SESAR 2020 Solution 05-35 SPR-INTEROP/OSED V3 -Part IV - Human Performance Assessment Report

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PJ.05-W2-DTT

DIGITAL TECHNOLOGIES FOR TOWER

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Abstract

This document contains the Human Performance (HP) assessment report for the solution 35 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 Step4 – Collate findings & conclude on V3 phase-4.

The HP V3 phase is considered closed for the solution 35.





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1 Executive Summary

This document describes the results of the activities conducted to date according to the Human Performance assessment process to derive the Human Performance Report for the Solution PJ05.35 "Multiple Remote Tower and Remote Tower Centre".

It is based on PJ05-35 HPAP. It corresponds to the completion of the 4 steps of the Human Performance assessment process, namely: Step 1 – Understand the concept: Reference, Solution and Assumptions and Step 2 – Understand the Human Performance Implications Step 3 – Improve and Validate the concept and Step4 – Collate findings & conclude on V3 phase. The outputs of the 4 steps are described and used to derive Human Performance requirements and demonstrate the V3 maturity achievement of "Multiple Remote Tower and Remote Tower Centre'. The following activities have been conducted to mature the solution:

- Workshops
 - o Workshop 1
 - HP and Safety workshop executed in Q4 2020
 - Workshop 2
 - HP and Safety workshop executed in Q2 2021
 - o Workshop 3
 - Final HP and Safety workshop executed in Q3 2022
- Validation Exercises:
 - EXE-PJ05-W2-35-V3-2.1
 - o EXE-PJ05-W2-35-V3-2.1. PSM (ATCO) DLR / FRQ Comsoft
 - EXE-PJ05-W2-35-V3-2.1.1 RTS (ATCO and SUP) DLR / FRQ/ON / PANSA
 - EXE-PJ05-W2-35-V3-2.2 RTS (ATCO) NATMIG/COOPANS
 - EXE-PJ05-W2-35-V3-2.3
 - EXE-PJ05-W2-35-V3-2.3.1 RTS (ATCO and SUP) INDRA/AVINOR
 - EXE-PJ05-W2-35-V3-2.3.2 PSM (ATCO) INDRA/HUNGAROCONTROL
 - EXE-PJ05-W2-35-V3-2.3.3 RTS (ATCO and SUP) INDRA/HUNGAROCONTROL
 - EXE-PJ05-W2-35-V3-2.4 RTS (ATCO and SUP) ENAV/IDS/ TECHNO SKY/DBL
 - EXE-PJ05-W2-35-V3-2.5 RTS (ATCO) DFS / FRQ / THALES



The results collected have been used to draft requirements and recommendations to mitigate the identified issues or to ensure the identified benefits. Most of the identified requirements and recommendations are then also included in the Part I of SPR-INTEROP/OSED.

Recommendations and requirements validated at V3 level in previous phase have not been included in this HPAR.

The V3 phase is considered closed for the solution 35.





2 Introduction

2.1 Purpose of the document

The purpose of this document is to describe the HP issues, mitigations, HP objectives, the HP activities and derived HP recommendations and requirements according to the Human Performance (HP) assessment process [1]. This document forms the V3 HP report for solution PJ05.35.

2.2 Intended readership

The intended audience and readership for this document is primarily all the partners involved in SESAR 2020, PJ05 addressing solution 35.

Stakeholders are to be found among:

- ANS providers;
- ATM infrastructure and equipment suppliers.
- Airspace users;
- Airport owners/providers;
- Affected NSA;
- Affected employee unions;





2.3 Structure of the document

The document includes the following sections:

- Executive Summary
- Introduction
- The Human Performance Assessment
- Appendix B HP Recommendations Register
- Appendix C HP Requirements Register

2.4 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 <i>as</i> <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: Acronyms and terminology





3 The Human Performance Assessment Process: Objective and Approach

The purpose of the HP assessment process described in detail in [1] is to ensure that HP aspects related to SESAR technical and operational developments are systematically identified and managed. The SESAR HP assessment process uses an 'argument' and 'evidence' approach. An HP argument is an 'HP claim that needs to be proven'. The aim of the HP assessment is to provide the necessary 'evidence' to show that the HP arguments impacted have been considered and satisfied by the HP assessment process. This includes the identification of HP requirements and recommendations to support the design and development of the concept.

The HP assessment process is a four-step process. Figure 1 provides an overview of these four steps with the tasks to be carried out and the two main outputs (i.e. HP plan and HP assessment report).

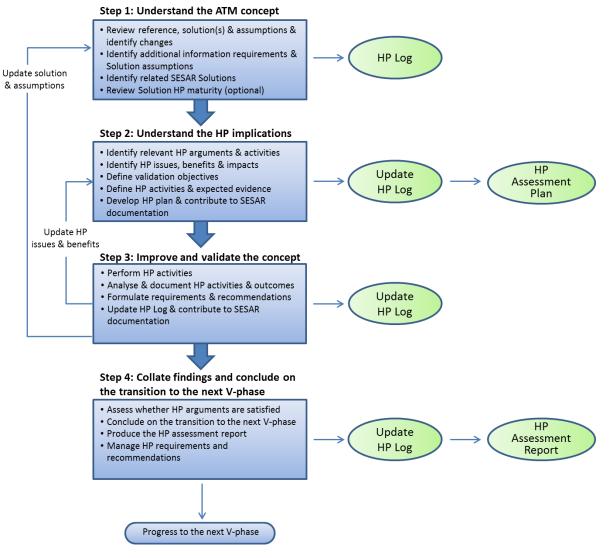


Figure 1: Steps of the HP assessment process





Throughout the HP assessment process, the HP experts collaborate with the other Transversal Areas (TAs) in order to ensure that there is no overlap between the objectives defined or that there are no issues/benefits that have not been considered. Safety is one of the TAs with whom the HP experts interact the most, from identifying the list of changes and activities that will be included in the HP Plan to conducting joint workshops following the validation exercises. A detailed overview of the synergies with other TAs can be found in the HP reference Material [1].





4 Human Performance Assessment

4.1 Step 1 Understand the ATM concept

4.1.1 Description of reference scenario

The reference scenario is described in the PJ05.35 W2 OSED and is the Remotely Provided Air Traffic Service for Multiple Aerodromes validated at V3 maturity level in SESAR 2020 W1 PJ05.02.

PJ.05-02 has validated a MRTM with a fixed allocation that allows the ATCO to maintain situational awareness for 2 or 3 airports simultaneously with the following traffic characteristics (including mix of IFR and VFR):

- 2 small airports (corresponding to the PJ.20 Operation environment description for a 'Small Airport Operating Environment') with up to 20 movements/hour in total for all airports.
- 3 other airports (corresponding to the PJ.20 Operation environment description for an 'Other Airport Operating Environment') with up to 15 movements/hour in total for all airports.

It is assumed that an ATCO can hold endorsements for up to 3 (single) different airports.

Providing ATS to more than one airport by one AFISO/ATCO, when it is safe and practical, will add benefits to airport providers, ANSPs, airlines and eventually the flying customers through a cut in costs and /or the provision of ATC to airports earlier not served.

When providing ATS to multiple aerodromes from an MRTM requirements to share or duplicate features required for the provision of ATS to more than one aerodrome are to be taken into consideration.

Technical enablers, AVFs, communications, radar displays and other features/function to assist with the provision of ATS should be integrated and shared between aerodromes when possible. Other required key features such as the strip bay etc. require duplication for each aerodrome. Any duplication of equipment/features that occurs in the RTM may be accompanied by distinctive features to allow easy and instant recognition of the aerodrome the feature relates to.

The provision of ATS to more than one aerodrome will be made possible by the provision of visual presentations that allow for the constant monitoring of each aerodrome. The screens will display each aerodrome simultaneously and continue to do so even when the AFISO/ATCO is managing traffic to one specific aerodrome. It is vitally important that the operator is, at all times, able to distinguish which aerodrome they are currently operating and which aerodrome any single set of displays or peripherals are linked to.

EATMA defined roles involved in the reference scenarios are:

- Tower Clearance Delivery Controller
- Tower Ground Controller
- Tower Runway Controller

These roles are combined in one single role assigned to the AFISO/ATCO providing ATS at the MRTM.





Figure below provides some examples of aerodrome distribution for Remotely Provided Air Traffic Service for Multiple Aerodromes in normal conditions or in high workload conditions. Once the MRTM configuration has been set, it cannot be dynamically changed.

There is a fixed allocation of airports to a set of MRTMs. However, in case of ATCO high workload, due to e.g. emergency, high traffic volumes or degraded mode, the ATCO can split one airport into a spare MRTM if required.

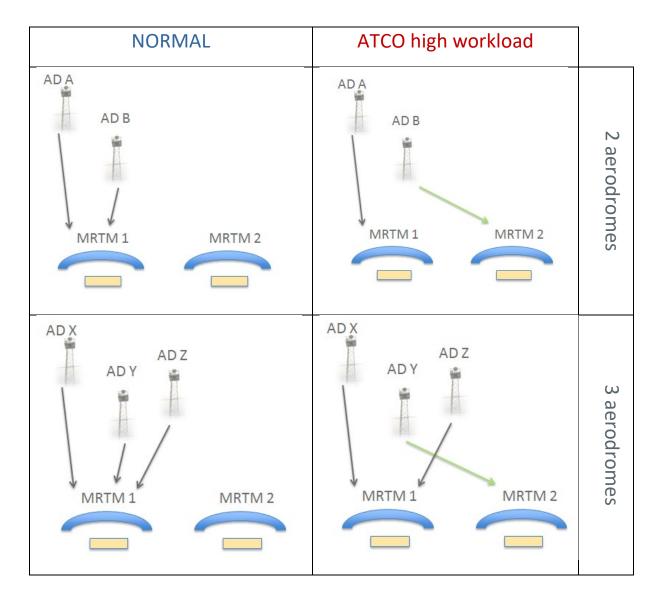


Figure 2 Example image of aerodrome distribution for ATCO high workload for 2 or 3 aerodromes





4.1.2 Description of solution scenario

The solution scenario is the Multiple Remote Tower and Remote Tower Centre that is described in the PJ05.35 W2 OSED [3] and aims at providing remote tower control for multiple aerodromes simultaneously and by one ATCO.

The objective of solution 35 is to increase ATCO productivity (i.e. reduce the number of ATCOs required) by better balancing the workload between different MRTMs within a Remote Tower Centre. This will be achieved by a flexible allocation of grouped aerodromes to dedicated MRTMs supported by a Remote Tower Centre Supervisor role (RTC supervisor) and a Supervisor Planning Tool.

Such a flexible allocation of aerodromes in the MRTM implies that one aerodrome can take different display slots/positions within MRTMs (e.g. aerodrome A is at the left position of the MRTM (1) in the morning and after a transfer to another MRTM (2) is received back at the right part of the MRTM (1)).

All issues that could impact the ATCOs ability to provide simultaneous ATS in a safe and efficient manner should be taken into consideration, including the following possibilities:

- The traffic load to be kept at the level defined in the scope of the solution 35 while taking into account other factors such as traffic complexity and required efforts for providing simultaneous ATS caused by the aerodrome layouts complexity, (e.g. backtracking vs taxi ways).
- The workload could be reduced by extended automation support.

The full range of ATS should be offered in such a way that the possible negative impact on the airspace users is reduced to a minimum while maintaining a safe and efficient service in comparison to the single remote tower operations.

As for the reference scenario, technical enablers, AVFs, communications, radar displays and other features/function to assist with the provision of ATS shall have varying degrees of integration and sharing between aerodromes. Features that are required continuously (such as the strip bay etc.) require duplication for each aerodrome. Any duplication of equipment/features that occurs in the RTM may be accompanied by distinctive features to allow easy and instant recognition of the aerodrome the feature relates to.

As for the reference scenario, the provision of ATS to more than one aerodrome will be made possible by the provision of visual presentations that allow for the constant monitoring of each aerodrome. The screens will display each aerodrome simultaneously and continue to do so even when the ATCO is managing flights to one specific aerodrome while no traffic or no movements are on the other aerodromes. It is vitally important that the operator is, at all times, able to distinguish which aerodrome they are currently operating and which aerodrome any single set of displays or peripherals are linked to.

As for the reference scenario, EATMA defined roles involved in the solution scenarios are:

- Tower Clearance Delivery Controller
- Tower Ground Controller
- Tower Runway Controller





• Optional (including combined TWR/APP) Approach Controller

These roles are combined in one single role assigned to the air traffic controller providing ATS at the MRTS.

In addition to these roles, a new role is introduced for PJ05.35: the RTC supervisor role the task of the flexible allocation of grouped aerodromes to dedicated MRTMs should be assigned to a specific role, depending on the complexity of the flexible allocation.

RTC Supervisor is responsible for the operational supervision of the remote tower center. This role may be filled by an ATCO with dedicated license and training or alternatively may be a distinct position with an endorsement for the task.

In order to enable an efficient allocation, it is assumed that the RTC supervisor will be supported with a support tool (Supervisor Planning Tool) that incorporates data like traffic volume/complexity and weather conditions at the different airports as well as ATCO endorsements and availability.

The balance of traffic load for the ATCO can be assured in time with the support of ATCO planning tools and RTC planning tools for the supervisor. It will help in the decision making on when to transfer airports between MRTMs. It will also help in the decision on which airports to combine when there is a choice in doing so, taking into consideration suitable airport combinations and ATCO endorsements or other priorities depending on local specifications.

The number of endorsements an ATCO can keep sets the limit of how airports can be distributed in a flexible way. One solution to keep a larger RTC running is to divide airports in different groups, clusters, to enable endorsements on all airports within a cluster.

Figure below shows feasible grouping of different aerodromes in two separate clusters (up to 4 aerodromes on each) within one RTC.

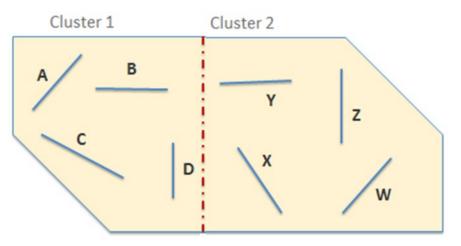


Figure 3 Airport cluster configurations in a RTC (see OSED)

Images below adds view on how an RTC with a flexible allocation of aerodromes could work:

• Four different aerodromes are flexibly allocated between two MRTMs in the one RTC





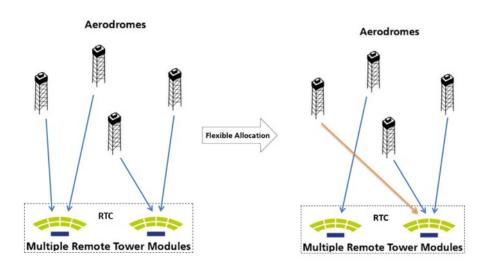


Figure 4 Flexible allocation of aerodromes to MRTM's in RTC (see OSED)

• RTC supervisor should be provided with all necessary data in order to flexibly allocate aerodromes between the different MRTMs achieving as much as possible balanced workload between the MRTMs

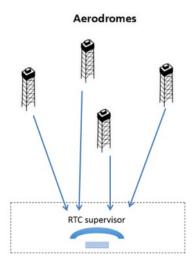


Figure 5 RTC Supervisor role with data from all connected airports (see OSED)

• The picture below assumes how a larger number of aerodromes could be allocated between several MRTMs placed inside one RTC. RTC supervisor supported by the supervisor planning tool will allocate aerodromes between different MRTMs





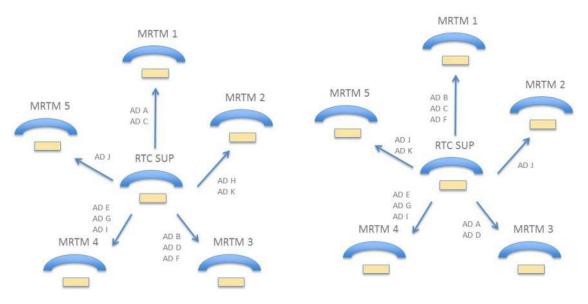


Figure 6 Aerodrome allocation examples within an RTC (see OSED)

The Real Time Simulations address in PJ05.35, in general, a setup with two MRTMs, each providing the capability to allocate 3 aerodromes at a time within each MRTM. Taking this into account, aerodromes could be allocated as follows:

- MRTM1 with 3 airports will impose allocation of 1 airport to MRTM2; and
- MRTM1 with 2 airports will impose allocation of 2 airports to MRTM2.

HPAP will consider the capability to allocate:

- Up to 3 aerodromes at a time within each MRTM in line with RTS validation exercises' scope (3 simultaneous aerodromes managed by one single ATCO)
- Up to 4 aerodrome endorsements for a single ATCO. This also states the limit of the number of aerodromes that can be flexibly allocated within a cluster (a group of 4 aerodromes can be flexibly relocated for each cluster)
- Up to 2 clusters of aerodromes assigned to the remote tower centre in the validation exercises: even if this number is not the limit for the RTC, validation exercises will test up to this limit (up to 8 aerodromes simultaneously supervised by one single RTC supervisor)
- Up to 4 clusters of aerodromes considered by the RTC supervisor tool (up to 16 simultaneous aerodromes considered by the RTC supervisor tool).

4.1.3 Consolidated list of assumptions

The following table summarises the consolidated assumptions agreed in PJ05.03 [4] and reviewed for PJ05.35





Assumptions Title and Description	Source
PJ05.35 W2 Remotely Provided Air Traffic Service for Multiple Aerodromes as reference scenario	;
Provision of remote ATS for a single aerodrome and for Multiple	W1-PJ05-02
Aerodromes without flexible allocation is already available, i.e. ATCOS are used to providing ATS from a MRTM	
Operating Methods / Traffic Characteristics	
• The remote provision of ATS for multiple aerodromes is applicable to	W1-PJ05-02
aerodromes with simultaneous traffic at the different airports	W1-PJ05-03
 Different airport layout usage configurations at the controlled 	W1-PJ05-02
airports (e.g. different runway configuration, different views on the runway) are possible	
The operational procedure/protocol for transfer of one airport between two ATCOs is developed	
Weather Conditions	
 Different visibility conditions might occur at the controlled airports 	W1-PJ05-02
(resulting in different operational procedures e.g. different CAT/VIS conditions, night and daytime)	
Different wind conditions might occur at the controlled airports	W1-PJ05-02
	W1-PJ05-03
Remote Tower Modules within an RTC	
A unified Multiple Remote Tower Module (MRTM) solution will be	W1-PJ05-02
developed and implemented (rather than different or even bespoke solutions) within an RTC.	
• The minimum set of same systems are available at all controlled	W1-PJ05-02
airports (i.e. air surveillance, electronic flight strips) and the HMIs of the systems of the controlled airports are harmonised	W1-PJ05-03
Allocation of airports to one MRTM can be:	
• fixed to MRTM, i.e. no change, and is already available	W1-PJ05-02
flexible to MRTM, i.e. changing at certain times (short term	W1-PJ05-02
planning) or due to emergencies and is already available	W1-PJ05-03
 dynamic, i.e. changing depending on traffic demand (long term planning), which requires a supervisor role 	W1-PJ05-03





Human actors are:	
 ATCO: one single ATCO for one MRTM, i.e. no workshare between two MRTMs 	W1-PJ05-02 W1-PJ05-03
	W1-PJ05-03
RTC Supervisor	
Training/ Licensing:	
Controllers are familiar with the operating environment and tools	W1-PJ05-02
	W1-PJ05-03
• ATCO can hold endorsements for up to 4(single) different airports	W1-PJ05-02
harmonised in terms of systems and procedures	W1-PJ05-03

Table 2 Consolidated list of assumptions

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

PJ05.35 W2 takes into account the work performed in SESAR 2020 W1 PJ5.02 [7] and PJ05.03 [4] (based on SESAR 1 in Project 06.09.03 [5]). This HP assessment plan documents the human performance activities planned for the solution PJ05-35 to address the maturity phase V3.

The PJ5.02 [7] and PJ05.03 [4][10] HP assessment plans [4] and the PJ05.02 (for V3) [8] and PJ05.03 (for V2) [9] Validation Reports are taken into account, including recommendations and requirements.

4.1.5 Identification of the nature of the change

The following table collects the changes on Human Performance Arguments areas (Roles and Responsibilities, Human and Systems, Teams & Communication, HP Related Transition Factors) introduced by PJ05.35. The changes were identified in V2 PJ05.03[10] and carried forward into the V3 current phase.

