 2.3: The design of the human-machine interface supports the human in carrying out their tasks.

If alert information are not well understood by the crew, it can	Open	OBJ-03b.05-V3-VALP-0030	Real Time Simulation Flight Trials	Pilots discriminated correctly information related to the function among the other ones in the cockpit. This result will have to be assessed in different cockpit	SURF-A_September2018_Design_Recommendation_4	N/A
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confuse pilots on the situation and lead to time-critical issues concerning expected actions to answer to the alert. Audio and textual messages have to be unambiguous and perceived by pilots in all operational contexts.			environment such as busy radio communication environment. Moreover, the wording of some alerts was found as not appropriate for the understanding of the criticality of the situation.	SURF-A_September2018_Design_Recommendation_10	
	OBJ-03b.05-V3-VALP-0090		The information displayed was intelligible and well interpreted by the crew.	SURF-A_September2018_Design_Recommendation_10	N/A
	OBJ-03b.05-V3-VALP-0160		Audio information was well associated with display. However, the intelligibility of the audio information was found not appropriate to convey the criticality of the situation	SURF-A_September2018_Design_Recommendation_7	N/A

Arg. 1.1: Roles and responsibilities of human actors are clear and exhaustive.

With or without alerts provided to ATCO through ATC tools, potential issues of contradictory resolution instructions may occur and may impact pilots understanding of the situation and their reaction to the alerts that may at the end impact safety of operations. Consistency between the two alerts (air and ground) as well as	Open	OBJ-03b.05-V3-VALP-0040	Stakeholder Workshop	SURF-A information should have priority over ATCO instruction in case of contradictory information. It is to follow the same priority principle as for TCAS alerts. During exercises with pilots and incident/accident events analysis it has been validated that with a short time of warning alert before collision there is no time in decision tree to get alignment with ATC and is expected immediate action based on the flight crew decision. ATC controls all flow management until the warning alert is triggered and ATC post coordination after maneuver.		N/A
		OBJ-03b.05-V3-VALP-0110				

authority sharing should be further investigated.		OBJ-03b.05-V3-VALP-0170					
ATC keeps usual authority for traffic de-confliction and pilots are able to decide if an avoidance							

maneuver is needed due to an issue on-board not perceptible by ATC (e.g. wind-shear, failure) but it has to be confirmed if on-board maneuvers in response to SURF-A alerts are in line with a decision ATC might make in parallel to solve the conflict (does not generate new conflicts, minimize impact on traffic management).							
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Arg. 1.2: Operating methods are exhaustive and support human performance.

Some conflicting situations generating alerts may let few manoeuvre possibilities to ownship aircraft and may require that pilots inform ATC or other aircraft of its presence or of a potential threat detected by aircraft systems. In a short timeline of safety net, if the phraseology between operators is not clear they may	Open	OBJ-03b.05-V3-VALP-0050	Stakeholders workshop did not identified the need of a specific phraseology. However, results from simulator sessions showed that specific phraseology should be studied and defined with concerned actors to support ATC/pilots communication.	SURF-IA_SALR-SESAR_WS_ACFT0_RTS2015_V3_Recommendation_05	N/A
		OBJ-03b.05-V3-VALP-0120			

transmit confusing communication and reduce the possibility to solve the conflict in time.		OBJ-03b.05-V3-VALP-0180				
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Arg. 1.3.3: The level of workload (induced by cognitive and/or physical task demands) is acceptable.

Depending on the use case and on the operational context (traffic density, low visibility conditions, equipment failure, etc.), traffic conflict situations	Open	OBJ-03b.05-V3-VALP-0060	Real Time Simulation Flight Trials	The impact on workload is limited and considered acceptable by pilots		N/A
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understanding and subsequent decision making may be complex to do upon alert triggering. It has to be ensured that workload induced by the alerts is acceptable to make a decision and perform the action in time.		OBJ-03b.05-V3-VALP-0130				
		OBJ-03b.05-V3-VALP-0190				

Arg. 2.3: The design of the human-machine interface supports the human in carrying out their tasks.

The CDTI is expected to support crew understanding of the SURF-ITA alerts (by providing surrounding traffic visualisation and providing additional information, monitored by the SURF-ITA function). Nevertheless, requiring the CDTI to allow the SURF-ITA functioning has strong impact on function KPA (costs, fleet equipment constraints, display		OBJ-03b.05-V3-VALP-00100	Real Time Simulation Flight Trials	The additional information provided on the CDTI display improves pilot's traffic situation awareness which help pilots in resolving conflicting situation and also reduce severity of runway incursions. This information is useful when pilots have a time to look at the display. However, the concept without the information on the CDTI (SURF-A) still allow pilot to detect and resolve a conflicting situation – it improves current solution without similar system on the board and is preferable for retrofit aircraft.	SURF-ITA 208/2019 Recommendation_01	
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information overload...) . Then, is the CDTI information really required to ensure an efficient pilot's reaction when detecting a potential conflict?							
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Table 7: Summary of the HP results and recommendations/ requirements for each identified issue & related argument

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4.4.2 Maturity of the Solution

Refer to PJ03b-05 VALR [5] section 4.1.1.