HP argument branch	Change & affected actors							
1. Roles & Responsibilities								
1.1 ROLES & RESPONSIBILITIES	EATMA defined roles involved in the solution scenarios are:							
	Tower Clearance Delivery Controller							
	Tower Ground Controller							
	Tower Runway Controller							
	These roles are combined in one single role assigned to the air traffic controller providing ATS at the MRTS.							
	In addition to these roles, a new role is introduced for PJ05.35: the RTC supervisor role as the task of the flexible allocation of grouped aerodromes to dedicated MRTMs must be allocated to a specific role, depending on the complexity of the flexible							





	allocation. This role can also be held by one of the ATCOs responsible of one of the MRTMs in the RTC, depending on the complexity of the operational environment.
	ATCO will be responsible for providing ATS to more than one aerodrome in parallel and up to 3 aerodromes simultaneously.
	RTC supervisor will be responsible to supervise the clusters of aerodromes assigned to the RTC.
	The number of aerodromes a supervisor can be responsible for depends on how the role is locally defined (i.e., which tasks is the supervisor responsible for): In certain centres / countries the supervisor might have a more active supporting role (in which case he also needs the licences of the airports) whereas in others centres the supervisor role might be a more "administrative" role. However, the supervisor is anyway responsible for the flexible allocation of aerodromes between modules and for initiating the transfer procedure.
	Any tasks that have to be performed at the aerodrome will be performed by personnel located on-site at the aerodrome.
	The supervisor is responsible for planning resource and aerodrome allocation and the supervisor will facilitate the transition of aerodromes to different MRTMs, monitoring all conditions (e.g. weather conditions, status of RTC and aerodromes, responsibilities between different MRTMs within RTC etc.).
	An ATCO should also be able to request a transfer (even if he/she is not holding the RTC supervisor role).
	ATCO should have the final decision in when/whether the handover takes place.
	Spare ATCOs should be available at the remote-control centre. The number of spare ATCOs depends on the number of endorsements.
1.2 OPERATING METHODS	The operating methods as such do not change for each airport, however an ATCO might work simultaneously on different airport with different operational modes (e.g. LVP at only one airport).
	New operating methods are expected to be locally established to define the operational procedure to transfer the aerodromes between the different MRTMs available at the RTC:
	 the RTC supervisor, supported by the supervisor planning tool, needs to plan the allocation of aerodromes during the day and need to initiate a transfer of an aerodrome from an MRTM to another ahead when an increase of requested movements on one/or several aerodromes for an ATCO in a MRTM is expected The ATCO is expected to receive instructions from the RTC supervisor about the changes in the allocation of aerodromes and is expected to initiate the transfer to





	 another MRTM, passing the control of the aerodrome to another ATCO. ATCO can also request for a transfer of aerodrome in case of need The operational methods for the Supervisor related to transition period (shifting an airport to another MRTM) and to the support tool (planning tool) have to be locally defined. In nominal conditions the transfer procedure should be initiated in low load period. In case of an emergency, the airport with the emergency shall be isolated if feasible. Operating procedure for the handover should foresee a period dedicated to the monitoring (also of the frequency) before the actual handover and a coordination between the ATCOs: the receiving ATCO should describe the situation and sending ATCO
	should confirm the acceptance. This operating procedure is expected to be supported by dedicated checklist locally defined.
1.3 TASKS	The ATCOs will be providing ATS for one or more aerodromes in parallel, so the individual tasks may not change significantly compared to static allocation of aerodromes to MRTM (PJ05.02) RTO. However, the number of tasks an ATCO will have to perform and the working methods will change, e.g. transfer of aerodromes to another MRTM
	The supervisor will be responsible for managing resources on tactical level on a daily basis. Hence resource management becomes less strategic and more tactical, i.e. on a shift basis rather than over a larger period of rotations.
	Some aspects need further local investigations:
	 Complexity: Work of ATCO was over-simplified in simulation environment (management of the light system, cameras, etc.)
	• Fatigue: Sessions were of limited duration. Fatigue tends to accumulate and toward the end of the shift, this might form a problem.
2. Human & System	
2.1 ALLOCATION OF TASKS (HUMAN & SYSTEM)	Compared to PJ05.02 MRTM no changes in task allocation between the ATCOs and the system are currently foreseen.
	As for single RT automated a/c identification and tracking may be implemented to enhance ATCOs situation awareness.
	The new task of assignment of operators to MRTMs/ aerodromes is envisaged to be allocated to the human [i.e. Supervisor], and the workload of the Supervisor is liable to increase.
	Nevertheless, human actors are expected to be supported by new tools in the decision-making process:





	 RTC supervisor is expected to be supported by a supervisor planning tool to establish the flexible allocation of aerodromes to the available MRTM. ATCO is expected to be supported by an ATCO planning tool enabling the ATCO planning and prioritizing tasks for all aerodromes connected to the MRTM beyond the horizon of 30 minutes The system may optionally support monitoring tasks that are currently performed by the ATCO (e.g. conformance monitoring, monitoring of upcoming traffic, etc.)
2.2 PERFORMANCE OF TECHNICAL SYSTEM	Compared to PJ05.02 MRTM, there are changes expected in the performance of the technical system as the systems shall allow the supervisor to flexibly establish the allocation of aerodromes to the available MRTM and the ATCO to flexibly transfer the aerodromes to other MRTMs available in the RTC. Other expected changes in the performance rely on development of an ATCO planning tool and a Supervisor planning tool. The ATCO planning tool takes into consideration a number of aerodromes assigned to each MRTM and a flexible allocation of the RTC aerodromes to the available MRTMs. The simulation environment will consider up to 3 aerodromes for each MRTM. The supervisor planning tool may optionally take into consideration a number of clusters of aerodromes assigned to the RTC. Finally, for R/T communication performance different changes are expected: for some aerodromes (where relevant) speakers may be replaced by headphones, just to help reduce ambient noise in the multiple tower control room; air traffic frequencies from the different airports are expected to be coupled and flexibly allocated to the different MRTMs (e.g. airports frequencies A, B, C coupled, etc.) while ground traffic, meaning vehicles at an aerodrome, may be coupled or not and in this last case may call for communication via speakers preferably situated in the MRTM to facilitate the notion from which aerodrome the call is coming from. Additionally, there might be the need for an alerting system to draw the attention of the ATCO to a certain airport under certain conditions e.g. aerodrome highlighted in case of communication; alerts for a pre-defined area. There should be a system tracking how much time the ATCO works on each airport to automatically monitor and ensure that the minimum required amount of hours (and therefore the endorsement) is maintained. EFS is minimum requirement for the CWP. Handover procedure may be supported by the technical system in silent transfer and acceptance of the split and merge

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	(without the need for a call).
2.3 HUMAN – MACHINE INTERFACE	When providing ATS to more than one aerodrome the ATCOs HMI will be configured so that the two (or more) aerodromes can be monitored & controlled by one ATCO. As PJ05.35 proposes the flexible allocation of aerodromes to the different MRTM, the HMI is expected to support the flexible transfer and switch of aerodromes between the different MRTM. Flexibility of the airport positions within the modules shall be available for the ATCO with use-friendly HMI to support the ATCO in maintaining SA (e.g. avoiding complex interactions to positioning a specific aerodrome in the desired position; automatic resize according to the available screen).
	Furthermore, as for PJ05.02 MRTM operations, additional information/ support tools may be added to support the ATCOs work e.g. automatic a/c identification & tracking (see HP assessment for single in SESAR).
	The ATCO may be provided with a visual indication of which aerodrome an incoming radio transmission is related to. The visual indications may be customisable and switched on-off on ATCO's request
	The CWP in the MRTM will display information & the OTW view will be displayed via visual reproduction (as is done for the single RTO) for each of the aerodromes being controlled by an ATCO. The actual design / setup of the CWP has not been decided at this stage (i.e. how to organise the HMIs / CWP to optimise ATCO performance and minimise the potential for error). The role of flexible allocation emphasizes this matter as it may happen that e.g. aerodrome A is at the left position of the MRTM (1) in the morning and after a transfer to another MRTM (2) is received back at the right part of the MRTM (1).
	The supervisors may require more information to support him/her with the additional tasks e.g. tactical resource management, slot co-ordination and transition of aerodromes via a Supervisor planning tool.
	Previous work on Safety Nets should be a prerequisite: e.g. a technical barrier to prevent clearing multiple aircrafts/vehicles for one runway should be available for the ATCO.
	ATCO planning tool and supervisor planning tool are also expected to be integrated in CWP HMI.
	MET information shall be displayed to the ATCO in the displays in the scan path of the ATCO considering he/she has already a significant number of screens in front.
3. TEAMS & COMMUNICATION	

3.1 TEAM COMPOSITION	While for W1 PJ05.02 there is currently a team of ATCOs working





	in the RTC and responsible for the different airports, in Pj05.35 solution there will be a team that is responsible for more than one airport with Multiple Remote Tower: 1 ATCO for each Remote Tower Module and 1 supervisor for the RTC (this role can also be assigned to one ATCO of the RTC where complexity allows). Depending on local decision, the team might include an additional ATCO to support one of the MRTM in service in the RTC or to flexible support the opening of an additional MRTM if needed. The supervisor role will take on more responsibility, s/he will be responsible for distributing the work and deciding which positions to open and what and how many aerodromes each ATCO will be responsible for providing ATS services. Therefore, the supervisor role will become more prominent.
3.2 Allocation of tasks	Instead of providing ATS to static PJ05.02 MRTM allocated aerodromes, ATCO will be expected to provide ATS to two or more aerodromes flexibly allocated during the working hours. However, the tasks the ATCOs will be required to do in order to provide ATS will be the same as with single RTO. The supervisor will take on additional tasks and his role will involve, as described in 3.1, deciding how many and what combination of aerodromes each ATCO can be responsible for providing ATS at a tactical level depending on traffic demands and available endorsements.
3.3 COMMUNICATION	Different changes are expected in terms of communication: frequencies are expected to be coupled between aerodromes for air traffic with flexible allocation of the coupling between MRTMs depending on the specific selected configuration, the consequences on flight crew require a dedicated assessment (flight crew on the frequencies will hear communications and clearances between ATCO and flight crew on other airports possibly affecting situation awareness, e.g. flight crew cleared to take-off at the airport A at the same time of flight crew cleared to land on the airport B) requiring the need of reinforcement of existing identification procedures between pilot, Approach and Tower Controller. Dedicated procedures for communicating the split (or merge) and aerodrome handover between the ATCOs who are sitting in two different MRTMs will need to be locally established, especially in cases with high workload –due to high traffic complexity or stemming from an abnormal scenario or system malfunction. Ground communications with vehicles might also be affected due to the flexible allocation of aerodromes between MTRMs, and procedures of communication of the changes between ATCO and ground traffic might be required. Supervisors need to have more information relating to the ATCOs workload and may require more tactical information about the

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 changes to resource management / allocation. Supervisors will be required to communicate with and co-ordinate more ATCOs on a shift than in current operations as they will have to tactically manage resources. The amount of communication and time on the frequency can still be a bottleneck: Frequencies should be coupled, so pilots have to get used to hear pilots in other areas on the same frequency. Ground vehicles should have their own frequency, have to get used to the fact that the ATCO is communicating also with other airports 4. HP RELATED TRANSITION FACTORS Having to dynamically, and more frequently, perform handover o aerodromes "may" impact job satisfaction (positively on negatively), also affected by the responsibility of controlling two on more airports at the same time. This may raise concerns specifically relating to safety – in particular concerns regarding multiple aerodromes concurrently, concerns regarding situatior awareness and potential for error(e.g. Skill Based Errors, Rule Based Errors, Knowledge-based). Anyway, there might be possibilities to increase job satisfaction as work is more demanding and waiting time can be reduced. Working in teams in an MRT centre might have an impact on jot satisfaction 		
MORE ATCOS on a shift than in current operations as they will have to tactically manage resources. The amount of communication and time on the frequency can still be a bottleneck: Frequencies should be coupled, so pilots have to get used to hear pilots in other areas on the same frequency. Ground vehicles should have their own frequency, have to get used to the fact that the ATCO is communicating also with other airports HP RELATED TRANSITION FACTORS ALACCEPTANCE & JOB SATISFACTION Having to dynamically, and more frequently, perform handover o negatively), also affected by the responsibility of controlling two omore airports at the same time. This may raise concerns specifically relating to safety – in particular concerns regarding multiple aerodromes concurrently, concerns regarding multiple aerodromes in an MRT centre might have an impact on job satisfaction. Anyway, there might be possibilities to increase job satisfaction as work is more demanding and waiting time can be reduced. Working in teams in an MRT centre might have an impact on job satisfaction. ACO WII hold ADI rating & unit endorsement (including endorsement for remote tower control to a number of aerodromes to enable flexible allocation. Additional skills might		imminent traffic load as they will have to communicate tactical changes to resource management / allocation.
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4.1 ACCEPTANCE & JOB SATISFACTION Having to dynamically, and more frequently, perform handover o aerodromes "may" impact job satisfaction (positively on negatively), also affected by the responsibility of controlling two or more airports at the same time. This may raise concerns specifically relating to safety – in particular concerns regarding whether or not ATCO can provide a safe service if working multiple aerodromes concurrently, concerns regarding situation awareness and potential for error(e.g. Skill Based Errors, Rule Based Errors, Knowledge-based). Anyway, there might be possibilities to increase job satisfaction as work is more demanding and waiting time can be reduced. Working in teams in an MRT centre might have an impact on job satisfaction. 4.2 COMPETENCE REQUIREMENTS ATCO will hold ADI rating & unit endorsement (including endorsement for remote tower control) to a number of aerodromes- in this solution it is up to 4 aerodromes to enable flexible allocation. 4.3 STAFFING REQUIREMENTS & STAFFING LEVELS As one ATCO can provide ATS to more than one aerodrome the total number of ATCO required to provide ATS to all aerodromes in the RTC might be reduced.		to get used to the fact that the ATCO is communicating
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endorsement for remote tower control) to a number of aerodromes- in this solution it is up to 4 aerodromes to enable flexible allocation. Additional skills might be needed: • Teamwork skills (TRM), depending on the context • SUP has to have a background in control tower 4.3 STAFFING REQUIREMENTS & STAFFING LEVELS As one ATCO can provide ATS to more than one aerodrome the total number of ATCO required to provide ATS to all aerodromes in the RTC might be reduced.	4.1 ACCEPTANCE & JOB SATISFACTION	Anyway, there might be possibilities to increase job satisfaction as work is more demanding and waiting time can be reduced. Working in teams in an MRT centre might have an impact on job satisfaction The supervisor will also be responsible for tactical resource
Teamwork skills (TRM), depending on the context SUP has to have a background in control tower As one ATCO can provide ATS to more than one aerodrome the total number of ATCO required to provide ATS to all aerodromes in the RTC might be reduced.	4.2 COMPETENCE REQUIREMENTS	endorsement for remote tower control) to a number of aerodromes- in this solution it is up to 4 aerodromes to enable
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total number of ATCO required to provide ATS to all aerodromes in the RTC might be reduced.		SUP has to have a background in control tower
4.4. RECRUITMENT AND SELECTION No impact	4.3 STAFFING REQUIREMENTS & STAFFING LEVELS	total number of ATCO required to provide ATS to all aerodromes
	4.4. RECRUITMENT AND SELECTION	No impact
4.5. TRAINING NEEDS Based on the assumptions ATCOs can hold endorsements for up to 4 aerodromes. This may have an effect on training in terms of its length, content and complexity.	4.5. TRAINING NEEDS	to 4 aerodromes. This may have an effect on training in terms of





ATCO will need to be trained to operate different aerodrome combinations; as well as to tactically receive new aerodromes to operate or handover aerodrome(s) to another operator/RTM. Procedures and working methods associated with the cooperation with the supervisor will also need to be part of the training

Table 3: Description of the change





4.2 Step 2 Understand the HP implications

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

All the HP Issues/ Benefits are considered as GROUND ATM scope. All the HP OBJ are considered Validated. The following table summarise the relevant arguments, HP issues & benefits and HP activities.

Argu ment	HP issue/ benefit ID	HP issue / benefit	Sta tus	Potential mitigation to the HP issue	Source	HP/ validation objectives ID	Objectiv es	Addr essed by	HP activit y/is	Suc ces s crit eria ID	Expecte d evidence (Succes s criteria)
Arg. 1.1.2:T he descrip tion of roles & respons ibilities cover all tasks to be perfor med by a human actor.	W2.PJ05.35 _Is.1.1.2-1	The description of the roles & responsibili ties does not cover all tasks to be performed by a human actor	Clos ed	To ensure the roles and responsibilities cover all tasks to be performed by human actor	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H07	Assess ATCO acceptance of roles and responsibili ties when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H07. 010	Majority of ATCOs assess that changes to ATCOs roles and responsibili ties introduced by the multiple remote tower concept are clear, consistent, stable and acceptable when working in





											a RTC with a flexible allocation of aerodrome s between MRTMs
						OBJ-PJ05-W2- 35-V3-VALP- H10	Assess Supervisor acceptance of roles and responsibili ties when supporting provision of ATS to multiple aerodrome s	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H10. 010	Majority of Supervisors assess that changes to their roles and responsibili ties introduced by the multiple remote tower concept are clear, consistent, stable and acceptable.
Arg. 1.1.3: Roles and respons ibilities are clear and consist ent (in	W2.PJ05.35 _Is.1.1.3-1	Roles & responsibili ties are not clear & consistent	Clos ed	To ensure the roles are clear and consistent	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H07	Assess ATCO acceptance of roles and responsibili ties when providing ATS to multiple	COOPA NS INDRA/ AVINO R - INDRA/ HC ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H07. 010	Majority of ATCOs assess that changes to ATCOs roles and responsibili ties introduced by the multiple









Arg. 1.2.1: Operati ng method s cover operati ons in normal operati ng conditi ons.	W2.PJ05.35 _Is.1.2.1-1	Operating methods do not cover all operations in normal operating condition	Clos ed	To ensure efficient operating methods are established and cover all operations in normal operating condition	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H09	Assess Supervisors acceptance of operating methods when supporting provision of ATS to multiple aerodrome s	COOPA NS DLR INDRA/ AVINO R - INDRA/ HC ENAV	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H09. 010	Majority of SUPs assess that operating methods can be applied in an accurate, efficient and timely manner in normal and abnormal operating conditions and degraded modes when working in a RTC with a flexible allocation of aerodrome
											aerodrome s between MRTMs
						OBJ-PJ05-W2- 35-V3-VALP- H06	Assess ATCOs acceptance of operating methods when providing	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H06.	Majority of ATCOs assess that operating methods can be applied in an





							multiple aerodrome s	ENAV DLR			efficient and timely manner in normal and abnormal operating conditions and degraded modes when working in a RTC with a flexible allocation of aerodrome s between MRTMs
Arg. 1.2.1: Operati ng method s cover operati ons in normal operati ng conditi ons.	W2.PJ05.35 _Is.1.2.1-2	Operating methods might not be appropriat e to control the required traffic volume in normal operating conditions	Clos ed		W1-PJ05.03						
Arg. 1.2.1: Operati ng	W2.PJ05.35 _ls.1.2.1-4	Operating methods for transferrin	Clos ed	To ensure efficient operating methods are established and cover all operations in normal operating condition	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H09	Assess Supervisors acceptance of	COOPA NS DLR INDRA/	RTS WS PSM	CRT- PJ05- W2- 35-	Majority of SUPs assess that operating





method	g/assuming			operating	AVINO		V3-	methods
s cover	control of			methods	R -		VALP	can be
operati	aerodrome			when	INDRA/		-	applied in
ons in	s from one			supporting	HC		H09.	an
normal	MRTM to			provision	ENAV		010	accurate,
operati	another			of ATS to				efficient
ng	are not			multiple				and timely
conditi	clear or			aerodrome				manner in
ons.	efficient.			s				normal and
	Transferrin							abnormal
	g/assuming							operating
	an							conditions
	aerodrome							and
	at an							degraded
	MRTM							modes
	might							when
	increase							working in
	workload							a RTC with
	depending							a flexible
	on traffic							allocation
	volumes							of
	and traffic							aerodrome
	complexity							s between
								MRTMs
			OBJ-PJ05-W2-	Assess	COOPA	RTS WS	CRT-	Majority of
			35-V3-VALP-	ATCOs	NS	PSM	PJ05-	ATCOs
			H06	acceptance	INDRA/		W2-	assess that
				of	AVINO		35-	operating
				operating	R -		V3-	methods
				methods	INDRA/		VALP	can be
				when	HC		-	applied in
				providing	- DFS		H06.	an
				ATS to	ENAV		010	accurate,
				multiple	DLR			efficient
				aerodrome				and timely
				s				, manner in
								normal an





										abnormal operating conditions and degraded modes when working in a RTC with a flexible allocation of aerodrome s between MRTMs
Arg. 1.2.1: Operati ng method s cover operati ons in normal operati ng conditi ons.	W2.PJ05.35 _ls.1.2.1-5	Different aerodrome s have different procedures and different characteris tics. This may add confusion, increase the amount of informatio n ATCOs have to remember, and as a consequen ce increase the	Clos ed	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H09	Assess Supervisors acceptance of operating methods when supporting provision of ATS to multiple aerodrome s	COOPA NS DLR INDRA/ AVINO R - INDRA/ HC ENAV	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H09. 010	Majority of SUPs assess that operating methods can be applied in an accurate, efficient and timely manner in normal and abnormal operating conditions and degraded modes when working in a RTC with





		potential for human error. This could have an impact at the system level on safety									a flexible allocation of aerodrome s between MRTMs
Arg. 1.2.2: Operati ng method s cover operati ons in abnorm al operati ng conditi ons.	W2.PJ05.35 _Is.1.2.2-1	Operating methods do not cover all operations in abnormal conditions (like in emergency situations)	Clos ed	To ensure efficient operating methods are established and cover abnormal conditions	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H06	Assess ATCOs acceptance of operating methods when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H06. 010	Majority of ATCOs assess that operating methods can be applied in an accurate, efficient and timely manner in normal and abnormal operating conditions and degraded modes when working in a RTC with a flexible allocation of aerodrome s between MRTMs