5 References

Human Performance

- [1] 16.06.05 D 27 HP Reference Material D27
- [2] PJ03b-05 OSED/SPR/INTEROP Part I D4.1.030
- [3] PJ03b-05 VALP V3 Part I D4.1.150
- [4] PJ03b-05 VALP V3 Part IV Human Performance Plan D4.1.150
- [5] PJ03b-05 VALR V3 [D4.1.180]

Appendix A **Additional HP activities conducted**

No additional HP activities was conducted.

Appendix B HP Recommendations Register

Refer to Appendix D, Tab “Recommendations Register”

Most of SURF-A/SURF-IA recommendations correspond with findings/recommendation from SURF-ITA/TWY-ITA.

HP Recommendations Register

Reference	Type of recommendation	Recommendation	Rationale	Assessment source + Reference report	Scope (Air, Air/Ground, Ground)
SURF-A_September2018_Design_Recommendation_1	System design	It is recommended to provide alert as soon as possible in order to make RTO feasible (e.g. when throttle in TO position, trigger alert as soon as runway is occupied).	The triggering of an alert should permit to avoid the collision in all cases if the appropriate recovery action is performed following the alert. For example if an alert is triggered during the take off, then the timeliness of the alert should permit pilots to do the rejected take off.	EXE-02- RTS 2018	Ground
SURF-A_September2018_Design_Recommendation_2	System design	It is recommended to provide alert when RTO is necessary and inhibit alert if RTO	The triggering of an alert during the take off should not be done if the take off is safe and feasible. Otherwise, the alert should be inhibited if rejected take	EXE-02- RTS 2018	Ground

		aggravates risk of collision	off aggravates the risk of collision.		
SURF-A_September2018_Design_Recommendation_3	System design	It is recommended to consider a two-stage alert in order to provide more time to pilots to prepare for go-around (e.g. advisory above a certain height).	The implementation of a advisory message before the warning is considered useful: - in case of approaches with conditional clearance. - to improve pilots situation awareness on the conflict.	EXE-02- RTS 2018	Air/Ground
SURF-A_September2018_Design_Recommendation_4	System design	It is recommended to evaluate the perception aspects of the alert in order to confirm there is no possibility for pilots to neglect or miss the alert in different workload situations	In case of implementation of a two-stage alert, the envisaged risks are: - The possibility to neglect the alert in VMC has been raised while looking to acquire visual on traffic. - The possibility to miss an alert has been raised due to workload, busy radio-com environment	EXE-02- RTS 2018	Air/Ground
SURF-A_September2018_Design_Recommendation_5	System design	It is recommended to analyse the possibility of airborne conflict following the alert in case ownship	A conflicting situation could potentially occur in case the ownship on approach proceeds to go-around and the traffic continues take-off. However, this can be	EXE-02- RTS 2018	Air/Ground

		proceeds to go-around and traffic continues take off (e.g. specific test session).	the case whether SURF-A is used or not. It is suggested to simulate this scenario in order to analyse the risk of airborne conflict, and to discuss possible actions for resolution of the conflict by aircraft and/or ATC		
SURF-A_September2018_Design_Recommendation_6	System design	It is recommended to evaluate the utility to have a dedicated audio for the advisory level of a two-stage alert, if implemented, in order to not overload the cockpit environment.	The use of an audio for the advisory level may bring additional noise and could be detrimental to operations. The crew can be focused on call outs or ATC communications. However, without an audio, the benefits of the early alerting could be lose in case the message on PFD is not perceived. This is not a safety issue because the crew will receive a warning shortly after.	EXE-02- RTS 2018	Air/Ground
SURF-A_September2018_Design_Recommendation_7	System design	It is recommended to adjust audio to increase alerting effect in order to better reflect the criticality of the	The alertness of the alert audio was found as not appropriate to convey the criticality of the situation.	EXE-02- RTS 2018	Air/Ground

		situation (Volume/tonne).			
SURF-A_September2018_Design_Recommendation_8	System design	It is recommended to consider a two-stage alert when the traffic is on approach in order to provide more time to pilots for envisaging the optimal recovery action	Give the crew more time to envisage the optimal action with a pre alert such as an advisory could be benefit. The advisory will inform the crew of the abnormal situation and the remaining time will allow pilots thinking on the best recovery action.	EXE-02- RTS 2018	Air/Ground
SURF-A_September2018_Design_Recommendation_9	System design	It is recommended to refine the triggering logic (alert earlier) in order to increase real TTC	Due to the time pressure and the low capability to move for the ownship when an alert "TRAFFIC BEHIND" is triggered, the timeliness of this alert should be modified for yield more time to pilots to perform the avoidance manoeuvre	EXE-02- RTS 2018	Ground
SURF-A_September2018_Design_Recommendation_10	System design	It is recommended to improve the alert content in order to support pilots' representation of the situation (modify wording, e.g.	The content of some alert messages needs to be modified and more adapted to the situation in order convey the criticality and the abnormality of the conflicting situation.	EXE-02- RTS 2018	Air/Ground