						OBJ-PJ05-W2- 35-V3-VALP- H06	Assess ATCOs acceptance of operating methods when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H06. 010	Majority of ATCOs assess that operating methods can be applied in an accurate, efficient and timely manner in normal and abnormal operating conditions and degraded modes when working in a RTC with a flexible allocation of aerodrome s between MRTMs
Arg. 1.2.4:T he content of operati	W2.PJ05.35 _Is.1.2.4-1	The content of the operating methods is unclear &	Clos ed	To ensure operating methods are clear and consistent	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H09	Assess Supervisors acceptance of operating methods	COOPA NS DLR INDRA/ AVINO R -	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP	Majority of SUPs assess that operating methods can be





ng method s is clear and consist ent (in V1: non- contrad ictory).	contradict ory.			when supporting provision of ATS to multiple aerodrome s	INDRA/ HC ENAV		- H09. 010	applied in an accurate, efficient and timely manner in normal and abnormal operating conditions and degraded modes when working in a RTC with a flexible allocation of aerodrome s between MRTMs
			OBJ-PJ05-W2- 35-V3-VALP- H06	Assess ATCOs acceptance of operating methods when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H06. 010	Majority of ATCOs assess that operating methods can be applied in an accurate, efficient and timely manner in normal and abnormal operating





											conditions and degraded modes when working in a RTC with a flexible allocation of aerodrome s between MRTMs
Arg. 1.2.5: Operati ng method s can be followe d in an accurat e, efficien t and timely manner	W2.PJ05.35 _Is.1.2.5-1	The operating methods cannot be followed in an accurate, efficient and timely manner	clos ed	To ensure the operating method can be followed in an accurate efficient and timely manner	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H09	Assess Supervisors acceptance of operating methods when supporting provision of ATS to multiple aerodrome s	COOPA NS DLR INDRA/ AVINO R - INDRA/ HC ENAV	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H09. 010	Majority of SUPs assess that operating methods can be applied in an accurate, efficient and timely manner in normal and abnormal operating conditions and degraded modes when working in a RTC with a flexible allocation





	PJ05-W2- ATCOs NS PSM PJ05- ATCOS NS PSM PJ05- ATCOS ACCeptance INDRA/ of AVINO 35- operation operating R - methods INDRA/ when HC providing - DFS H06. an ATS to ENAV 010 accura
	multiple DLR efficie aerodrome and ti s abnor opera condit and degrae mode: when workin a RTC a flexi alloca of
3	aerodi s betw MRTM





potenti al for human error is reduce d as far as possibl e.		displayed airports when searching for flights (search in wrong display) as some informatio n is displayed in a combined HMI integrating the different airports or as informatio n is displayed only temporaril y.									
Arg. 1.3.1:T he potenti al for human error is reduce d as far as	W2.PJ05.35 _ls.1.3.1-1b	SUP might confuse displayed airports when searching for flights (search in wrong display) as some	Clos ed	To ensure SUP is provided with appropriate identification means of displayed airport	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H01	Assess SUP situation awareness when working in a RTC	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS	CRT- PJ05- W2- 35- V3- VALP - H01. 010	Majority of SUPs state that situation awareness is at an acceptable level when working in a RTC with a flexible





possibl e.	informatio n is displayed in a							allocation of aerodrome s between
	combined							MRTMs
	HMI integrating the different airports or as informatio n is displayed only temporaril y.		OBJ-PJ05-W2- 35-V3-VALP- H01	Assess SUP situation awareness when working in a RTC	INDRA/ AVINO R - INDRA/ HC DLR	RTS	CRT- PJ05- W2- 35- V3- VALP - H01. 040	Majority of SUP confirm that they maintain an adequate level of SA, despite having to divide their attention to different clusters of aerodrome s
			OBJ-PJ05-W2- 35-V3-VALP- H12	Assess usability and utility of Supervisor human machine interface when supporting provision of ATS to multiple aerodrome s	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H12. 050	The SUP human machine interface does not increase the potential for human error





					OBJ-PJ05-W2- 35-V3-VALP- H18	Assess that human- machine interface supports the team in carrying out their tasks	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H18. 010	Technical System/HM I support ATCOs and SUP when working in a RTC with a flexible allocation of aerodrome s between MRTMs.
					OBJ-PJ05-W2- 35-V3-VALP- H01	Assess SUP situation awareness when working in a RTC	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS	CRT- PJ05- W2- 35- V3- VALP - H01. 030	Majority of SUPs confirm that the user interface design supports a sufficient level of individual situation awareness
Arg. 1.3.1:T he potenti al for human error is reduce d as far as	W2.PJ05.35 _ls.1.3.1-2	Wrong procedures applied to wrong APT. If an ATCO confuses the aerodrome s she/he may	Clos ed	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H02	Assess ATCO situation awareness when providing ATS to multiple aerodrome S	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H02. 040	ATCO maintain an adequate level of SA, despite having to divide their attention to several airports





possibl e.		provide erroneous control actions. Safety implication s.								with different procedures and characterist ics (geographic al area, urban infrastructu re, weather conditions etc.)
					OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility of ATCO human machine interface when providing ATS to multiple aerodrome S	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H11. 050	The ATCO human machine interface does not increase the potential for human error
Arg. 1.3.1:T he potenti al for human error is reduce d as far	W2.PJ05.35 _ls.1.3.1-4	ATCOs confuse geographic al local details of two airports. Pilots refer often to	Clos ed	W1-PJ05.03						





as possibl e.		local geographic positions, therefore the ATCO needs to be aware of the local geographic al details for all aerodrome s they are controlling.					
Arg. 1.3.1:T he potenti al for human error is reduce d as far as possibl e.	W2.PJ05.35 _Is.1.3.1-5	ATCO might confuse / have difficulty to find the informatio n for an a/c as some informatio n is displayed in a combined HMI integrating the different airports or as informatio n is	Clos ed	W1-PJ05.03			





		displayed only temporaril y									
Arg. 1.3.1:T he potenti al for human error is reduce d as far as possibl e.	W2.PJ05.35 _ls.1.3.1-6	Confusion related to phraseolog y	Clos ed		W1-PJ05.03						
Arg. 1.3.1:T he potenti al for human error is reduce d as far as possibl e.	W2.PJ05.35 _Is.1.3.1-7	ATCO might confuse aerodrome s, or aerodrome s characteris tics, when switching between different aerodrome s and/or aerodrome s	Clos ed	To ensure ATCO is provided with appropriate identification means of displayed airport and airport characteristics	W2-PJ05.35 / HP Plan drafting	OBJ-PJ05-W2- 35-V3-VALP- H02	Assess ATCO situation awareness when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H02. 010	Majority of ATCOs state that situation awareness is at an acceptable level when working in a RTC with a flexible allocation of aerodrome s between MRTMs
		arrangeme nts within the RTM				OBJ-PJ05-W2- 35-V3-VALP- H02	Assess ATCO situation awareness	COOPA NS INDRA/ AVINO	RTS PSM	CRT- PJ05- W2- 35-	ATCOs confirm that the user





	when providing ATS to multiple aerodrome s	R - INDRA/ HC - DFS ENAV DLR	RTS WS	V3- VALP - H02. 030	interface design supports a sufficient level of situation awareness ATCO
овл-н. 35-V3 H02	I05-W2- Assess -VALP- ATCO situation awareness when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H02. 040	ATCO maintain an adequate level of SA, despite having to divide their attention to several airports with different procedures and characterist ics (geographic al area, urban infrastructu re, weather conditions etc.)
OBJ-P. 35-V3- H11	and utility	COOPA NS INDRA/	RTS WS PSM	CRT- PJ05- W2-	Majority of ATCOs asses that
	of ATCO human machine	AVINO R - INDRA/		35- V3- VALP	they have all required information





			interface when providing ATS to multiple aerodrome s	HC - DFS ENAV DLR		- H11. 010	easy to access and presented in an effective way.
		OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility of ATCO human machine interface when providing ATS to multiple aerodrome s	COOPA NS DLR ENAV INDRA/ AVINO R - INDRA/ HC - DFS	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H11. 070	Majority ATCOs confirm there is n confusion about which aerodrom s are displayed on which display
		OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility of ATCO human machine interface when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H11. 050	The ATCC human machine interface does not increase the potential for huma error
		OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility	COOPA NS ENAV	RTS WS PSM	CRT- PJ05- W2-	Majority ATCOs confirm





							of ATCO human machine interface when providing ATS to multiple aerodrome s	INDRA/ AVINO R - INDRA/ HC DLR		35- V3- VALP - H11. 080	there is no confusion about which aerodrome will be transferred between the MRTMs.
Arg. 1.3.2: Tasks can be achieve d in a timely manner	W2.PJ05.35 _Is.1.3.2-1	SUP tasks cannot be achieved in a timely manner. Resulting in operator stress (with tasks	Clos ed	To ensure SUP is provided with appropriate identification means od displayed airport	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H01	Assess SUP situation awareness when working in a RTC	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS	CRT- PJ05- W2- 35- V3- VALP - H01. 020	Majority of SUPs state that they can prioritise tasks
		stacking up and requiring recall) leads to increased human error probabiliti es and consequen ces. At system level could impact efficiency				OBJ-PJ05-W2- 35-V3-VALP- H12	Assess usability and utility of Supervisor human machine interface when supporting provision of ATS to multiple aerodrome s	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H12. 050	The SUP human machine interface does not increase the potential for human error





						OBJ-PJ05-W2- 35-V3-VALP- H18	Assess that human- machine interface supports the team in carrying out their tasks	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H18. 010	Technical System/HM I support ATCOs and SUP when working in a RTC with a flexible allocation of aerodrome s between MRTMs.
Arg. 1.3.2: Tasks can be achieve d in a timely manner	W2.PJ05.35 _ls.1.3.2-3a	ATCO might focus on tasks at one airport neglecting priorities at other airport	Clos ed	To ensure ATCO is provided with appropriate means to focus on primary tasks and is able to prioritise effectively	W1-PJ05.03						
Arg. 1.3.2: Tasks can be achieve d in a timely manner		SUPs might focus on tasks at one airport neglecting priorities at other airport	Clos ed			OBJ-PJ05-W2- 35-V3-VALP- H01	Assess SUP situation awareness when working in a RTC	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS	CRT- PJ05- W2- 35- V3- VALP - H01. 020	Majority of SUPs state that they can prioritise tasks
						OBJ-PJ05-W2- 35-V3-VALP- H12	Assess usability and utility of Supervisor	COOPA NS ENAV INDRA/ AVINO	RTS WS PSM	CRT- PJ05- W2- 35- V3-	The SUP human machine interface does not





							human machine interface when supporting provision of ATS to multiple aerodrome s	R - INDRA/ HC DLR		VALP - H12. 050	increase the potential for human error
						OBJ-PJ05-W2- 35-V3-VALP- H18	Assess that human- machine interface supports the team in carrying out their tasks	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H18. 010	Technical System/HM I support ATCOs and SUP when working in a RTC with a flexible allocation of aerodrome s between MRTMs.
Arg. 1.3.2: Tasks can be achieve d in a timely manner	W2.PJ05.35 _Is.1.3.2-3b	Handover cannot be achieved in a timely manner, for example in case of an emergency situation at	Clos ed	To ensure handover can be timely achieved	W2-PJ05.35 / HP Plan drafting	OBJ-PJ05-W2- 35-V3-VALP- H02	Assess ATCO situation awareness when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS	CRT- PJ05- W2- 35- V3- VALP - H02. 020	Majority of ATCOs assess that they can prioritise tasks
		one aerodrome requiring				OBJ-PJ05-W2- 35-V3-VALP- H18	Assess that human- machine	COOPA NS ENAV	RTS WS PSM	CRT- PJ05- W2-	Technical System/HM I support





		to handover the other aerodrome (s) to another RTM				interface supports the team in carrying out their tasks	INDRA/ AVINO R - INDRA/ HC DLR		35- V3- VALP - H18. 010	ATCOs and SUP when working in a RTC with a flexible allocation of aerodrome s between MRTMs.
					OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility of ATCO human machine interface when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H11. 020	Majority of ATCOs confirm adequate usability of input devices and HMI controls.
Arg. 1.3.3:T he level of worklo ad (induce d by cognitiv e and/or physical task	W2.PJ05.35 _ls.1.3.3-1	Exceeding workload (increased number of aerodrome s to be controlled) might lead to errors	Clos ed	W1-PJ05.03						





deman ds) is accepta ble.											
Arg. 1.3.3:T he level of worklo ad (induce d by cognitiv e and/or physical task deman ds) is accepta ble.	W2.PJ05.35 _Is.1.3.3-2	Simultaneo us activities at different aerodrome s may overload the ATCO increasing thus the potential for human errors.	Clos ed		W1-PJ05.03						
Arg. 1.3.3:T he level of worklo ad (induce d by cognitiv e and/or physical task deman ds) is	W2.PJ05.35 _Ben.1.3.3- 4	Potential benefit of dynamic allocation on the manageme nt of ATCO's workload	Clos ed	To ensure dynamic allocation maintain adequate ATCO's workload level	W2-PJ05.35 / HP Plan drafting	OBJ-PJ05-W2- 35-V3-VALP- H04	Assess ATCO workload when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H04. 010	Majority of ATCOs assess workload at an acceptable level when working in a RTC with a flexible allocation of aerodrome s between MRTMs





accepta ble.											
Arg. 1.3.3:T he level of worklo ad (induce d by cognitiv e and/or physical task deman ds) is accepta ble.	W2.PJ05.35 _Is.1.3.3-3	Potential increase in ATCO workload due to frequent handover of aerodrome s between MRTMs	Clos ed	To ensure dynamic allocation maintain adequate ATCO's workload level	W2-PJ05.35 / HP Plan drafting	OBJ-PJ05-W2- 35-V3-VALP- H04	Assess ATCO workload when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H04. 010	Majority of ATCOs assess workload at an acceptable level when working in a RTC with a flexible allocation of aerodrome s between MRTMs
Arg. 1.3.3:T he level of worklo ad (induce d by cognitiv e and/or physical task deman ds) is	W2.PJ05.35 _Is.1.3.3-3	Potential increase in ATCO workload due to the responsibili ty of too many simultaneo us aerodrome s to be controlled	Clos ed	To ensure adequate ATCO's workload level	W2-PJ05.35 / HP Plan drafting	OBJ-PJ05-W2- 35-V3-VALP- H04	Assess ATCO workload when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H04. 010	Majority of ATCOs assess workload at an acceptable level when working in a RTC with a flexible allocation of aerodrome s between MRTMs





Arg. 1.3.3:T he level of	W2.PJ05.35 _ls.1.3.3-3	Potential increase in SUP	Clos ed	To ensure adequate SUP's workload level	W2-PJ05.35 / HP Plan drafting	OBJ-PJ05-W2- 35-V3-VALP- H07 OBJ-PJ05-W2- 35-V3-VALP- H05	Assess ATCO acceptance of roles and responsibili ties when providing ATS to multiple aerodrome s Assess Supervisor workload when	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC - DFS DLR COOPA NS INDRA/ AVINO	RTS RTS WS	CRT- PJ05- W2- 35- V3- VALP - H07. 030 CRT- PJ05- W2- 25	Majority of ATCOs confirm the feasibility and acceptabilit y of providing ATS services to the assigned number of aerodrome s Majority of SUPs assess workload at
of worklo ad (induce d by cognitiv e and/or physical task deman		workload due to responsibili ty of several clusters of airports in the MRTMs					when supporting the provision of ATS to multiple aerodrome s	AVINO R - INDRA/ HC ENAV DLR		35- V3- VALP - H05. 010	an acceptable level when working in a RTC with a flexible allocation of aerodrome s between MRTMs
ds) is accepta ble.						OBJ-PJ05-W2- 35-V3-VALP- H10	Assess Supervisor acceptance of roles and responsibili ties when	COOPA NS ENAV INDRA/ AVINO R - INDRA/	RTS WS	CRT- PJ05- W2- 35- V3- VALP -	Majority of Supervisors confirm the feasibility and acceptabilit y of





					supporting provision of ATS to multiple aerodrome s	HC DLR		H10. 030	supervise the assigned number of clusters of aerodrome s
Arg. 1.3.3:T he level of worklo ad (induce d by cognitiv e and/or physical task deman	SUP tasks cannot be achieved in a timely manner. Resulting in operator stress (with tasks stacking up and requiring recall) leads to	Clos ed	W2-PJ05.35 / HP Plan drafting	OBJ-PJ05-W2- 35-V3-VALP- H05	Assess Supervisor workload when supporting the provision of ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H05. 010	Majority of SUPs assess workload at an acceptable level when working in a RTC with a flexible allocation of aerodrome s between MRTMs
ds) is accepta ble.	increased human error probabiliti es and consequen ces. At system level could impact efficiency and safety			OBJ-PJ05-W2- 35-V3-VALP- H10	Assess Supervisor acceptance of roles and responsibili ties when supporting provision of ATS to multiple aerodrome s	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H10. 030	Majority of Supervisors confirm the feasibility and acceptabilit y of supervise the assigned number of clusters of aerodrome s





Arg. 1.3.4:T he level of trust in the new concep t/the new proced ures is approp riate.	W2.PJ05.35 _Is.1.3.4-1a	The level of trust in the new concept and system is not appropriat e for the ATCO	Clos ed		W1-PJ05.03						
Arg. 1.3.4:T he level of trust in the new concep t/the new proced ures is approp riate.	W2.PJ05.35 _Is.1.3.4-1b	The level of trust in the new concept and system is not sufficient for the SUP	Clos ed	To ensure SUP is provided with reliable systems that ensure an appropriate trust level	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H14	Assess Supervisor trust in support systems when supporting provision of ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC ENAV DLR	RTS PSM	CRT- PJ05- W2- 35- V3- VALP - H14. 010	Supervisor trust the functionalit ies of the supervisor planning tool when working in a RTC with a flexible allocation of aerodrome s between MRTMs
Arg. 1.3.5: Human actors can maintai n a sufficie	W2.PJ05.35 _ls.1.3.5-2	ATCOs/ SUPs might not be able to maintain Situation awareness if there are	Clos ed	To ensure ATCO/SUP situation awareness is at appropriate level to perform their tasks in any conditions	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H01	Assess SUP situation awareness when working in a RTC	COOPA NS ENAV INDRA/ AVINO R - INDRA/	RTS	CRT- PJ05- W2- 35- V3- VALP -	Majority of SUPs state that situation awareness is at an acceptable level when





nt level of situatio n awaren ess.		various operating conditions.						HC DLR		H01. 010	working in a RTC with a flexible allocation of aerodrome s between MRTMs
						OBJ-PJ05-W2- 35-V3-VALP- H02	Assess ATCO situation awareness when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H02. 010	Majority of ATCOs state that situation awareness is at an acceptable level when working in a RTC with a flexible allocation of aerodrome s between MRTMs
Arg. 1.3.5: Human actors can maintai n a sufficie nt level of	W2.PJ05.35 _ls.1.3.5-3	ATCO/ SUPs might not be able to maintain situation awareness if there are various weather	Clos ed	To ensure ATCO/SUP situation awareness is at appropriate level to perform their tasks in any conditions	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H02	Assess ATCO situation awareness when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H02. 010	Majority of ATCOs state that situation awareness is at an acceptable level when working in a RTC with





situatio n awaren ess.		conditions (wind or visibility) at the different airports									a flexible allocation of aerodrome s between MRTMs
Arg. 1.3.5: Human actors can maintai n a sufficie nt level of situatio n awaren ess.	W2.PJ05.35 _Is.1.3.5-4	ATCOs/SUP s might not be able to maintain Situation awareness if there is a geographic al difference between the aerodrome s	Clos ed	To ensure ATCO/SUP situation awareness is at appropriate level to perform their tasks in any conditions	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H01	Assess SUP situation awareness when working in a RTC	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS	CRT- PJ05- W2- 35- V3- VALP - H01. 010	Majority of SUPs state that situation awareness is at an acceptable level when working in a RTC with a flexible allocation of aerodrome s between MRTMs
						OBJ-PJ05-W2- 35-V3-VALP- H02	Assess ATCO situation awareness when providing ATS to multiple aerodrome S	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H02. 010	Majority of ATCOs state that situation awareness is at an acceptable level when working in a RTC with a flexible allocation of aerodrome





											s between MRTMs
Arg. 1.3.5: Human actors can maintai n a sufficie nt level of situatio n awaren ess.	W2.PJ05.35 _ls.1.3.5-5	ATCOs/ SUPs might be overlookin g or missing movement s on one APT, while focusing on the other one.	Clos ed	To ensure ATCO/SUP situation awareness is at appropriate level to perform their tasks in any conditions	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H01	Assess SUP situation awareness when working in a RTC	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS	CRT- PJ05- W2- 35- V3- VALP - H01. 010	Majority of SUPs state that situation awareness is at an acceptable level when working in a RTC with a flexible allocation of aerodrome s between MRTMs
						OBJ-PJ05-W2- 35-V3-VALP- H03	Assess team situation awareness when providing ATS to multiple aerodrome S	COOPA NS INDRA/ AVINO R - INDRA/ HC ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H03. 010	HMI supports an acceptable level of team (ATCOs and SUP) situation awareness when working in a RTC with a flexible allocation of aerodrome s between MRTMs





OBJ-PJ05-W2- 35-V3-VALP- H12	Assess usability and utility of Supervisor human machine interface when supporting provision of ATS to multiple aerodrome s	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H12. 050	The SUP human machine interface does not increase the potential for human error
OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility of ATCO human machine interface when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H11. 050	The ATCO human machine interface does not increase the potential for human error
OBJ-PJ05-W2- 35-V3-VALP- H02	Assess ATCO situation awareness when providing ATS to multiple	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS	RTS WS	CRT- PJ05- W2- 35- V3- VALP -	Majority or ATCOs state that situation awareness is at an acceptable level when





							aerodrome s	ENAV DLR		H02. 010	working in a RTC with a flexible allocation of aerodrome s between MRTMs
Arg. 1.3.5: Human actors can maintai n a sufficie nt level of situatio n awaren ess.	W2.PJ05.35 _ls.1.13.5- 11	Switching between different aerodrome s allocation in an RTM could impact negatively the SA (e.g., if the transfer of informatio n during the handover is not complete; if there are confusions between aerodrome s or aerodrome s characteris tics etc.)	Clos ed	To ensure ATCO/SUP situation awareness is at appropriate level to perform their tasks in any conditions	W2-PJ05.35 / HP Plan drafting	OBJ-PJ05-W2- 35-V3-VALP- H02	Assess ATCO situation awareness when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H02. 010	Majority of ATCOs state that situation awareness is at an acceptable level when working in a RTC with a flexible allocation of aerodrome s between MRTMs
									RTS WS		





Arg. 1.3.5: Human actors can maintai n a sufficie nt level of situatio n awaren ess.	W2.PJ05.35 _Ben.1.3.5- 12	The support of the supervisor can improve ATCO SA because future workload is better anticipated and more efficiently managed by dynamic allocation of aerodrome S	Clos ed	To ensure ATCO situation awareness is at appropriate level to perform their tasks in any conditions	W2-PJ05.35 / HP Plan drafting	OBJ-PJ05-W2- 35-V3-VALP- H02	Assess ATCO situation awareness when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR		CRT- PJ05- W2- 35- V3- VALP - H02. 010	Majority of ATCOs state that situation awareness is at an acceptable level when working in a RTC with a flexible allocation of aerodrome s between MRTMs
Arg. 1.3.5: Human actors can maintai n a sufficie nt level of situatio n awaren ess.	W2.PJ05.35 _ls.1.13.5- 13	SA is not sufficient because the number of aerodrome s to monitor and/or the number of tasks to manage are too important, and/or because	Clos ed	To ensure SUP situation awareness is at appropriate level to perform their tasks in any conditions	W2-PJ05.35 / HP Plan drafting	OBJ-PJ05-W2- 35-V3-VALP- H02	Assess ATCO situation awareness when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H02. 010	Majority of ATCOs state that situation awareness is at an acceptable level when working in a RTC with a flexible allocation of aerodrome s between MRTMs





informatio n/function s available to the SUP are not sufficient.	OBJ-PJ05-W2- 35-V3-VALP- H12 and util of Supervi human machin interfac when support provisic of ATS t multiple aerodro S	ility NS PSM P. ility INDRA/ M AVINO 3. visor R - V n INDRA/ V ne HC ace ENAV H DLR 0 rting ion to le rome	12. when 10 working a RTC w a flexible allocation of aerodro s betwee
	OBJ-PJ05-W2- 35-V3-VALP- H01 when working a RTC	on NS P. ness ENAV W INDRA/ 3. ng in AVINO V R - V INDRA/ - HC H	MRTMs RT- Majority of J05- SUPs /2- confirm 5- that the 3- user ALP interface
	OBJ-PJ05-W2- 35-V3-VALP- H01 when working a RTC	on NS P. ness ENAV W INDRA/ 3. ng in AVINO V	RT-MajorityJ05-SUPs statJ2-that5-situation3-awarenesALPis at an





								HC DLR		H01. 010	level when working in a RTC with a flexible allocation of aerodrome s between MRTMs
Arg. 1.3.5: Human actors can maintai n a sufficie nt level of situatio	W2.PJ05.35 _ls.1.3.5-6	ATCO ability to judge distance/s eparation may be impacted by compresse d OTW presentati	Clos ed	To ensure OTW provides ATCO with appropriate HMI to be able to judge separations/distances	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H02	Assess ATCO situation awareness when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS PSM	CRT- PJ05- W2- 35- V3- VALP - H02. 030	ATCOs confirm that the user interface design supports a sufficient level of situation awareness
n awaren ess.		on.				OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility of ATCO human machine interface when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H11. 020	Majority of ATCOs confirm adequate usability of input devices and HMI controls.
Arg. 1.3.5: Human	W2.PJ05.35 _Is1.3.5-10	Various similarities on the	Clos ed	To ensure OTW provides ATCO/SUP with appropriate HMI	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility	COOPA NS DLR	RTS WS PSM	CRT- PJ05- W2-	Majority of ATCOs confirm





actors can maintai n a sufficie nt level of situatio n awaren		airports controlled (landscape, buildings, runway configurati on etc.) induce a risk to mismatch		to be able to judge separations/distances			of ATCO human machine interface when providing ATS to multiple aerodrome s	ENAV INDRA/ AVINO R - INDRA/ HC - DFS		35- V3- VALP - H11. 070	there is no confusion about which aerodrome s are displayed on which display
ess.		signal/cue and relate that to the wrong airport. (configurat ion of airport)				OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility of ATCO human machine interface when providing ATS to multiple aerodrome s	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H11. 080	Majority of ATCOs confirm there is no confusion about which aerodrome will be transferred between the MRTMs.
Arg. 2.1.6:T he level of trust in automa ted functio ns is approp	W2.PJ05.35 _ls.2.1.6-1	ATCOs might not trust in the system if: - the reliability of the supported task priorities	Clos ed	To ensure ATCOs is provided with reliable systems that ensure an appropriate trust level	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H13	Assess ATCO trust in support systems when providing ATS to multiple aerodrome s	- DFS ENAV	RTS	CRT- PJ05- W2- 35- V3- VALP - H13. 010	ATCOs trust the functionalit y of the automated task prioritisatio n
riate.		is too low - the reliability				OBJ-PJ05-W2- 35-V3-VALP- H13	Assess ATCO trust in support	- DFS	RTS	CRT- PJ05- W2-	ATCOs trust the functionalit





		of the conforman ce monitoring is too low					systems when providing ATS to multiple aerodrome s			35- V3- VALP - H13. 020	y of the conforman ce monitoring
Arg. 2.3.1:T he type of informa tion provide d satisfies the informa tion require	W2.PJ05.35 _ls.2.3.1-1	The type of informatio n provided does not satisfy the informatio n requireme nts of the ATCOs (and SUP).	clos ed	To ensure ATCO and SUP are provided with adequate and required information	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility of ATCO human machine interface when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H11. 010	Majority of ATCOs asses that they have all required information easy to access and presented in an effective way.
ments of the human.						OBJ-PJ05-W2- 35-V3-VALP- H12	Assess usability and utility of Supervisor human machine interface when supporting provision of ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC ENAV DLR	RTS PSM	CRT- PJ05- W2- 35- V3- VALP - H12. 010	Majority of Supervisors asses that they have all required information available when working in a RTC with a flexible allocation of aerodrome s between MRTMs





Arg. 2.3.1:T he type of informa tion provide d satisfies the informa	W2.PJ05.35 _Is.2.3.1-2	ATCOs are not aware of the traffic forecast and thus expected workload level at the different airports in	Clos ed	To ensure ATCO is provided with a short term ATCO planning tool to have a clear view of the traffic level and thus the expected workload at the different airports in the short term execution phase. The short term planning tool might be a complex forecast tool or a simple flight list depending on the specific operational environment complexity	w2-PJ05.35 / HP Plan drafting	OBJ-PJ05-W2- 35-V3-VALP- H02	Assess ATCO situation awareness when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS PSM	CRT- PJ05- W2- 35- V3- VALP - H02. 030	ATCOs confirm that the user interface design supports a sufficient level of situation awareness
tion require ments of the human.		the short term execution phase negatively affecting ATCOs' situation awareness				OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility of ATCO human machine interface when providing ATS to multiple aerodrome s	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC - DFS DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H11. 060	ATCOs confirm the adequacy of the general usability and utility of ATCO short term planning tool/traffic forecast and/or prioritisatio n tool.
Arg. 2.3.2: Input devices (e.g. keyboa rd, mouse, touch screen)	W2.PJ05.35 _ls.2.3.2-1	Wrong APT input device is used to control function in the different APT. Some errors	Clos ed	To ensure usability of input devices	W1-PJ05.03						





corresp	would be							
ond to	readily							
HF	identified							
principl	and							
es. [V1:	corrected,							
AIR	others not.							
only]	If ATCOs							
,1	are							
	controlling							
	more than							
	one APT							
	they may							
	have							
	different							
	input devices for							
	different							
	APT, these							
	may lead							
	to the							
	wrong							
	input							
	device							
	being used							
	to control							
	a function							
	in a							
	different							
	APT. This							
	may affect							
	the							
	efficiency							
	with end							
	user can							
	execute a							
	task.							
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Arg. 2.3.3: Visual displays and other types of output devices adhere to HF principl	W2.PJ05.35 _ls.2.3.3-1	Visual displays and other output devices usability lack, for example there can be a confusion with regards to	Clos ed	To ensure consistency, reliability and clearness of output devices	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility of ATCO human machine interface when providing ATS to multiple aerodrome s	COOPA NS DLR ENAV INDRA/ AVINO R - INDRA/ HC - DFS	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H11. 070	Majority of ATCOs confirm there is no confusion about which aerodrome s are displayed on which display
es. [V1: AIR only]		which aerodrome is displayed on which visual display.				OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility of ATCO human machine interface when providing ATS to multiple aerodrome s	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H11. 080	Majority of ATCOs confirm there is no confusion about which aerodrome will be transferred between the MRTMs.
						OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility of ATCO human machine interface when providing ATS to	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H11. 020	Majority of ATCOs confirm adequate usability of input devices and HMI controls.





		multiple				
		aerodrome				
		S				
	OBJ-PJ05-W2-	Assess	COOPA	RTS WS	CRT-	ATCOs
	35-V3-VALP-	usability	NS	PSM	PJ05-	confirm
	H11	and utility	ENAV		W2-	adequa
		of ATCO	INDRA/		35-	of the
		human	AVINO		V3-	genei
		machine	R -		VALP	usabi
		interface	INDRA/		-	and u
		when	НС		H11.	of AT
		providing	- DFS		060	short
		ATS to	DLR			planni
		multiple				tool/t
		aerodrome				foreca
		S				and/o
						priorit
						n tool
	PJ05-W2-	Assess	COOPA	RTS WS	CRT-	The AT
35-V3-V	VALP-	usability	NS	PSM	PJ05-	human
H11		and utility	INDRA/		W2-	machin
		of ATCO	AVINO		35-	interfac
		human	R-		V3-	does n
		machine	INDRA/		VALP	increa
		interface	HC		-	the
		when	- DFS		H11.	potent
		providing	ENAV		050	for hur
		ATS to	DLR			error
		multiple				
		aerodrome				
		S	COOD 4	DTC	CDT	N.4
OBJ-PJ(Assess	COOPA	RTS	CRT-	Major
	3-VALP-	usability	NS		PJ05-	ATCOs
1	411	and utility	- DFS		W2-	confir
		of ATCO	ENAV		35- V2	adequ usabili
		human	DLR		V3-	usab





							machine interface when providing ATS to multiple aerodrome s			VALP - H11. 040	and utility of alarms and alerts
Arg. 2.3.3: Visual displays and other types of output devices adhere to HF principl es. [V1: AIR only]	W2.PJ05.35 _Is.2.3.3-1	The visual displays do not sufficiently support the accomplish ment of approach tasks when providing ATS to multiple aerodrome s	Clos ed	To ensure consistency, reliability and clearness of output devices	W2-PJ05.35 / HP Plan drafting	OBJ-PJ05-W2- 35-V3-VALP- H18	Assess that human- machine interface supports the team in carrying out their tasks	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H18. 010	Technical System/HM I support ATCOs and SUP when working in a RTC with a flexible allocation of aerodrome s between MRTMs.
Arg. 2.3.3: Visual displays and other types of output devices adhere to HF	W2.PJ05.35 _ls.2.3.3-2	The visual presentati on does not contain complete informatio n and therefore impacting the detection, recognition	Clos ed		W1-PJ05.03						





principl		, 					
es. [V1:		identificati					
AIR		on and					
only]		ranging of					
		objects					
		relevant					
		for service					
		provision					
Arg.	W2.PJ05.35	The visual	Clos	W1-PJ05.03			
2.3.3:	_ls.2.3.3-3	presentati	ed				
Visual		on for					
displays		multiple					
and		aerodrome					
other		s should					
types		incorporat					
of		e overlaid					
output		informatio					
devices		n to					
adhere		indicate /					
to HF		high light					
principl		specific					
es. [V1:		parts of					
AIR		the					
only]		aerodrome					
		, such as					
		runways,					
		taxiways,					
		in order to					
		enhance					
		the ATCO					
		(and SUP)					
		situational					
		awareness,					
		specifically					
		in darkness					
		and low					





		visibility conditions									
Arg. 2.3.3: Visual displays and other types of output devices adhere	W2.PJ05.35 _ls.2.3.3-4	Situation awareness negatively affected by the flexible positioning of aerodrome s in the visual display (In	Clos ed	To ensure ATCO situation awareness is not affected by the flexible positioning of aerodromes in the visual displays: a potential mitigation might be to allow the ATCO to customise the positioning of the aerodromes in the visual display	w2-PJ05.35 / HP Plan drafting	OBJ-PJ05-W2- 35-V3-VALP- H02	Assess ATCO situation awareness when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS PSM	CRT- PJ05- W2- 35- V3- VALP - H02. 030	ATCOs confirm that the user interface design supports a sufficient level of situation awareness
to HF principl es. [V1: AIR only]		RTC where there is the need to allocate more than 3 airports (e.g. 4) it is not possible to maintain the same position of the aerodrome s in the visual display)				OBJ-PJ05-W2- 35-V3-VALP- H18	Assess that human- machine interface supports the team in carrying out their tasks	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H18. 010	Technical System/HM I support ATCOs and SUP when working in a RTC with a flexible allocation of aerodrome s between MRTMs.
Arg. 2.3.4: Alarms and alerts have	W2.PJ05.35 _Is.2.3.4-1	ATCO do not notice or wrongly interpret alarms and alerts	Clos ed	To ensure alarms and alerts provide clear and consistent information on safety critical events	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility of ATCO human machine	COOPA NS - DFS ENAV DLR	RTS	CRT- PJ05- W2- 35- V3- VALP	Majority of ATCOs confirm adequate usability and utility





been develop ed accordi ng to HF principl es. [V1: AIR only]		provided by the system				interface when providing ATS to multiple aerodrome S			- H11. 040	of alarms and alerts
Arg. 2.3.4: Alarms and alerts have been develop ed accordi ng to HF principl es. [V1: AIR only]	W2.PJ05.35 _ls.2.3.4-2	SUP do not notice or wrongly interpret alarms and alerts provided by the system	Clos ed	To ensure alarms and alerts provide clear and consistent information on safety critical events	OBJ-PJ05-W2- 35-V3-VALP- H12	Assess usability and utility of Supervisor human machine interface when supporting provision of ATS to multiple aerodrome S	ENAV DLR	RTS	CRT- PJ05- W2- 35- V3- VALP - H12. 040	Majority of Supervisors confirm adequate usability and utility of alarms and alerts
Arg. 2.3.6:T he usabilit y of the user interfac e (input devices , visual	W2.PJ05.35 _Is.2.3.6-1	The usability of the user interface is not acceptable (e.g. display of two APT on one screen	Clos ed							-





displays /output devices , alarm& alerts) is accepta ble. [V1: AIR only]		at the same time is not acceptable)									
Arg. 2.3.6:T he usabilit y of the user interfac e (input devices , visual displays /output devices , alarm& alerts) is accepta ble. [V1: AIR only]	W2.PJ05.35 _Is.2.3.6-2	The handling of input devices for more than one airport is not acceptable	Clos ed								
Arg. 2.3.6:T he usabilit	W2.PJ05.35 _Is.2.3.6-3	Input devices and HMI controls	Clos ed	To ensure adequate usability of input devices and HMI controls	w2-PJ05.35 / HP Plan drafting	OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility of ATCO	COOPA NS INDRA/ AVINO	RTS WS PSM	CRT- PJ05- W2- 35-	Majority of ATCOs confirm adequate





y of the user interfac e (input devices , visual displays /output devices , alarm& alerts) is accepta ble. [V1: AIR only]		usability do not support ATCOs in the smooth and efficient executio n of tasks			human machine interface when providing ATS to multiple aerodrome s	R - INDRA/ HC - DFS ENAV DLR	V3- VALP - H11. 020	usability of input devices and HMI controls.
Arg. 2.3.7:T he user interfac e design reduces human error as far as possibl e. [V1: AIR only]	W2.PJ05.35 _Is.2.3.7-1	Confusion of which informatio n (e.g. strips, meteo etc.) is linked to which APT. This could increase the potential for human error, as ATCOs may give the wrong informatio n,	Clos ed	W1-PJ05.03				





Arg. 2.3.8:T he user interfac e	W2.PJ05.35 _Is.2.3.8-2	instruction to wrong a/c at another aerodrome Therefore, this could have a potential negative impact on system safety. Simultaneo us radio calls on different frequencie	Clos ed	W1-PJ05.03			
support s a sufficie nt level of individu al situatio n awaren ess. [V1: AIR only]		s (decoupled) might lead to the loss of informatio n.					
Arg. 2.3.8:T he user interfac	W2.PJ05.35 _ls.2.3.8-3	Coupling of frequencie s might lead to	Clos ed	W1-PJ05.03			





e support s a sufficie nt level of individu al situatio n awaren ess. [V1: AIR only]		ATCO, pilot and vehicle driver`s confusion. (refer to Arg. 1.3.1)									
Arg. 2.3.8:T he user interfac e support s a sufficie nt level of individu al situatio n awaren ess. [V1: AIR only]	W2.PJ05.35 _Is.2.3.8-4	Confusion relating to which pilot at which APT, ATCO is communic ating / How to ensure that the ATCO understan d which aircraft is calling.	Clos ed		W1-PJ05.03						
Arg. 2.3.8:T he user interfac	W2.PJ05.35 _ls.2.3.9-1	The supervisor is not aware of	Clos ed	To ensure SUPs are provided with adequate means to monitor ATCOs workload	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H01	Assess SUP situation awareness when	INDRA/ AVINO R - INDRA/	RTS	CRT- PJ05- W2- 35-	Majority of SUP confirm that they





e support s a sufficie nt level of individu al situatio n awaren	the task load of the ATCO informatio n available to the SUP is not sufficient or not presented in a			working in a RTC	HC DLR		V3- VALP - H01. 040	maintain an adequate level of SA, despite having to divide their attention to different clusters of aerodrome S
ess. [V1: AIR only]	suitable way)		OBJ-PJ05-W2- 35-V3-VALP- H12	Assess usability and utility of Supervisor human machine interface when supporting provision of ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC ENAV DLR	RTS PSM	CRT- PJ05- W2- 35- V3- VALP - H12. 010	Majority of Supervisors asses that they have all required information available when working in a RTC with a flexible allocation of aerodrome s between MRTMs
			OBJ-PJ05-W2- 35-V3-VALP- H12	Assess usability and utility of Supervisor human machine interface when	COOPA NS INDRA/ AVINO R - INDRA/ HC ENAV DLR	RTS PSM	CRT- PJ05- W2- 35- V3- VALP - H12. 030	Majority of Supervisors confirm adequate usability and utility of supervisor





							supporting provision of ATS to multiple aerodrome s				planning tool
Arg. 2.3.9:T he user Interfac e design support s a sufficie nt level of team situatio nal awaren ess. [V1: AIR only]	W2.PJ05.35 _ls.2.3.9-1	The flexible frequent allocation of aerodrome s generates confusion affecting the team situation awareness with a possible increase of human error and workload	Clos ed	To ensure the design of HMI supports the team situation awareness and task execution	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H03 OBJ-PJ05-W2- 35-V3-VALP- H03	Assess team situation awareness when providing ATS to multiple aerodrome s Assess team situation awareness when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H03. 010	HMI supports an acceptable level of team (ATCOs and SUP) situation awareness when working in a RTC with a flexible allocation of aerodrome s between MRTMs
						OBJ-PJ05-W2- 35-V3-VALP- H18	Assess that human- machine interface supports the team in carrying out their tasks	COOPA NS ENAV	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H18. 020	Number and/or severity of team errors in the solution is within tolerable limits or not





											increased with respect to the reference scenario.
Arg. 3.2.2:T he propos ed task allocati on betwee n human actors is support ed by technic al system s/the HMI.	W2.PJ05.35 _Is.3.2.2-1	The task allocation for the SUP/ATCO is not supported by technical systems / the HMI	Clos ed	To ensure an appropriate Technical system/HMI support to human actors	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H18	Assess that human- machine interface supports the team in carrying out their tasks	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H18. 010	Technical System/HM I support ATCOs and SUP when working in a RTC with a flexible allocation of aerodrome s between MRTMs.
Arg.	W2.PJ05.35	APTs	Clos		W1-PJ05.03						
3.2.2:T	_ls.3.3.2-1	having the	ed								
he propos		same or similar									
ed task		RWY									
allocati		designator									
on		s could									
betwee		lead to									
n		confusion.									
human		(the									
actors		inclusion of									





is support ed by technic al system s/the HMI.		airport names in clearances / radio transmissio ns shall be considered as a standard procedure) (Arg. 1.3.1)								
Arg. 3.3.2:T he phrase ology support s commu nicatio n in all operati ng conditi ons.	W2.PJ05.35 _ls.3.3.2-2	Not clear on which airport is the flight that is receiving clearances (Also affecting Arg. 1.3.5)	Clos ed		OBJ-PJ05-W2- 35-V3-VALP- H02	Assess ATCO situation awareness when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H02. 010	Majority of ATCOs state that situation awareness is at an acceptable level when working in a RTC with a flexible allocation of aerodrome s between MRTMs
					OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility of ATCO human machine interface when providing	COOPA NS DLR ENAV INDRA/ AVINO R - INDRA/	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H11. 070	Majority of ATCOs confirm there is no confusion about which aerodrome s are