		"TRAFFIC AT TAKE OFF").			
SURF-IA_SALR- SESAR_WS_ACFT0_RTS2015_V3_Design_Recommendation_01	System design	It is recommended to make the alerting function active for a longer time at take off in order for pilots to avoid possible threat while remaining within operational acceptable limits for RTO	Task efficiency is quite good because alert permits to avoid the conflict by performing an RTO or vacating the runway. If the intruder was not identified at the moment of the alert, collision would happen if alert was not triggered. The 100 kts inhibition speed is accepted but if an alert is triggered at 95kts, the alert should keep triggering after reaching 100kts	DEL-09 14 - D11- V3 VALR - 00 00 01	Airborne
SURF-IA_SALR- SESAR_WS_ACFT0_RTS2015_V3_Recommendation_04	OPS (operating methods / procedures	It is recommended to inform pilots of clear actions associated to the alert in order to facilitate the pilots' management of the situation. Examples: systematic max braking RTO whatever the situation, go around on approach and ATC call.	In the majority of cases, the expected recovery action was performed. But the application of different recovery action for one use case (ownship at take-off) raised the need to inform pilots of the expected recovery action following the triggering of an alert. The purpose is to reduce the ambiguity related to the recovery action.	DEL-09 14 - D11- V3 VALR - 00 00 01	Airborne

SURF-IA_SALR- SESAR_WS_ACFT0_RTS2015_V3_Recommendation_05	OPS (operating methods / procedures)	It is recommended to define a phraseology associated to the alerts when this one requires to inform ATC of the conflict, in order to avoid any confusion from the operators and leave time to ATC and intruder aircraft to react to avoid the conflict.	No need for clear phraseology was identified by the stakeholders during the SAFE Forum. However, results of simulator sessions highlighted the need to consider the specification of a standard phraseology to contact ATC following an alert (similar to TCAS quick standard call). It is noted that this point should be discussed during dedicated meeting with ATC within demo phase.	DEL-09 14 - D11- V3 VALR - 00 00 01	Air/Ground
SURF-IA_SALR- SESAR_WS_ACFT0_RTS2015_V3_Recommendation_09	System design	It is recommended to add a triggering criterion on the intruder speed in addition to the TTC when ownship is on the runway (taxiing) with the intruder at take-off behind, in order to ensure that the alerts triggers sufficiently early so that pilots have time to make a decision and perform the a recovery action	Due to the time pressure and the low capability to move for the ownship when an alert "TRAFFIC BEHIND" is triggered, the timeliness of this alert should be modified for yield more time to pilots to perform the avoidance manoeuvre	DEL-09 14 - D11- V3 VALR - 00 00 01	Ground

SURF-ITA 2018/2019 Recommendation_01	System design	It is recommended to have a two-stage alert with audio when applicable to provide more time to pilots to choose the optimal recovery action based on CDTI information and minimize probability that the alert will be missed	To increase the benefit of the SURF-ITA concept it is required to get pilot's attention earlier to provide pilot with additional time to look at CDTI display and use provided information to improve decision making process.	VALR - 00 00 01	Ground
SURF-ITA 2018/2019 Recommendation_02	Training	It is recommended to emphasize criticality of traffic behind situation during the training to avoid inappropriate action which can result in increasing risk of collision.	The traffic behind message was identified as problematic and can cause inappropriate action (due to breaking).	VALR - 00 00 01	Ground

Table 8: HP recommendations

Appendix C – HP Requirements Register

No HP requirements register was emitted.

Appendix D – HP Log



D4_1_150 - SESAR
Solution 03b-05 VAL

Project PJ03b Members



Founding Members



Project PJ.03b Active Organizations

ADP	ENAV	LPS SR
AIRBUS SAS	EUROCONTROL	MICROSTEP-MIS
AIRBUS OPS	FREQUENTIS	NLR
ANS CR	HONEYWELL SAS	PANSA
BULATSA	HONEYWELL Inc.	TECHNO SKY
DASSAULT	HONEYWELL Sro	THALES LAS
DFS	INDRA	THALES AVIONICS
DLR	INDRA NAVIA	R-SYS
DSNA	INTEGRA	UNIWARSAW
EDISOFT	LEONARDO	UNIZA