						ATS to multiple aerodrome s	HC - DFS			displayed on which display
					OBJ-PJ05-W2- 35-V3-VALP- H08	Assess usage of the ATCO phraseolog y when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H08. 010	The phraseolog y is acceptable for the ATCO in normal and abnormal operating conditions and degraded modes
					OBJ-PJ05-W2- 35-V3-VALP- H11	Assess usability and utility of ATCO human machine interface when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC - DFS ENAV DLR	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H11. 010	Majority of ATCOs asses that they have all required information easy to access and presented in an effective way.
Arg. 3.3.4:T he commu nicatio n load	W2.PJ05.35 _ls.3.3.4-1	The amount of communic ation and time on the	Clos ed		OBJ-PJ05-W2- 35-V3-VALP- H04	Assess ATCO workload when providing ATS to	COOPA NS ENAV INDRA/ AVINO R -	RTS	CRT- PJ05- W2- 35- V3- VALP	Majority of ATCOs confirm that the amount of communica





of team membe rs is accepta ble in normal and abnorm al conditi ons and degrad ed mode of operati ons.		frequency can be a bottleneck in situations with high task load, rather than workload or situation awareness and should be further evaluated at V3 level					multiple aerodrome s	INDRA/ HC DLR		- H04. 020	tion and time on the frequency are acceptable
Arg. 4.1.1: Change s in roles and respons ibilities are accepta ble to the affecte d human actors.	W2.PJ05.35 _Is.4.1.1-1	The concept and resulting changes in roles & responsibili ties are not acceptable to the affected actors	Clos ed	To ensure acceptability of changes in roles and responsibilities and concept	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H07	Assess ATCO acceptance of roles and responsibili ties when providing ATS to multiple aerodrome s	COOPA NS INDRA/ AVINO R - INDRA/ HC ENAV DLR	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H07. 010	Majority of ATCOs assess that changes to ATCOs roles and responsibili ties introduced by the multiple remote tower concept are clear, consistent, stable and acceptable when working in



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			-				a RT a flei alloc of aero s bet MRT
		OBJ-PJ05-W2- 35-V3-VALP- H09	Assess Supervisors acceptance of operating methods when supporting provision of ATS to multiple aerodrome s	COOPA NS DLR INDRA/ AVINO R - INDRA/ HC ENAV	RTS WS PSM	CRT- PJ05- W2- 35- V3- VALP - H09. 010	Majc SUPs that oper meth can b appli an accu effici and t man abno oper cond and degra wher work a RTC a flex alloc of aerof s bet MRT



Arg. 4.2.1: Knowle dge, skill and experie nce require ments for human actors have been identifi ed.	W2.PJ05.35 _Is.4.2.1-1	New MRTM system might require new knowledge , skills and experience	Clos ed	To ensure MTI system transition factors are taken into consideration	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H15	Early assessment of transition factors in a RTC with a flexible allocation of aerodrome s between MRTMs	COOPA NS ENAV INDRA/ AVINO R - INDRA/ HC	RTS WS	CRT- PJ05- W2- 35- V3- VALP - H15. 010	Knowledge, skill and experience requiremen ts are identified/c onsolidated per actor group
Arg. 4.3.2:T he impact on shift organis ation is identifi ed.	W2.PJ05.35 _ls.4.3.2-1	The maximum shift length of an ATCO might be reduced with Multiple Remote Tower compared to single remote tower	Clos ed		W1-PJ05.03						
Arg. 4.5.1:T he content of	W2.PJ05.35 _ls.4.5.1-1	The training does not sufficiently contain a	Clos ed	To ensure ATCOs/SUP are provided with appropriate level of training and familiarizations	W1-PJ05.03	OBJ-PJ05-W2- 35-V3-VALP- H15	Early assessment of transition factors in a	COOPA NS ENAV INDRA/ AVINO	RTS WS	CRT- PJ05- W2- 35- V3-	Training needs per actor group are identified





training	technical			RTC with a	R -	VALP	(preliminar
for	part on the			flexible	INDRA/	-	y
each	new			allocation	HC	H15.	identificati
actor	MRTM			of		020	on only).
group is	The			aerodrome			
specifie	ATCOs/			s between			
d. (V3	SUPs are			MRTMs			
only)	not						
	sufficiently						
	familiarise						
	d with the						
	aerodrome						
	(physical						
	characteris						
	tics,						
	procedures						
	, operating						
	conditions						
	etc.)						
	The ATCO/						
	SUPs is not						
	sufficiently						
	familiarise						
	d with the						
	technical						
	behaviour						
	of the						
	camera						
	and other						
	RT specific						
	technical						
	componen						
	ts.						

Table 4: Identification of relevant arguments, HP issues & benefits and HP activities





4.3 Step 3 Improve and validate the concept

4.3.1 Description of HP activities conducted

The following table summarises the planned HP activities:

HP activity	HP activity	By when
Activity 1.	HP Change assessment Review	Q3 2020
Activity 2.	HP Focus Group	Q4 2020
Activity 3.	RTS EXE-2.1-V3-DLR Remote Tower Lab at DLR Braunschweig	Q4 2021
Activity 4.	RTS EXE-2.2-V3-COOPANS MRTC	Q3 (early Q4) 2021 and Q1 2022 respectively
Activity 5.	RTS EXE-2.3-V3-INDRA/AVINOR Norway Remote Tower Simulation	Q2-Q3 2021
Activity 6.	EXE-2.6-V3-INDRA/HC Hungary Remote Tower Trials (Shadow Mode & RTS)	Q3 and Q4 2021, respectively
Activity 7.	RTS EXE-2.4-V3-ENAV Remote Tower Modules	Q4 2021
Activity 8.	RTS EXE-2.5-V3-DFS MRTC Simulation Automation Features	Q4 2021
Activity 9.	HP Post-simulations workshop	Q1 2022
Activity 10.	HP Requirements workshop	Q2 2022
Activity 11.	HP and SAF Final Solution Workshop	Q3 2022

Table 5: Table of proposed HP activities

The following tables details the executed HP related validation activities:

ΑCTIVITY 1.	HP Change assessment Review
Description	Review and integration of change assessment
Arguments & related issues addressed	See section 4.1.5





HP OBJECTIVES	Updates of reference and solution scenarios according to the latest OSED updates and solution members common understanding
	Updates of change assessment of relevant arguments
	Updates of issues and benefits
	Updates of HP validation objectives
Tool selected out of the HP repository	Off-line review
Summary of the HP activity	Change assessment reviewed

Table 6: Description of Activity 1

ACTIVITY 2.	HP Focus Group			
Description	HP tools, metrics and indicators focus group			
HP objectives	 To discuss a set of possible common methods/metrics/tools To harmonize the HP assessment To harmonize the solution results To enhance the data comparison 			
Tool selected out of the HP repository	Focus Group			
Summary of the HP activity	HP tools, metrics and indicators identified			

Table 7: Description of Activity 2

Астіvіту 3.	RTS EXE-2.1-V3-DLR Remote Tower Lab at DLR Braunschweig
Description	The DLR Validation will be performed as a Real Time Simulation in the first part and passive shadow mode in the second parts:
	Part 1: The operational scope of this exercise includes the dynamic allocation with a maximum of 15 simulated small sized airports. The excessive focus is on the interaction of several multiple remote tower module with the supervisor workplace. In relation to the supervisor workplace, the focus is on dynamic situations within such an environment. This includes that the supervisor interacts with each remote tower workplace.



	Part 2: The focus area of the second part is how the correlation and fusion of electro-optical and traditional surveillance detections and thereby possible safety net improvements can enhance the situational awareness.
Arguments & related issues addressed	See Section 4.4.1
HP objectives	H01; H02; H03; H04; H05; H06; H07; H09; H10; H11; H12; H13.040; H13.080; H14; H15; H18.010
Tool selected out of the HP repository	Bedford; NASA-TLX (+customized quest); SASHA-Q; CARS; Eye tracking; SUS; SATI; Tailor-Made Questionnaires;
Summary of the HP activity	See VALR

Table 8: Description of Activity 3

Activity 4.	RTS EXE-2.2-V3-COOPANS MRTC
Description	 The COOPANS Validation will be performed as a Real Time Simulation divided in two parts: Part 1 will focus only on providing ATS to three aerodromes from one MRTM and by one ATCO at a time. This will stabilize the results gained in the previous PJ05.03-V2 phase and will ensure ATCOs with sufficient basis to provide simultaneous ATS to three aerodromes. Part 2 will focus on RTC and flexible allocation of aerodromes to MRTMs. This flexible allocation will be assisted by a role of RTC Supervisor supported with RTC Supervisor Planning Tool.
Arguments & related issues addressed	According to SESAR Solution 05.35: Validation Plan (VALP) for V3 – Part IV Human Performance Assessment Plan
HP objectives	H01.010,020,030 H02.010,020,030,040 H03.010 H04.010,020 H05.010 H06.010 H07.010,030 H08.010 H09.010 H10.010,030 H11.010,020,040,050,060,070,080 H12.010,020,030,050 H13.040,080 H14.010 H15.010,020 H18.010,020
Tool selected out of the HP repository	Workload: Bedford (+ customized questionnaires) Situation Awareness: China Lake, SASHA Acceptability: CARS Usability: SUS Trust: SATI Human Error: Observations, De-briefing, Tailor–Made questionnaire





Summary of the H	HP RTS
activity	Standard Questionnaires
	Tailor–Made Questionnaires
	De-briefings
	Observations
	Log-Data
	Workshops

Table 9: Description of Activity 4

Αςτινιτγ 5.	RTS EXE-2.3-V3-INDRA/AVINOR Norway Remote Tower Simulation					
Description	Real Time Simulation utilizing four simulated Norwegian aerodromes and a Remote Tower Centre with two Multiple Remote Tower Modules (MRTM), an approach position and a supervisor position. The MRTMs may present up to three aerodromes simultaneously or a combination of two aerodromes and approach area.					
	The objective is to assess dynamic allocation of aerodromes to MRTMs while maintaining operations as well as the supervisor tools to support the dynamic allocation and planning of aerodrome allocation.					
	A Human Performance analysis will be conducted as well as part of the activities.					
Arguments & related issues addressed	See Section 4.4.1					
HP objectives	H01.010,020,030,040 H02.010,020,030,040 H03.010 H04.010,020 H05.010 H06.010 H07.010,030 H08.010 H09.010 H10.010,030 H11.010,020, 050,060,070,080 H12.010,020,030,050 H13.080 H14.010 H15.010,020 H18.010,030 H14.010 H15.010,020 H18.010,030 H14.010 H15.010,020					
Tool selected out of the HP repository	Bedford, China Lake, CARS, Tailor-made questionnaires					
Summary of the HP activity	See VALR					

Table 10: Description of Activity 5

Астіvіту 6.	EXE-2.6-V3-INDRA/HC Hungary Remote Tower Trials (Shadow Mode & RTS)
Description	The Passive Shadow Mode (PSM) exercise will include three Hungarian aerodromes (Pápa, Győr-Pér, Nyíregyháza) with two MRTMs and one Supervisor position with long-term planning tool. This modus operandi allows the evaluation of the system and flexible allocation concept with realistic/real





PSM will be followed by the RTS utilizing four simulated Norwegian aerodrom and a Remote Tower Centre with two Multiple Remote Tower Modules (MRT and a supervisor position. The MRTMs may present up to three aerodrom simultaneously or a combination of two aerodromes and approach area. To objective is to assess dynamic allocation of aerodromes to MRTMs will maintaining operations as well as the supervisor tools to support planning aerodrome allocation.Arguments & related issues addressedSee Section 4.4.1HP objectivesPSM: H06.010 H09.010 H10.010 H11.010,020,050,060,070,080 H12.010,020,030,040 H13.080 H14.010 H18.010 RTS: H01.010,020,030,040 H02.010,020,030,040 H04.010,020 H05.010 H06.010							
issues addressed PSM: HP objectives PSM: H06.010 H09.010 H10.010 H11.010,020,050,060,070,080 H12.010,020,030,0 H13.080 H14.010 H18.010 RTS:	and a Remote Towe and a supervisor po simultaneously or a objective is to asso maintaining operati						
H06.010 H09.010 H10.010 H11.010,020,050,060,070,080 H12.010,020,030,0 H13.080 H14.010 H18.010 RTS:							
H13.080 H14.010 H18.010 RTS:	HP objectives						
H01.010,020,030,040 H02.010,020,030,040 H04.010,020 H05.010 H06.0							
H07.010 H08.010 H09.010 H10.010 H11.010,020,050,060,070,0 H12.010,020,030,050 H13.080 H14.010 H15.010,020 H18.010							
Tool selected out of the HP repositoryBedford, SASHA-Q, AIM, SATI and tailor-made questionnaires (post-run a post-exercise)							
Summary of the HP See VALR activity							

Table 11: Description of Activity 6

Αςτινιτγ 7.	RTS EXE-2.4-V3-ENAV Remote Tower Modules				
Description	RTS including 2 MRTM ATCO CWP and 1 RTC SUP WP; The Supervisor position is provided with a SUP planning tool to supervise and plan the flexible allocation of 3 aerodromes between the 2 MRTMs. An ATCO planning tool to prioritise next high priority action is integrated in the EFPS system of ATCO MRTM CWP. See Section 4.4.1				
Arguments & related issues addressed					
HP objectives	 H01: CRT-H01.010 /CRT- H01.020/CRTH01.030 H02: CRT-H02.010 /CRT-H02.020/CRT-H02.030 H03: CRT-H03.010 				





	• H04: CRT-H04.010/CRT-H04.020				
	• H05: CRT-H05.010				
	 H06: CRT-H06.010 /OBJ-H07/CRT-H07.010/CRT-H07.030 				
	• H08: CRT-H08.010				
	• H09: CRT-H09.010				
	• H10: CRT-H10.010 /CRT-H10.030				
	• H18: CRT-H18.010 /CRT-H18.020				
	• H11: CRT-H11.010 /CRT-H11.020 /CRT-H11.040 /CRT-H11.050 /CRT-				
	H11.060/CRT-H11.070/CRT-H11.080				
	• H12: CRT-H12.010/ CRT-H12.020 /CRT-H12.030/ CRT-H12.040/ CRT-				
	H12.050				
	 H13: CRT-H13.010 /CRT-H13.040/CRT-H13.080 				
	• H14: CRT-H14.010				
	• H15: CRT-H15.010 /CRT-H15.020				
Tool selected out of the	Workload: Bedford (+customized quest)				
HP repository	Situation awareness: China Lakes				
	Situation awareness. China Lakes				
	Acceptability: CARS				
	Usability: SUS				
	Trust: SATI				
	Trust. SATT				
	Human Error: Tailor-Made Questionnaires				
	End of simulation questionnaire				
	End of simulation questionnaire				
Summary of the HP	See VALR				
activity					

Table 12: Description of Activity 7

Αςτινιτγ 8.	RTS EXE-2.5-V3-DFS MRTC Simulation Automation Features					
Description	Real Time Simulation with an ATCO providing ATS to 3 small size aerodromes at a time with the aerodromes flexibly allocated to the MRTM. The ATCO will be supported by automation tools (e.g. conformance monitoring, attention guidance with event list) which are based on basic ground and airborne surveillance. The visual presentation will be reduced to a minimum with the surveillance being focussed on radar/MLAT/ADS-B and use of PTZ. The objective is to assess the ATCO situation awareness and human performance in different scenarios					
Arguments & related issues addressed	See Section 4.4.1					



HP objectives	H02.010,020,030 H04.010,020 H06.010 H07.030 H08.010 H11.010,020,040,050,060,070 H13.010,020,040
Tool selected out of the HP repository	Bedford, China Lake, CARS, SUS, SATI and questionnaires (standardized and tailored)
Summary of the HP activity	See VALR

Table 13: Description of Activity 8

Астіvіту 9.	HP Post-simulations workshop				
Description	Workshop to integrate and consolidate HP solution results				
Arguments & related issues addressed	See Section 4.4.1				
HP objectives	Review and integration of HP solution results				
Tool selected out of the HP repository	Focus group				
Summary of the HP activity	Review of HP Issues & Benefits, HP results				

Table 14: Description of Activity 9

Α CTIVITY 10 .	HP Requirements workshop
Description	Workshop to consolidate HP requirements and remove potential duplication with safety requirements
Arguments & related issues addressed	See Section 4.4.1
HP objectives	Consolidation of HP requirements
Tool selected out of the HP repository	





Summary of	the	HP	HP Mitigation
activity			

 Table 15: Description of Activity 10

Астіvіту 11.	IP and SAF Final Solution Workshop					
Description	Norkshop					
Arguments & related issues addressed	See Section 4.4.1					
HP objectives	To harmonise HP and Safety achievements To verify requirements' overlap between HP and SAF					
Tool selected out of the HP repository	Structured Walkthrough					
Summary of the HP activity	HP&SAF requirements input					

Table 16: Description of Activity 11





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

4.4.1 Summary of HP activities results & recommendations / requirements

Final Recommendations and Requirements are provided in Appendix B and C respectively. More readable table providing the full traceability is available in the HP-Log in Appendix D.

Arg	ISSUE /BEN ID	HP issu e / ben efit	Status	HP Obj ID	HP SUC ID	Actual evidence	Input Requirement & EXE req Input_Recommendation & EXE rec			n & EXE rec	Final Requir ement	Final Reco mme ndati on
Arg.	W2.PJ	The	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	If an additional	If an additional spare	The Supervisor should	The	The	In
1.1.	05.35	desc		W2-35-V3-	W2-35-	RTS: The	spare ATCO or	ATCO or assistant is	initiate the split as s/he	handover	receivi	case
2:	_ls.1.1	ripti		VALP-H07	V3-VALP-	majority of	assistant is	required, the	is the one who has the	procedure	ng	of
The	.2-1	on			H07.010	the ATCOs	required, the	corresponding roles and	overview of the	initiation	ATCO	conti
desc		of				indicated	corresponding	responsibilities and the	predicted traffic load.	should be	shall	ngen
ripti		the				that ATCO	roles and	coordination procedures	If the overload is	responsibilit	be	су
on		role				roles and	responsibilities	shall be locally defined.	uncertain or would last	y of the RTC	respo	and
of		s &				responsibilit	and the	The RTC supervisor role	for a short period, the	supervisor	nsible	in
role		resp				ies were	coordination	shall monitor the RTC	SUP should consult with	role.	to	case
s &		onsi				clear. In	procedures shall	aerodromes conditions	the ATCO whether s/he		finalis	of
resp		biliti				terms of	be locally defined.	and traffic load to	wants to split or keep		e the	emer
onsi		es				split and		establish the aerodromes	the aerodrome. It is		transf	genc
biliti		does				merge, it is		allocation to the RTC	possible that the ATCO		er of	у
es		not				vital to		modules	would rather take on 2		contro	part
cov		cove				differentiat			additional flights than		l and	of
er		r all				e between			to split.		compl	ATCO
all		task				the SUP and			It should be the ATCOs'		ete	s task
task		s to				the ATCO			responsibility to		the	may





s to	be	2	re	esponsibilit		manage the handover	hando	be
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perf	or	m	s	should		thus the timing of the	proce	ated
orm	ed	Ł	m	monitor the		split should be	dure	to
ed	by	/ a	R	RTC traffic		coordinated between		The
by a	hu	um	si	situation		SUP and ATCOs.	The	RTC
hum	an	า	а	and shall			RTC	super
an	ac	to	ir	nitiate the		Local assessment is	super	visor
acto	r		s	plit. The		recommended to	visor	to
r.			A	ATCO is		establish if part of	role	redu
			re	esponsible		ATCOs task of	shall	ce
			to	o execute		coordination with other	monit	the
			tł	he task (i.e.		entities can be	or the	workl
			C	coordinatio		delegated to the	RTC	oad
			n	n with the		supervisor e.g. the	aerodr	for
			0	other		coordination with other	omes	the
			N	MRTM and		entities might be	condit	remo
			m	managing		delegated to the	ions	te
			tł	he system)		supervisor rather than	and	towe
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			tl	he			es	tion
			а	aerodrome				shoul
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ATCOs roles			
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		responsibilities	the transfer of an	ā	assessment	er	local
		shall be locally	aerodrome between	S	should be	proce	asses
		defined, ensuring	MRTMs) shall be locally	0	conducted	dures	smen
		they cover all	defined with a clear	t	to establish	(for	t
		actors involved	description of the	S	supervisor	the	shoul
		for normal,	associated roles and	ć	and ATCOs	transf	d be
		abnormal and	responsibilities and	r	responsibilit	er of	cond
		degraded modes	corresponding	i	ies in the	an	ucte
		of operations.	coordination procedures.	r	remote	aerodr	d to
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				t	the ATCO	of the	te
				١	works on	associ	towe
				6	each airport	ated	r
				2	should be	roles	centr
				ā	automaticall	and	e
				Y	y monitored	respo	with
				t	to ensure	nsibilit	the
				t	that the	ies	flexib
				r	minimum	and	le
				r	required	corres	alloc
				á	amount of	pondi	ation

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					hours (and therefore the endorseme nt) is	ng coordi nation proce dures.	depe nding on the avail
					maintained.		able level
							of auto
							mati on and
							the RTC
							size
							The time
							the ATCO
							work s on
							each airpo
							rt shoul
							d be auto
							matic ally
							moni tored
							to ensur

EUROPEAN PARTNERSHIP





										е
										that
										the
										mini
										mum
										requi
										red
										amo
										unt
										of
										hour
										S
										(and
										there
										fore
										the
										endo
										rsem
										ent)
										is
										main
										taine
										d.
		OBJ-PJ05-	CRT-PJ05-	Indra/HC	-Future validation	Roles and responsibilities	For the SUP position,	ATCO shall	ATCO	In
		W2-35-V3-	W2-35-	RTS:	activities shall	shall be locally defined,	the roles should be	be able to	shall	case
		VALP-H10	V3-VALP-	Participatin	involve the	ensuring they cover all	clearly defined because	request a	be	of
			H10.010	g ATCOs	Supervisor	actors involved for	different interaction	transfer	able	conti
				unanimousl	position	normal, abnormal and	would be expected	even if	to	ngen
				y agree that		degraded modes of	from a big center SUP	he/she is	reque	су
				the SUP		operations.	and from a 2-3 airport	not holding	st a	and
				roles and			multi remote tower	the RTC	transf	in
				responsibilit			center SUP.	supervisor	er	case
				ies are clear				role	even if	of
				and			A local assessment of		he/sh	emer





acceptable	which coordination task	e is	genc
in a RTC	actually assigned to the	not	y
environmen	ATCOs can be	holdin	part
t. It was a	delegated to the	g the	of
bit unusual	supervisor might be	RTC	ATCO
for them to	needed. Also, a local	super	s task
step back	assessment of extended	visor	may
and do not	SUP support of the	role	be
get involved	handover phase might	TOIE	deleg
in an	be needed before the		ated
	deployment		
unexpected	deployment		to The
situation.			RTC
Also,			
sectorisatio			super
n is a task			visor
that is not			to
part of the			redu
current			ce
Budapest			the
TWR			workl
Supervisor's			oad
responsibilit			for
ies.			the
Importantly,			remo
one			te
participant			towe
made the			r
following			mod
observation			ule
:			ATCO
•"For the			
SUP			Timin
position,			g of
the roles			the

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should be	hand
defined	over
because	proc
different	edur
interaction	e
would be	shoul
expected	d be
from a big	coor
centre SUP	dinat
and from a	ed
2-3 airport	betw
multi	een
remote	SUP
centre."	and
	ATCO
Indra/Avino	s as
r: There was	it's
not a	ATCO
majority of	resp
supervisors	onsib
assessing	ility
that the	to
change in	mana
roles and	ge
responsibilit	the
ies was	hand
acceptable	over
since	
improveme	
nts were	
needed on	
the	
supervisor	
position.	
position	

EUROPEAN PARTNERSHIP





The
acceptabilit
y of the
change in
roles and
responsibilit
ies was
conditioned
for
supervisors
to necessary
system
improveme
nts to
better
monitor the
traffic
situation
and
workload at
MRTMs, to
have a
cleared
view on
ATCOs
endorseme
nts and
availability,
and a better
planning
tool to
support the
flexible
allocation of

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aerodromes	
2.1 DLR The	
majority of	
the	
participants	
at the SUP	
workplace	
agreed with	
their roles	
and	
responsibilit	
ies and also	
confirmed	
that they	
are clear,	
consistent,	
stable and	
acceptable.	
Even so, the	
expert	
comments	
suggest that	
there is still	
work to do	
and the	
roles and	
responsibilit	
ies have to	
be defined	
in more	
detail	





ENAV: The
description
of the roles
&
Responsibili
ties was
found clear,
stable and
complete,
but
supervisors
test
subjects
raised and
agreed on
the
possibility
of
undertaking
some of the
coordinatio
n tasks
currently
assigned to
the ATCOs
as
mentioned
in the
previous
objective. A
further
comment
was also
raised about





						the				
						possibility				
						for the				
						supervisor				
						to support				
						more the				
						handover				
						phase, but				
						while both				
						the				
						supervisor				
						agreed on				
						this option,				
						they did not fully agree				
						on which				
						extend this				
						support was				
						to be				
						provided				
						and on the				
						modality.				
Arg.	W2.PJ	Role	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	In case the TWR			
1.1.	05.35	s &		W2-35-V3-	W2-35-	RTS: See	ATCO`s			
3:	_ls.1.1	resp		VALP-H07	V3-VALP-	W2.PJ05.35	responsibility			
Role	.3-1	onsi			H07.010	_ls.1.1.2-1	covers the apron			
S		biliti					area as well, the			
and		es				Indra/Avino	apron shall be			
resp		are				r: Same as	visible on the			
onsi biliti		not				W2.PJ05.35	cameras.			
es		clea r &				_ls.1.1.2-1				
are		cons				2.1 DLR The				
		COIIS								
clea						results				





r and cons iste nt (in V1: non- cont radi ctor y).	iste nt		show that the majority of participants finds the changes clear, consistent, acceptable, and applicable.					
			COOPANS: Check W2.PJ05.35 _Is.1.1.2-1 ENAV: roles and responsibilit ies were acceptable for the participatin g ATCOs					
			~	Split and merge procedures shall be locally defined with a clear description of the associated roles and responsibilities	Transfer procedures (for the transfer of an aerodrome between MRTMs) shall be locally defined with a clear description of the associated roles and responsibilities and	A local assessment should be conducted to establish supervisor and ATCOs responsibilit	Transf er proce dures (for the transf er of	A local asses smen t shoul d be cond

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SESAR 2020 SOLUTION 05-35 SPR-INTEROP/OSED V3 - PART IV - HUMAN PERFORMANCE ASSESSMENT REPORT



						auto
						mati
						on
						and
						the
						RTC
						size
						The
						time
						the
						ATCO
						work
						s on
						each
						airpo
						rt
						shoul d be
						auto matic
						ally
						moni
						tored
						to
						ensur
						e
						that
						the
						mini
						mum
						requi
						red
						amo

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EUROPEAN PARTNERSHIP





			Transfor		Transf	unt of hour s (and there fore the endo rsem ent) is main taine d.
			Transfer procedures (for the transfer of an aerodrome between MRTMs) shall be locally defined with a clear description of the associated roles and responsibilities and corresponding coordination procedures.		er proce dures (for the transf er of an aerodr ome betwe en MRT Ms) shall be locally define	

EUROPEAN PARTNERSHIP





					d with
					a clear
					descri
					ption
					of the
					associ
					ated
					roles
					and
					respo
					nsibilit
					ies
					and
					corres
					pondi
					ng
					coordi
					nation
					proce
					dures.
OBJ-PJ05-	CRT-PJ05-	Indra/HC	Roles and		
W2-35-V3-	W2-35-	RTS: See	responsibilities		
VALP-H10	V3-VALP-	W2.PJ05.35	shall be locally		
	H10.010	_ls.1.1.2-1	defined, ensuring		
			they cover all		
		Indra/Avino	actors involved		
		r: Same as	for normal,		
		W2.PJ05.35	abnormal and		
		_ls.1.1.2-1	degraded modes		
			of operations.		
		2.1 DLR			
		Same as			
		W2.PJ05.35			
		_ls.1.1.2-1			

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		ENAV: roles and responsibilit ies were acceptable for the participatin g ASUPs				
			-Future validation activities shall involve the Supervisor position			





Arg.	W2.PJ	Ope	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	Split and merge	Transfer procedures (for	The Supervisor should	Operating	Transf	Oper
1.2.	05.35	ratin	0.0000	W2-35-V3-	W2-35-	RTS:	procedures shall	the transfer of an	initiate the split as s/he	procedure	er	ating
1:	_ls.1.2	g		VALP-H09	V3-VALP-	Supervisors	be locally defined	aerodrome between	is the one who has the	for the	proce	proc
Ope	.1-1	met			H09.010	reported	with a clear	MRTMs) shall be locally	overview of the	handover	dures	edur
rati		hod				that they	description of the	defined with a clear	predicted traffic load.	should	(for	e for
ng		s do				were able	associated roles	description of the	If the overload is	foresee a	the	the
met		not				to	and	associated roles and	uncertain or would last	period	transf	hand
hod		cove				efficiently	responsibilities	responsibilities and	for a short period, the	dedicated	er of	over
S		rall				support	and	corresponding	SUP should consult with	to the	an	shoul
cov		oper				ATCOs in	corresponding	coordination procedures.	the ATCO whether s/he	monitoring	aerodr	d
er		atio				non-	coordination		wants to split or keep	including	ome	fores
ope		ns in				nominal			the aerodrome. It is	frequency	betwe	ee a
rati		nor				situations,			possible that the ATCO	monitoring	en	perio
ons		mal				and were			would rather take on 2	before the	MRT	d
in		oper				also able to			additional flights than	actual	Ms)	dedic
nor		atin				make			to split.	handover	shall	ated
mal		g				decisions			It should be the ATCOs'	and a	be	to
ope		con				about the			responsibility to	coordinatio	locally	the
rati		ditio				split.			manage the handover	n between	define	moni
ng		n				However,			between themselves,	the ATCOs	d with	torin
con						they also			thus the timing of the		a clear	g
ditio						expressed			split should be		descri	inclu
ns.						some of the			coordinated between		ption	ding
						difficulties			SUP and ATCOs.		of the	frequ
						they faced					associ	ency
						as first-time			Operational procedures		ated	moni
						RTC			and check lists for		roles	torin
						Supervisors.			nominal conditions as		and	g
						Some of			well as for abnormal		respo	befor
						their issues			and degraded mode		nsibilit	e the
						were the			shall be revised,		ies	actua
						followings:			definitely consolidated		and	1
						•"To			and put in place to		corres	hand
						precisely					pondi	over

EUROPEAN PARTNERSHIP





identify the	support the RTC with	ng	and a
peaks. I	flexible allocation	coordi	coor
needed to		nation	dinat
analyse the		proce	ion
data		dures.	betw
provided by			een
the system,		The	the
because the		receivi	ATCO
yellow		ng	s
marked		ATCO	
periods		shall	The
were not		be	hand
real peaks		respo	over
in most		nsible	proc
cases."		to	edur
•"To stay in		finalis	e
my place		e the	initia
and not to		transf	tion
take part		er of	shoul
physically in		contro	d be
the		l and	resp
situation.		compl	onsib
Maybe		ete	ility
bigger		the	of
distances		hando	the
between		ver	RTC
the		proce	super
positions		dure	visor
and direct			role.
phone lines		Hando	
would have		ver	Timin
solved this		Opera	g of
issue."		tional	the
		proce	hand

EUROPEAN PARTNERSHIP





Indra/Avino	dures	over
		over
r: The	and	proc
majority of	check	edur
SUPs	lists	е
assessed	for	shoul
that	nomin	d be
operating	al	coor
methods	condit	dinat
could be	ions,	ed
applied in	abnor	betw
an efficient	mal	een
manner in	and	SUP
normal	degra	and
operating	ded	ATCO
conditions	mode	s as
but not in	shall	it's
abnormal	be	ATCO
operating	locally	resp
conditions	establi	onsib
or degraded	shed	ility
modes.	to	to
The	suppo	mana
operating	rt the	ge
methods	RTC.	the
consisting in		hand
changing		over
the		
allocation of		
aerodromes		
by splitting		
aerodrome(
s) could not		
always be		
always be applied in		

EUROPEAN PARTNERSHIP





case of
unexpected
situations or
overload on
a position,
because
there was
no other
ATCO
available to
take over
the
aerodrome(
s) when
needed.
This
illustrates
the
necessity to
have
sufficient
personnel
available to
make the
dynamic
allocation
operating
method
applicable
for
supervisors.
2.1 DLR The
majority of





the	
participants	
agreed that	
their mental	
workload	
was not	
above	
average and	
therefore in	
a timely	
manner and	
that they	
could	
perform	
their task	
efficiently.	
No	
abnormal or	
degraded	
modes were	
tested in	
the	
scenarios. It	
has to be	
noted that	
abnormal	
operating	
conditions	
and	
degraded	
modes were	
not tested	
and were	
only part of	





the tailor-	
made	
questionnai	
re.	
ENAV: The	
participatin	
g supervisors	
supervisors	
agreed that	
that	
operating	
methods	
can be	
applied in	
an accurate,	
efficient	
and timely	
manner in	
normal	
operating	
conditions,	
in case of	
aircraft	
emergency	
and in case	
of failure of	
the system	
when	
working in a	
RTC with a	
flexible	
allocation of	





aerodromes
between
MRTMs, but
as already
mentioned
they
recommend
ed that
operational
procedures
and check
lists for
nominal
conditions
as well as
for
abnormal
and
degraded
mode shall
be revised,
definitely
consolidate
d and put in
place to
support the
RTC with
flexible
allocation





			Supervisor operating methods for frequently occurring abnormal conditions and emergency situations shall be defined.	It should be the ATCOs' responsibility to manage the handover between themselves, thus the timing of the split should be coordinated between SUP and ATCOs.	Super visor operat ing metho ds for freque ntly occurr ing abnor mal condit ions and emerg ency situati ons shall be define	Timin g of the hand over proc edur e shoul d be coor dinat ed betw een SUP and ATCO s as it's ATCO resp ancib
					situati	ATCO
					d.	onsib
						ility
						to mana
						ge
						the
						hand
						over







	OBJ-PJ05-	CRT-PJ05-	Indra/HC	During Transfer of	Split should happen in a	Handover	During	Hand
	W2-35-V3-	W2-35-	RTS: The	an aerodrome	lower traffic period,	procedure	Transf	over
	VALP-H06	V3-VALP-	majority of	both ATCOs shall	when the ATCOs have	should be	er of	proc
		H06.010	the ATCOs	be presented with	spare capacity for the	initiated in	an	edur
			indicate	the same	handover process and	lower traffic	aerodr	e
			that the	information on	to build up the	period to	ome	shoul
			procedures	the aerodrome	situational awareness.	not affect	both	d be
			adequately	being transferred		ATCOs	ATCOs	initia
			support	with all available	Operational procedures	workload	shall	ted
			efficient	technical systems	and check lists for	and	be	in
			task	as replicas until	nominal conditions as	situational	prese	lowe
			performanc	the transfer	well as for abnormal	awareness	nted	r
			e.	process is	and degraded mode	in nominal	with	traffi
				finished,	shall be revised,	conditions	the	с
			Indra/Avino	readiness by	definitely consolidated	Handover	same	perio
			r: All ATCOs	overtaking ATCO	and put in place to	procedure	inform	d to
			confirmed	is confirmed and	support the RTC with	should be	ation	not
			that	the fully control	flexible allocation	initiated in	on the	affec
			Operating	over the new		lower traffic	aerodr	t
			methods	aerodrome is	It is recommended to	period to	ome	ATCO
			when	being reported	finalise operational	not affect	being	S
			providing	established.	procedures and	ATCOs	transf	workl
			ATS services		checklist for the	workload	erred	oad
			to multiple		handover, for abnormal	and	with	and
			aerodromes		and for degraded mode	situational	all	situa
			were		to support the	awareness	availa	tiona
			efficient		deployment	in nominal	ble	1
			under both			conditions	techni	awar
			normal and				cal	enes
			abnormal				syste	s in
			operating				ms as	nomi
			conditions.				replica	nal
							s until	condi
			2.1 DLR The				the	tions

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results	transf
show that	er
the majority	proces
of	s is
participants	finishe
took below	d,
medium	readin
effort to	ess by
issue timely	overta
commands.	king
The tailor-	ATCO
made PE	is
questionnai	confir
re shows	med
that the	and
majority of	the
participants	fully
agrees with	contro
the	l over
statements	the
concerning	new
the	aerodr
different	ome is
modes of	being
operation.	report
And the	ed
final	establi
comment	shed.
indicates a	
general	Checkl
need for	ist for
more	the
training of	hando
the	ver





operational	shall
methods.	be
	define
COOPANS:	d
Operating	
methods	The
could be	receivi
applied in	ng
	ATCO
	shall
	be
manner in	respo
normal	nsible
operating	to
	finalis
ENAV: the	
g ATCOs	
methods	the
	hando
conditions,	
applied in accurate, efficient and timely manner in	ng ATCO shall be respo nsible to finalis e the transf er of contro I and compl ete

EUROPEAN PARTNERSHIP





emergency
and in case
of failure of
the system
when
working in a
RTC with a
flexible
allocation of
aerodromes
between
MRTMs, but
as already
mentioned
they
recommend
ed that
operational
procedures
and check
lists for
nominal
conditions
as well as
for
abnormal
and
degraded
mode shall
be revised,
definitely
consolidate
d and put in
place to





						support the RTC with flexible allocation				
							Operating methods shall be locally defined covering normal, abnormal and degraded modes of operations. <u>Future validation</u> activities shall			
							involve the Supervisor position			
Arg. 1.2. 1: Ope rati	W2.PJ 05.35 _ls.1.2 .1-2	Ope ratin g met hod	Closed	#N/D	#N/D					
ng met hod s cov er ope rati		s mig ht not be appr opri ate						Split and merge procedures shall be locally defined with a clear description of the associated roles and responsibilities and corresponding coordination		

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ons in nor mal ope rati ng con ditio ns.		to cont rol the requ ired traff ic volu me in nor mal oper atin g con									
Arg.	W2.PJ	ditio ns Ope	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	Assess Supervisor		In case of	Checkl	
1.2.	05.35	ratin	cioseu	W2-35-V3-	W2-35-	RTS: Same	workload in		high	ist for	
1:	_ls.1.2	g		VALP-H09	V3-VALP-	as	scenarios		workload	the	
Ope	.1-4	met			H09.010	W2.PJ05.35	addressing the		situations,	hando	
rati ng		hod s for				_ls.1.2.1-1	transfer/ assuming of		such as an emergency	ver shall	
met		tran				Indra/Avino	aerodromes.		situation, at	be	
hod		sferr				r: Same as			one of the	define	
s		ing/				W2.PJ05.35			airports -	d	
cov		assu				_ls.1.2.1-1			significantly		
er		min							increasing	Hando	
ope		g				2.1 DLR			the	ver	
rati		cont				Same as			ATCO/AFISO	Opera	
ons		rol				W2.PJ05.35			workload	tional	
in		of				_ls.1.2.1-1			and	proce	





nor	aero		affecting dures
mal	dro	ENAV:	her/his and
ope	mes	Supervisors	capability to check
rati	fro	recommend	continue to lists
ng	m	ed to	provide ATS for
con	one	finalise	to all nomin
ditio	MRT	operational	airports al
ns.	M to	procedures	under condit
	anot	and	responsibilit ions,
	her	checklist for	y - the ATCO abnor
	are	the	may mal
	not	handover,	perform and
	clea	for	one of the degra
	ror	abnormal	following ded
	effic	and for	actions in mode
	ient.	degraded	order to be shall
	Tran	mode to	able to be
	sferr	support the	manage the locally
	ing/	deployment	high establi
	assu		workload shed
	min		situation: to
	g an		• suppo
	aero		Temporarily rt the
	dro		stopping/de RTC.
	me		laying traffic
	at		at the
	an		other/all
	MRT		airport(s);
	M		•
	mig		Transferring
	ht		the
	incr		provisioning
	ease		of ATS for
	wor		the





kloa			airport(s)
d			not affected
dep			by the
endi			unexpected
ng			event to
on			another
traff			MRTM;
ic			•
volu			Requesting
mes			the support
and			of another
traff			ATCO to be
ic			able to
com			continue
plexi			the service
ty.			provision
-,			for all
			aerodromes
			from the
			existing
			RTM.
			Note: The
			RTC
			Supervisor
			may
			support the
			controller to
			apply these
			procedures.
			procedures.





		OBJ-PJ05-	CRT-PJ05-	Indra/HC	-Assess Supervisor	The Supervisor should	The	Checkl	The
		W2-35-V3-	W2-35-	RTS: Same	acceptance of	initiate the split as s/he	handover	ist for	hand
		VALP-H06	V3-VALP-	as in	operating	is the one who has the	procedure	the	over
			H06.010	W2.PJ05.35	methods in	overview of the	initiation	hando	proc
				_ls.1.2.1-1	scenarios	predicted traffic load.	should be	ver	edur
					addressing	If the overload is	responsibilit	shall	е
				Indra/Avino	transferring of	uncertain or would last	y of the RTC	be	initia
				r: Same as	aerodromes.	for a short period, the	supervisor	define	tion
				W2.PJ05.35		SUP should consult with	role.	d	shoul
				_ls.1.2.1-1		the ATCO whether s/he			d be
						wants to split or keep		The	resp
				2.1 DLR		the aerodrome. It is		receivi	onsib
				Same as		possible that the ATCO		ng	ility
				W2.PJ05.35		would rather take on 2		ATCO	of
				_ls.1.2.1-1		additional flights than		shall	the
						to split.		be	RTC
				COOPANS:		It should be the ATCOs'		respo	super
				ATCOs		responsibility to		nsible	visor
				agreed that		manage the handover		to	role.
				the		between themselves,		finalis	
				operating		thus the timing of the		e the	Hand
				methods for		split should be		transf	over
				transfer of		coordinated between		er of	proc
				the		SUP and ATCOs.		contro	edur
				aerodromes				l and	е
				between		It is recommended to		compl	shoul
				the MRTMs		finalise operational		ete	d be
				were		procedures and		the	initia
				feasible and		checklist for the		hando	ted
				acceptable.		handover, for abnormal		ver	in
				Since the		and for degraded mode		proce	lowe
				traffic		to support the		dure	r
				volume and		deployment			traffi
				traffic				Hando	С

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			complexity			ver	perio
			can			Opera	d to
			contribute			tional	
							not affec
			to increased			proce	
			workload,			dures	t
			timely			and	ATCO
			transfer of			check	S
			the			lists	workl
			aerodromes			for	oad
			between			nomin	and
			MRTMs			al	situa
			should be			condit	tiona
			performed			ions,	1
			in order to			abnor	awar
			mitigate			mal	enes
			high			and	s in
			workload at			degra	nomi
			one of the			ded	nal
			MRTMs.			mode	condi
						shall	tions
			ENAV:			be	
			ATCOs			locally	Timin
			recommend			establi	g of
			ed to			shed	the
			finalise			to	hand
			operational			suppo	over
			procedures			rt the	proc
			and			RTC.	edur
			checklist for				e
			the				shoul
			handover,				d be
			for				coor
			abnormal				dinat
			and for				ed

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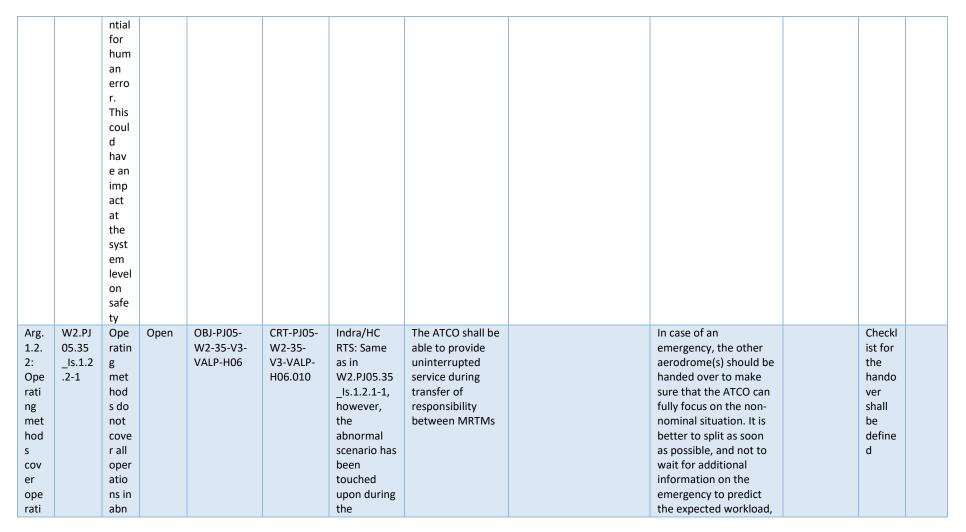
			degraded mode to support the deployment			betw een SUP and ATCO s as it's ATCO resp onsib ility to mana ge the hand over
Arg.W2.PJ1.2.05.351:_Is.1.2Ope.1-5rati	Diff Closed eren t aero dro mes hav e diffe rent proc edur es and diffe rent	W2-35-V3- VALP-H09	CRT-PJ05- W2-35- V3-VALP- H09.010			





ope	acte					
rati	risti					
ng	CS.					
con	This					
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	on					
	ATC					
	Os					
	hav					
	e to					
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	er,					
	and					
	as a					
	cons					
	equ					
	ence					
	incr					
	ease					
	the					
	pote					







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JOINT UNDERTAKING



ons	orm			debriefing		because such a		
in	al			sessions.		situation can quickly		
abn	con			According		escalate, which would		
orm	ditio	1		to ATCO		make split process		
al	ns			feedbacks,		more challenging.		
ope	(like			the				
rati	in			emergency		HMI for the emergency		
ng	eme			situation		communication should		
con	rgen			(aircraft		be refined		
ditio	су			emergency		Checklists are		
ns.	situ			due to		recommended to be		
	atio			landing gear		refined to handle		
	ns)			problem)		emergency situation.		
				was		It is recommended to		
				manageable		isolate the airport		
				, although it		hosting the aircraft in		
				is important		emergency		
				that the		0 ,		
				aerodrome(
				s) which are				
				not affected				
				with the				
				emergency				
				situation				
				should				
				always be				
				split as soon				
				as possible,				
				and the				
				ATCO				
				should not				
				wait for				
				additional				
				information				
				mormation				





on the
emergency
to predict
the
expected
expected
workload,
because
such a
situation
can quickly
escalate,
which
would make
split process
more
challenging.
It is
recommend
ed to apply
this as an
obligatory
rule.
Indra/Avino
r: Same as
W2.PJ05.35
_ls.1.2.1-1
2.1 DLR
Same as
W2.PJ05.35
_ls.1.2.1-1
COOPANS:





No
abnormal
situation
was tested.
ENAV:
Emergency
scenario has
been line line line line line line line l
tested, HMI
for the
emergency
communicat
ion should
be refined,
anyway
situation
awareness
was and a second s
maintained
at
acceptable
level.
Checklists
were
recommend
ed to be
refined to
handle
emergency
situation. It
was also
suggested
to isolate





		the airport hosting the aircraft in emergency so that ATCO attention can be focused on the aircraft in emergency				
OBJ-PJ05- W2-35-V3- VALP-H06	CRT-PJ05- W2-35- V3-VALP- H06.010	Indra/HC RTS: same as above Indra/Avino r: Same as W2.PJ05.35 _Is.1.2.1-1 2.1 DLR Same as W2.PJ05.35 _Is.1.2.1-1 COOPANS: No	The ATCO shall be able to transfer one of the controlled aerodromes to another MRTM			
		abnormal situation was tested.				





		as W2.PJ05.35 _ls.1.2.1-1				
			In case of high workload situations, such as an emergency situation, at one of the airports - significantly increasing the ATCO/AFISO workload and affecting her/his capability to continue to provide ATS to all airports under responsibility - the ATCO may perform one of the following actions in order to be able to manage the high workload situation: • Temporarily stopping/delaying traffic at the other/all airport(s); • Transferring the			





		provisioning of ATS for the airport(s) not affected by the unexpected event to another MRTM; • Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Supervisor may support the controller to apply these procedures.	
#N/D	#N/D	Supervisor operating methods for frequently occurring abnormal conditions and emergency situations shall be defined.	Super visor operat ing metho ds for freque ntly occurr ing abnor mal





									condit ions and emerg ency situati ons shall be define d.	
Arg. 1.2. 4: The cont ent of ope rati ng met hod s is clea r and cons iste nt (in	W2.PJ 05.35 _Is.1.2 .4-1	The cont ent of the oper atin g met hod s is uncl ear & cont radi ctor y.	Closed	OBJ-PJ05- W2-35-V3- VALP-H09	CRT-PJ05- W2-35- V3-VALP- H09.010	Indra/HC RTS: Same as in W2.PJ05.35 _ls.1.2.1-1 Indra/Avino r: Same as W2.PJ05.35 _ls.1.2.1-1 2.1 DLR Same as W2.PJ05.35 _ls.1.2.1-1 ENAV: Same as W2.PJ05.35 _ls.1.2.1-1		Local guidelines with regard to when the support from an additional ATCO or assistant shall be asked for, should be locally defined		





V1:	OBJ-PJ05-	CRT-PJ05-	Indra/HC	NOTAM and AIP			
non-	W2-35-V3-	W2-35-	RTS: Same	information shall			
cont	VALP-H06	V3-VALP-	as in	clearly indicate to			
radi		H06.010	W2.PJ05.35	the flight crew			
ctor		1100.010	_ls.1.2.1-1	that they are			
y).			_13.1.2.1 1	going to fly to a			
y).			Indra/Avino	"multiple remote"			
			r: Same as	TWR, in order to			
			W2.PJ05.35	ensure			
			_ls.1.2.1-1	appropriate			
				awareness about			
			2.1 DLR	the possibility of			
			Same as	hearing multiple			
			W2.PJ05.35	clearances on			
			_ls.1.2.1-1	frequency that			
				apply to other			
				aerodromes.			
			COOPANS:				
			Same as				
			W2.PJ05.35				
			_ls.1.2.1-1				
			_13.1.2.1-1				
			ENAV: Same				
			as				
			W2.PJ05.35				
			_ls.1.2.1-1				
				-Assess Supervisor			
				acceptance of			
				operating			
				methods in			
				scenarios			
				addressing			
				transferring of			
				aerodromes.			
		1					





Arg.	W2.PJ	The	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	-Future validation			
1.2.	05.35	oper		W2-35-V3-	W2-35-	RTS: Same	activities shall			
5:	_ls.1.2	atin		VALP-H09	V3-VALP-	as in	involve the			
Ope	.5-1	g			H09.010	W2.PJ05.35	Supervisor			
rati	.5 1	met			1105.010	_ls.1.2.1-1	position			
ng		hod					position			
met		s				Indra/Avino				
hod		can				r: Same as				
S		not				W2.PJ05.35				
can		be				_ls.1.2.1-1				
be		follo								
follo		wed				2.1 DLR				
wed		in				Same as				
in		an				W2.PJ05.35				
an		accu				_ls.1.2.1-1				
accu		rate,								
rate		effic				ENAV: Same				
,		ient				as				
effic		and				W2.PJ05.35				
ient		time				_ls.1.2.1-1				
and		ly				_	Future validation			
time		man					activities shall			
ly		ner					assess the			
man							timeliness of			
ner.							executing tasks			
							for the supervisor			
							position.			
				OBJ-PJ05-	CRT-PJ05-	Indra/HC				
				W2-35-V3-	W2-35-	RTS: Same				
				VALP-H06	V3-VALP-	as in				
					H06.010	W2.PJ05.35				
						_ls.1.2.1-1				
						Indra/Avino				





						r: Same as W2.PJ05.35 _Is.1.2.1-1 2.1 DLR Same as W2.PJ05.35 _Is.1.2.1-1			
						COOPANS: Same as W2.PJ05.35 _ls.1.2.1-1 ENAV: Same as W2.PJ05.35 _ls.1.2.1-1			
Arg. 1.3. 1: The pote ntial for hum an erro r is red uce d as far	W2.PJ 05.35 _ls.1.3 .1-1a	ATC O mig ht conf use displ aye d airp orts whe n sear chin	Closed	#N/D	#N/D				





as	g for					
	giui					
poss	fligh					
ible.	ts					
	(sea					
	rch					
	in					
	wro					
	ng					
	ng displ					
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	ay)					
	as					
	som					
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	infor					
	mati					
	on is					
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	com					
	bine					
	d					
	HMI					
	inte					
	grati					
	ng					
	ng the					
	diffe					
	ront					
	rent					
	airp					
	orts					
	or					
	as					





		infor mati on is displ aye d only tem pora rily.								
Arg. 1.3. 1: The pote ntial for hum an erro r is red uce d as far as poss ible.	W2.PJ 05.35 _ls.1.3 .1-1b	SUP mig ht conf use displ aye d airp orts whe n sear chin g for fligh ts (sea rch in wro ng displ ay)	Closed	OBJ-PJ05- W2-35-V3- VALP-H01	CRT-PJ05- W2-35- V3-VALP- H01.010	Indra/HC RTS: The mean scores of the China- Lake metric suggest that SUPs' situational awareness was at acceptable level. Indra/Avino r: Situation awareness could not always be maintained at a satisfying level because	-Future validation activities shall identify system possibilities on the SUP HMI to indicate different airports.	SUP tool HMI should allow multiple windows to access all the needed information displayed at the same time and should include airport transfer system		





	as	supervisors
S	som	lacked
e		sufficient
ir	nfor	information
n	nati	on their
C	on is	position to
d	displ	monitor
	ауе	workload
	d in	and manage
а	a	unexpected
с	com	situations at
b	pine	MRTMs.
d	t l	
F	HMI	2.1 DLR The
ir	nte	majority of
g	grati	participants
	ng	at the SUP
	he	workplace
d	diffe	indicates a
r	rent	positive SA.
а	airp	The PE
	orts	tailor-made
o	or 🛛	questionnai
а	as	re even
ir	nfor	indicates so
n	nati	much that
o	on is	the
d	displ	participants
	aye	thought
d		they could
o	only	also keep
	iem	the same SA
	oora	under
	ily.	abnormal





			condition.				
			condition. ENAV: Supervisor situation awareness was found acceptable by all the participatin g test subjects, nevertheles s they suggested improveme nt in the HMI supervisor tool, even if there was never confusion about which airport was				
			displayed				Tho
	OBJ-PJ05- W2-35-V3-	CRT-PJ05- W2-35-	Indra/HC RTS decided	The RTC Supervisor should			The RTC
	VALP-H01	V3-VALP- H01.040	not addressed	be provided with the forecasted			Supe rviso
			this specifically.	demand for all involved			r shoul
				aerodromes part			d be
			Indra/Avino	of the RTC.			provi





			r: The			ded
			majority of			with
			SUP			the
			confirmed			forec
			that they			asted
			could			dem
			maintain an			and
			adequate			for
			level of SA,			all
			despite			invol
			heuring to			
			having to			ved
			divide their			aero
			attention to			drom
			different			es
			clusters of			part
			aerodromes			of
			. The			the
			validity of			RTC.
			the results			
			for the			
			criteria			
			applies to			
			an assigned			
			number of 4			
			aerodromes			
			·			
			2.1 DLR			
			China Lake			
			and tailor-			
			maid results			
			show that			
			that the			
			participants			





W2-35-V3- W2- VALP-H12 V3-V	were able to divide their attention 	SUP tool HMI should allow multiple windows to access all the needed information displayed at the same time.	The RTC Supe rviso r role shoul d be provi ded with a displ ay prese nting an overv iew of the
--------------------------------	--	---	---





	RTC,
Indra/Avino	inclu
r: The	ding
supervisor	e.g.
HMI did not	MRT
lead to	М
error during	statu
the difference of the differen	S,
validation;	aero
however,	drom
some HMI	es
improveme	alloc
nts are	ated
needed to	to
prevent use	MRT
errors such	Ms,
as confusion	traffi
between	с
the live vs.	load,
the planned	etc.
allocation of	to be
aerodromes	able
to MRTMs.	to
	trans
2.1 DLR	fer
Even so, the	an
system is	airpo
usable	rt.
above	
average the	
participant	
agreed that	
changes to	
the SUP role	





would		
significantly		
contribute		
to human		
error. The		
human		
error could		
be		
decreased		
with		
automation		
in the SUP		
user		
interface.		
ENAV: No		
critical		
errors were		
observed		
during the		
simulation		
execution.		
Anyway,		
supervisor		
planning		
tool HMI		
improveme		
nts were		
suggested		
to have the		
option of		
multiple		
windows		
that could		
that could	1	





	reduce the possibility of human error by having all the needed information displayed at the same time.	





		OBJ-PJ05-	CRT-PJ05-	Indra/HC	The video system		COOPANS: Having same	When
		W2-35-V3-	W2-35-	RTS: The	shall follow the	The HMI of the RTC	layout on the WACOM	an
		VALP-H18	V3-VALP-	НМІ	ATM system's	technical system shall be	, screen for e-strips for	aerodr
			H18.010	supported	split and merge	locally assessed and	single, double and triple	ome is
				the SUP to	state, and the	designed in relation to	aerodrome mode.	opene
				identify	unnecessary	the specific operational		d in an
				peak traffic	aerodrome	environment, depending	The deployment the	MRT
				periods and	should not be	on the size and type of	HMI of the technical	M the
				initiate the	displayed in the	the RTC	system shall be locally	video
				split and	video system's	Meteo information shall	assessed and designed	syste
				merge	menu. Also, when	be integrated and	in relation to the	m
				process. On	an aerodrome is	displayed in the scan path	specific operational	shall
				the ATCO	opened in an	of the ATCOs and shall be	environment.	autom
				side	MRTM, the video	automatically handed		aticall
				however,	system shall	over according to the		у
				the HMI's	automatically	established module		displa
				radar map	follow this, and	configuration after split		y it
				layout and	no additional	and merge procedures.		witho
				the EFS bay	activation click			ut the
				changed to	shall be needed			need
				accommoda	on the video			for
				te the new	system's user			additi
				aerodrome,	interface.			onal
				but the MET				ATCOs
				window				manu
				remained at				al
				the same				action
				position				S
				which led to				
				confusion.				Meteo
				The same				inform
				happened				ation
				even if the				shall
				ATCOs just				be





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splitting
aerodromes
Supervisors
missed the
possibility
to mirror
when
needed a
given
Biveri
MRTM's
HMI such as
strip bays
and out of
the window
view to be
able to
understand
or monitor
the current
situation for
the ATCO
without
having to
move to the
position in
order to
keep access
to their own
tools and
maintain
supervision
on the
other





MRTM/aero		
dromes.		
Indra/HC		
PSM: The		
technical		
system		
(InNOVA)		
supported		
the ATCOs		
during split		
and merge.		
However,		
the IRTOS		
video		
system was		
not		
connected		
to the		
InNOVA		
system,		
which led to		
the		
situation		
that even		
though the		
aerodrome		
was not		
with the		
MRTM (not		
even in		
"view only		
mode"), the		
ATCO could		
ATCO could		





		still use its			
		IRTOS			
		menu.			
		menu.			
		2.1 DLR The			
		majority of			
		the ATCOs			
		agreed that			
		the System			
		(In a			
		/ HMI			
		supported			
		the transfer			
		of an			
		Aerodrome			
		and was in			
		accordance			
		with the			
		operating			
		methodolog			
		у.			
		<i>y</i> .			
		COOPANS:			
		Technical			
		System/HMI			
		supported			
		the ATCOs			
		by being			
		accurate,			
		useful for			
		task			
		execution			
		and well			
		integrated.			





ENAV: even if it was considered that the technical system/HMI supported the ATCOs in performing their tasks, the ATCOs suggested improveme nts to the employed HMI, especially in the position of the emergency button and the handover transfer		
especially in the position of the		
button and the		
transfer that were		
located in the border of the head-		
down display while the ATCOs		

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		would have			
		preferred			
		them			
		integrated			
		in the strip			
		bay area.			
		These			
		results are			
		to be			
		interpreted			
		as			
		recommend			
		ations for			
		the			
		simulating			
		environmen			
		t rather			
		than the			
		concept			
		itself and			
		what can be			
		generalised			
		for the			
		concepts is			
		that before			
		the			
		deployment			
		the HMI of			
		the			
		technical			
		system shall			
		be locally			
		assessed			
		and			
		anu			





	de	signed in				
	rel	ation to				
	the	specific				
	ор	erational				
	en	/ironmen				
	t.					
		other				
		sible				
		ue was in				
		ation to				
		fix				
		sition of				
		airports				
		he out of				
		window				
		w and				
		/P head				
	do					
		play.				
	Wł	nile in the				
		vious				
	nh	ase of the				
	pri	ject it				
	wa					
		ommend				
		to keep				
		position				
		the				
		ports to				
		p the				
	citu	ation				
		areness,				
	the					
	COL	lected				





		feedback			
	١	was that the			
	f	fix position			
		had an			
		opposite			
	e	effect			
		especially			
	1	when the			
		transferred			
		airport was			
		a third			
		airport in the middle			
	T	fix position:			
	(during the			
		transfer			
		allocating			
		the airport			
		in the			
		middle			
		caused a			
		temporary			
		disorientati			
	(on of the			
		ATCOs that			
	r	required a			
	f	few times to			
		recap the			
		exact			
		position of			
		the airports.			
	-	They would			
	ł	have			
		preferred to			
	1	preferreuto			





		receive the			
		transferred			
		airport			
		always			
		occupying			
		the last			
		position in			
		all the			
		screen i.e.			
		on the			
		bottom of			
		the displays			
		for the			
		external			
		view and on			
		the right on			
		the head			
		down CWP			
		displays.			
		Finally the			
		ATCOs			
		suggested a			
		line marking			
		the airport			
		area of each			
		displayed			
		airport in			
		the OTW			

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OBJ-PJ05- CRT	-PJ05- Indra/HC		It is recommended to		
W2-35-V3- W2-			allow a flexible display		
	VALP- participant		of the airports in the		
	.030 agreed that		OTW view and in head-		
	the HMI		down display (no fix		
	supported		position, but the new		
	their		airports always		
	situational		displayed as the last		
	awareness		one.		
	and				
	decision-		The OTW should		
	making		underline the border of		
	process.		each displayed airport		
	Indra/Avino				
	r: The user				
	interface				
	design did				
	not support				
	a sufficient				
	level of				
	situation				
	awareness				
	regarding				
	the current				
	traffic				
	situation				
	and				
	workload at				
	the MRTMs.				
	The traffic				
	timeline				
	tool did not				
	always				





reflect the
aircraft
movements
that the
ATCOs had
on
frequency
and that
were active
on his
stripboard.
Supervisors
also missed
information
about
vehicles
movements
and runway
closure.
The need
was also
raised to
show traffic
numbers
over
periods of
time and to
get capacity
threshold
alerts to be
able to
anticipate
potential
overloads.





2.1 DLR The majority of
the
participants
confirms by an above
average
SASHA
score which
indicates an
above
average
situation
awareness.
ENAV Situation
awareness
was
maintained
at
acceptable
level by all
the
participatin
g test
subject. Anyway it
was raised a
possible
issue in
relation to
the fix





position of
the airports
in the out of
the window
view and
CWP head
down
display.
While in the
previous
phase of the
project it
was
recommend
ed to keep
fix position
for the
airports to
help the
situation
awareness,
the
collected
feedback
was that the
fix position
had an
opposite
effect
especially
when the
transferred
airport was
a third





airport in
the middle
fix position:
during the
transfer
allocating
the airport
in the
middle
caused a
temporary
disorientati
on of the
ATCOs that
required a
few times to
recap the
exact
position of
the airports.
They would
have
preferred to
receive the
transferred
airport
always
occupying
the last
position in
all the
screen i.e.
on the
bottom of





						the displays for the external view and on the right on the head down CWP displays				
Arg.	W2.PJ	Wro	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	The ATCO should	It is recommended to	Visual	The
1.3.	05.35	ng		W2-35-V3-	W2-35-	RTS: ATCOs	be provided with a	allow a flexible display	Prese	ATCO
1:	_ls.1.3	proc		VALP-H02	V3-VALP-	could	clear indication of	of the airports in the	ntatio	shoul
The	.1-2	edur			H02.040	maintain	which aerodrome	OTW view and in head-	n	d be
pote		es .				their	an incoming radio	down display (no fix	requir	provi
ntial		appl				situational	transmission is	position, but the new	ement	ded
for		ied				awareness	related to.	airports always	s shall	with
hum		to				in spite of the four		displayed as the last	be locally	a
an erro		wro ng				different		one.	refine	visua I
ris		APT.				Norwegian		The OTW should	d to	clear
red		lf an				airports.		underline the border of	suppo	indic
uce		ATC				They		each displayed airport	rt the	ation
d as		0				expressed			deplo	de-
far		conf				the need for			yment	activ
as		uses				an			of the	able
poss		the				indication of			RTC	on
ible.		aero				cardinal			with	ATCO

EUROPEAN PARTNERSHIP





dro	d	directions			flexibl	requ
mes		on the			e	est of
she/		visual			allocat	whic
he		panorama			ion of	h
may		(due not			airpor	aero
prov		being			ts	drom
ide		familiar			betwe	e an
erro		with the			en	inco
neo		airports).			modul	ming
us					es.	radio
cont	1	Indra/Avino				trans
rol		r: ATCOs				missi
acti		could				on is
ons.		maintain an				relat
Safe		adequate				ed to
ty		level of SA				in
impl		despite				order
icati		having to				to
ons.		divide their				quick
		attention to				Iy
	s	several				distin
	а	airports				guish
		with				the
	d	different				aero
		procedures				drom
		and				es
	с	characteristi				and
	с	cs.				ident
		It was only				ify
	i	in the first				wher
		run that				e the
		ATCOs				call is
		experienced				comi
	d	difficulties				

EUROPEAN PARTNERSHIP





identifying	ng
runway	from.
directions	
on the	
different	
aerodromes	
. This was	
due to both	
unfamiliarit	
y with	
aerodromes	
and	
absence of	
overlaid	
information	
aids, such as	
compass	
and/or RWY	
directions,	
on the	
heads-up	
display	
aerodrome	
views.	
views.	
2.1 DLR The	
results	
show that	
the majority	
of	
participants	
could keep	
a mental	
picture of	





the	
different	
aerodromes	
and was	
able to	
divide their	
attention if	
the setting	
was and a second	
changing.	
COOPANS:	
ATCOs	
maintained	
an	
adequate	
level of SA,	
despite	
having to	
divide their	
attention to	
maximum 3	
aerodromes	
at a time	
with	
different	
procedures	
and	
characteristi	
cs. No	
confusion	
about	
aerodromes	





were
detected by
observers or
reported by
the ATCOs.
All
inconsistenc
ies that
affect SA
are more
related to
other
factors than
the
differences
on
procedures
and
characteristi
cs on itself.
ENAV:
Situation
awareness
was always
maintained
at
acceptable
level and
there was
no margin
of
confusion.
Even if it





was a second sec
considered
that the
technical
system/HMI
supported
the ATCOs
in a second seco
performing
their tasks,
the ATCOs
suggested
improveme
nts to the
employed
HMI,
especially in
the position
of the
emergency
button and
the
handover
transfer
that were
located in
the border
of the head-
down
display
while the
ATCOs
would have
preferred





them
integrated
in the strip
bay area.
These
results are
to be
interpreted
as
recommend
ations for
the
simulating
environmen
t rather
than the
concept
itself and
what can be
generalised
for the
concepts is
that before
the
deployment
the HMI of
the
technical
system shall
be locally
assessed
and
designed in
relation to





the specific
operational
environmen
t.
Another
possible
issue was in
relation to
the fix
position of
the airports
in the out of
the window
view and
CWP head
down
display.
While in the
previous
phase of the
project it
was and the second seco
recommend
ed to keep
fix position
for the
airports to
help the
situation
awareness,
the
collected
feedback
was that the





fix position
had an
opposite
effect
especially
when the
transferred
airport was
a third
airport in
the middle
fix position:
during the
transfer
allocating
the airport
in the
middle
caused a
temporary
disorientati
on of the
ATCOs that
required a
few times to
recap the
exact
position of
the airports.
They would
have
preferred to
receive the
transferred
uansierreu





airport always occupying the last position in all the screen i.e. on the bottom of the displays for the external view and on the right on the head down CWP displays. Finally the ATCOs suggested a line marking the airport area of each displayed airport in the OTW	
	The HMI shall support the ATCO to easily distinguish the input/output devices of each aerodrome for vehicles.





OBJ-PJ05- W2-35-V3- VALP-H11 V3-VALP- H11.050	Indra/HC RTS: The system behaviour during split and merge increased the potential for human error by not moving the MET window together with the radar map and EFS bay. However, the issue mentioned in column D did not occur during the simulations.	A harmonised working method for all aerodromes clustered in a multiple remote tower shall be envisaged.	COOPANS: Having same layout on the WACOM screen for e-strips for single, double and triple aerodrome mode.	When a handover is initiated or performed all systems and information that belongs to the same aerodrome shall be transferred in a synchronize d way.	When a hando ver is compl eted and accept ed all syste ms and inform ation that belon gs to the same aerodr ome shall be accept ed in a single action
	did not occur during the				accept ed in a single
	Indra/Avino r: The human machine				When a hando
	interface sometimes				ver is initiat

EUROPEAN PARTNERSHIP





increased	ed or
the difference of the differen	perfor
potential for	med
human	all
error, i.e.,	syste
action error	ms
on flight	and
status	inform
update,	ation
non-	that
detection of	belon
wind	gs to
variation.	the
Wind	same
variation	aerodr
displayed	ome
on the wind	shall
information	be
window was	transf
not found	erred
sufficiently	in a
visible,	synchr
which	onized
contributed	way.
to the non-	
detection of	
significant	
wind	
changes	
that should	
have led the	
ATCO to	
change the	
runway in	





	_
use.	
In addition	
during the	
first run	
that ATCOs	
found	
difficult to	
locate the	
wind	
information	
after taking	
over a new	
aerodrome	
since the	
wind	
information	
window(s)	
did not	
automaticall	
y follow the	
new layout	
and could	
be line line line line line line line lin	
consequentI	
y displayed	
over the	
wrong	
aerodrome	
display slot.	
2.1 DLR For	
EXE-PJ05-	
W2-35-V3-	
2.1.1 again,	





the SATI	
scores show	
that the	
ATCOs trust	
the system	
and the	
interface.	
They see	
the	
increased	
human	
error in the	
changed	
role and	
responsibilit	
ies.	
COOPANS:	
ATCOs	
stated that	
the human	
machine	
interface	
could at	
sometimes	
increase the	
potential for	
human	
error.	
ENAV:	
overall	
perception	
hercehtion	





was that
human
error was
not
increased in
terms of
potential
and severity
respect to
the scenario
without
flexible
allocation
being the
most of the
answers
above the
tolerable
threshold of
4, ATCOs
commented
that there is
the need to
always
properly
balance the
workload in
order to
minimise
the impact
on human
error,
meaning
that the





						team human error potential is acceptable if the workload of the operators is acceptable.			
Arg. 1.3. 1: The pote ntial for hum an erro r is red uce d as far as	W2.PJ 05.35 _ls.1.3 .1-4	ATC Os conf use geo grap hical local deta ils of two airp orts. Pilot s refe	Closed	#N/D	#N/D				





poss	r						
ible.	oft	te					
	nt	0					
	loc	cal					
	ge						
	gra	ар					
	hic	:					
	ро						
	tio	n					
	S,						
	the	er					
	efo	or					
	е						
	the	e					
	AT	C					
	0						
	ne						
	ds						
	to						
	be						
	aw	/a					
	re	of					
	the	e					
	loc	cal					
	ge	0					
	gra	ар					
	gra hic	al					
	de	ta					
	ils						
	for	r					
	all						
	ae						
	dro	D					
	me						





		they are cont rolli ng.							
Arg. 1.3. 1: The pote ntial for hum an erro r is red uce d as far as poss ible.	W2.PJ 05.35 _Is.1.3 .1-5	ATC O mig ht conf use / hav e diffi cult y to find the infor mati on for an a/c as som e infor mati on is displ	Closed	#N/D	#N/D				

EUROPEAN PARTNERSHIP



aye d in а com bine d HMI inte grati ng the diffe rent airp orts or as infor mati on is displ aye d only tem pora rily #N/D W2.PJ #N/D Arg. Conf Closed 05.35 1.3. usio 1: _ls.1.3 n The .1-6 relat pote ed ntial to for phra

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SESAR 2020 SOLUTION 05-35 SPR-INTEROP/OSED V3 - PART IV - HUMAN PERFORMANCE ASSESSMENT REPORT



hum	se	eol					
an	Og	gy					
erro							
r is							
red							
uce							
d as							
far							
as							
poss							
ible.							





Arg.	W2.PJ	ATC	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	The ATCO should	To highlight, in the out		The
1.3.	05.35	0		W2-35-V3-	W2-35-	RTS:	be provided with a	of the window view, the		ATCO
1:	_ls.1.3	mig		VALP-H02	V3-VALP-	Situation	clear indication of	frame related to the		shoul
The	.1-7	ht			H02.010	awareness	which aerodrome	airport where pilots are		d be
pote		conf				was at an	an incoming radio	transmitting.		provi
ntial		use				acceptable	transmission is	_		ded
for		aero				level when	related to.			with
hum		dro				providing				а
an		mes,				ATS to 3				visua
erro		or				aerodromes				1
r is		aero				in parallel				clear
red		dro				according to				indic
uce		mes				the SASHA-				ation
d as		char				Q scores.				de-
far		acte				ATCOs were				activ
as		risti				aware				able
poss		cs,				which				on
ible.		whe				aircraft they				ATCO
		n				were				requ
		swit				communicat				est of
		chin				ing with and				whic
		g				which a/c or				h
		bet				vehicle				aero
		wee				belonged to				drom
		n				which				e an
		diffe				aerodrome.				inco
		rent				However,				ming
		aero				the system				radio
		dro				did not				trans
		mes				support				missi
		and/				situation				on is
		or				awareness				relat
		aero				during the				ed to
		dro				split or				in





	-				a sector a
mes		when the			order
arra		ATCOs			to
nge		wanted to			quick
men	n	flexibly			ly
ts		switch the			distin
with	h	airports			guish
in		within the			the
the		MRTM (for			aero
RTIV	Л	further			drom
		details see			es
		CRT-PJ05-			and
		W2-35-V3-			ident
		VALP-			ify
		H02.030)			wher
					e the
		Indra/Avino			call is
		r: Situation			comi
		awareness			ng
		could not			from.
		always be			
		maintained			
		at a			
		satisfying			
		during the			
		time when			
		the traffic			
		level			
		exceeded			
		the capacity			
		threshold of			
		8			
		simultaneou			
		S			
		movements			





(where VFR	
would count	
as 1,5).	
us 1,5 / .	
2.1 DLR The	
majority of	
participants	
stated an	
above	
average	
situation	
awareness	
in the PR	
assessment	
when	
working	
MRTM with	
a flexible	
allocation.	
COOPANS:	
For majority	
of ATCOs	
situation	
awareness	
is at an	
acceptable	
level when	
working in a	
RTC with a	
flexible	
allocation of	
aerodromes	
between	





MRTMs.	
Nevertheles	
s, the SA	
could be	
decreased	
very quickly	
when	
controlling	
three	
aerodromes	
with this	
traffic	
volume,	
hence the	
source of	
information	
is slightly	
larger, the	
incoming	
calls from	
aircraft and	
vehicles are	
increased,	
traffic could	
become	
more	
complex, so	
that all	
these	
factors	
increase the	
time	
needed for	
scanning of	





all systems
in order to
keep SA
updated.
No
confusions
about
aerodromes
, or
aerodromes
characteristi
cs, when
switching
between
different
aerodromes
and/or
aerodromes
arrangemen
ts within
the RTM
were
detected.
ENAV:
Situation
awareness
was
maintained
at
acceptable
level by the
majority of
ATCOs.





	Majority of ATCOs confirmed there is no confusion about which aerodromes are displayed on which display; anyway, some ATCOs suggested during the debriefing to highlight, in the out of the window view, the frame related to the airport where pilots are transmitting		
--	--	--	--

EUROPEAN PARTNERSHIP





OBJ-PJ05-	CRT-PJ05-	Indra/HC	The HMI shall			When	Pre-
W2-35-V3-	W2-35-	RTS:	support the ATCO		When a	а	sets
VALP-H02	V3-VALP-	Whenever	to easily		handover is	hando	shoul
	H02.030	the ATCO	distinguish the		initiated or	ver is	d be
		received/ga	input/output		performed	compl	defin
		ve away an	devices of each		all systems	eted	ed
		aerodrome	aerodrome for		and	and	for
		due to the	vehicles.		information	accept	the
		split and			that belongs	ed all	aero
		merge (or			to the same	syste	drom
		changed the			aerodrome	ms	e
		setup of the			shall be	and	radar
		MRTM via			transferred	inform	maps
		flexible			in a	ation	in
		allocation),			synchronize	that	order
		there was a			d way.	belon	to
		short period				gs to	supp
		when most				the	ort
		of them lost				same	the
		their				aerodr	ATCO
		situational				ome	to
		awareness.				shall	effici
		lt was				be	ently
		because of				accept	mana
		the way the				ed in a	ge
		head-down				single	flexib
		system				action	le
		behaved:					alloc
		the radar					ation
		maps				When	
		shifted to a				а	
		different				hando	
		place on the				ver is	
		display with				initiat	





a changing	ed or
view. To	perfor
make	med
matters	all
worse, the	syste
MET	ms
displays	and
remained in	inform
the previous	ation
positions.	that
This caused	belon
major	gs to
confusion	the
and	same
temporary	aerodr
loss of SA.	ome
Essentially	shall
the	be
situation	transf
awareness	erred
ATCOs built	in a
for	synchr
themselves	onized
via the	way.
head-down	
display got	
massively	
impacted	
during such	
a change. It	
took some	
time to set	
the air	
situation	





display and
the MET
windows
after the
split/merge.
Indra/Avino
r: The user
interface
generally
supported a
sufficient
level of
situation
awareness.
However
one
difficulty
impacting
SA was both
observed
and
reported:
when
handing
over (i.e.,
splitting),
taking over
(i.e.,
merging) or
swapping
aerodrome(
s) on the
same





position,
the HMI of
the heads-
down
display did
not
automaticall
y reposition
all HMIs
elements in
the correct
place to
follow the
new
aerodrome
display slot
on the
screen.
2.1 DLR For
EXE-PJ05-
W2-35-V3-
2.1.1 this
criterion is
covered
with the
SASHA as
well as CRT-
PJ05-W2-
35-V3-VALP-
H02.010.
The SASHA
looks at the
system and





			the SA and				
			therefore				
			the same				
			results				
			apply here.				
			COOPANS:				
			The user				
			interface				
			design				
			supports a				
			sufficient				
			level of				
			situation				
			awareness.				
			All systems				
			and system				
			functionaliti				
			es were well				
			integrated				
			which				
			contributed				
			to achieve				
			this				
			criterion.				
			ATCOs				
			possibility				
			to self-				
			decide				
			where to				
			allocate				
			taken				
			aerodrome				
			in the				
		1			1		





		MRTM VP			
		was			
		considering			
		as very			
		important			
		feature for			
		the SA. This			
		is especially			
		preferred			
		during			
		realising			
		one of the			
		three			
		aerodromes			
		, which			
		allows			
		ATCOs, the			
		remained			
		two			
		aerodromes			
		to be kept			
		at the same			
		position as			
		prior the			
		transfer			
		occurred.			
		All systems			
		have			
		followed			
		the			
		aerodromes			
		allocation			
		accordingly.			





OBJ-PJ05- W2-35-V3- VALP-H02 CRT-P W2-35-V3- V3-VA H02.0	5- RTS: ATCOs LP- could 40 maintain their situational awareness in spite of the four different Norwegian airports. They expressed the need for	A harmonised working method for all aerodromes clustered in a multiple remote tower shall be envisaged.		Cardinal directions on the visual panorama should be displayed	Visual Prese ntatio n requir ement s shall be locally refine d to suppo rt the deplo yment of the	Cardi nal direc tions on the visua l pano rama shoul d be displ ayed
						,

EUROPEAN PARTNERSHIP





directions	flexibl
on the	e
visual	allocat
panorama.	ion of
	airpor
Indra/Avino	ts
r: same as	betwe
W2.PJ05.35	
	en
_ls.1.3.1-2	modul
	es.
2.1 DLR The	
results	
show that	
the majority	
of	
participants	
could keep	
a mental	
picture of	
the	
different	
aerodromes	
and was	
able to	
divide their	
attention if	
the setting	
was	
changing.	
COOPANS:	
ATCOs	
maintained	
an	





adequate
level of SA,
despite
having to
divide their
attention to
maximum 3
aerodromes
at a time
with
different
procedures
and
characteristi
CS.
All
inconsistenc
ies that
affect SA
are more
related to
other
factors than
the
differences
on
procedures
and
characteristi
cs on itself.
ENAV:
Situation
awareness
awareness





was at acceptable level and no issue about the different airports characteristiImage: CharacteristiceImage: CharacteristiceImage: Characteristice
c was raised





OBJ-PJ05- W2-35-V3- VALP-H11 CRT-PJ05 W2-35-V3- V3-VALP-H11	RTS: frequency push	The ground frequency push buttons shall be integrated in the CWP coherently with the airports positioning in the CWP to be easily distinguishable between airports (e.g. if airports are represented side by side the push buttons shall be respectively located on each side). The ATCO should be provided with a visual clear indication system (de-)activable on ATCO request of which aerodrome an incoming radio transmission is related to in order to quickly distinguish the aerodromes and identify where the call is coming from.	The ATCO AT displays dis shall retain ys the sha predefined ret ATCOS Set- the up when pre receiving a ine new AT aerodrome Set for the wh handover red ng ne for the the composite for the the the composite for the the the the composite for the	CO spla all tain e edef ed COs t-up nen ceivi a w rodr ne re ne re ndo
---	---------------------	--	---	--

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the EFS
layout
changed,
yet the MET
window
remained at
the same
position, so
the layout
had to be
re-arranged
and that
took
valuable
time.
Indra/Avino
r: ATCOs
assessed
that all
required
information
were easy
to access
and
presented
in an
effective
way.
Nevertheles
s, the need
to optimize
the
"timeline"





tool and the
presentatio
n of wind
information
were raised.
The timeline
was not
always
reflecting
the traffic
sequence as
executed by
the real-
time
simulation
environmen
t.
The
indication of
wind
variation
was
considered
as not
standing
out
sufficiently
The display
of wind
information
on the
heads-up
display (in
addition to





	heads-down			
	display)			
	would			
	probably			
	have			
	improved			
	the			
	detection of			
	change in			
	wind			
	direction			
	during the			
	runs.			
	Indra/HC			
	PSM: The			
	frequencies			
	could not be			
	coupled for			
	the passive			
	shadow			
	mode			
	validation,			
	which			
	turned out			
	to be a			
	major			
	inconvenien			
	ce,			
	especially			
	on Day 1			
	where there			
	was a lot of			
	overlap			





between the aerodromes . In line with the findings of the previous wave PI05- 02 02 02 02 02 02 02 02 02 02	
aerodromes . In line with the findings of the previous wave PJ05- 02 02 04 04 A/G frequencies shall be coupled in order to order to order to establish and maintain situational awareness. In addition, squelch indication shall be istuational awareness. In addition, squelch indication shall be istuational awareness. In addition, squelch indication shall be istuational indication shall be istuational indication shall be istuational indication shall be istuational indication shall be istuational indication shall be indication shall be ind	
In line with the findings of the previous wave PJ05- 02 outcome, A/G frequencies shall be coupled in order to order to order to stabilsh and maintain situational awareness. In addition, squelch indication shall be integrated to visualize where the radio transmissio n is coming from, supported by coloured	
h findings of the previous wave PJOS- O2 outcome, A/G frequencies shall be coupled in order to establish and maintain situational awareness. In addition, squetch indication shall be coupled in order to establish and maintain situational awareness. In addition, squetch indication shall be coupled in order to establish and maintain situational awareness. In addition, squetch indication shall be coupled in order to establish and maintain situational awareness. In addition, squetch indication shall be coupled in indication shall be integrated to visualize where the radio from, supported by coloured	aerodromes
of the previous wave PUS- 02 outcome, A/G frequencies shall be coupled in order to coupled in order to establish and maintain situational awareness. In addition, squeich indication shall be integrated to visualize where the radio transmissio transmissio supported by coloured	. In line with
of the previous wave PUS- 02 outcome, A/G frequencies shall be coupled in order to coupled in order to establish and maintain situational awareness. In addition, squeich indication shall be integrated to visualize where the radio transmissio transmissio supported by coloured	the findings
previous wave PJ05- O2 outcome, A/G frequencies shall be coupled in order to establish and maintain situationall awareness. In addition, squelch indication shall be coupled in order to establish add maintain situationall awareness. In addition, squelch indication shall be squelch indication shall be coupled in order to establish add maintain situationall awareness. In addition, squelch indication shall be coupled in order to squelch indication shall be coupled integrated to visualize where the radio transmissio n is coming from, supported by coloured	of the
wave P105- 02 outcome, A/G frequencies shall be coupled in order to establish and maintain situational awareness. In addition, squelch indication shall be integrated to visualize where the radio transmissio n is coming from, supported by coloured	
02 outcome, A/G frequencies shall be coupled in order to establish and maintain situational awareness. In addition, squelch indication shall be integrated to visualize where the radio rt ansmissio n is coming from, supported by coloured	
A/G frequencies shall be coupled in order to establish and maintain situational awareness. In addition, squelch indication shall be integrated to visualize where the radio from, supported by coloured	
A/G frequencies shall be coupled in order to establish and maintain situational awareness. In addition, squelch indication shall be integrated to visualize where the radio transmissio n is coming from, supported by coloured	outcome,
Image: Section of the section of th	
shall be coupled in order to establish and maintain situational awareness. In addition, squelch indication shall be integrated to visualize where the radio to sualize where the radio b soported b y coloured	
<pre>coupled in order to establish and maintain situational awareness. In addition, squelch indication shall be integrated to visualize where the where the radio transmissio n is coming from, supported by coloured</pre>	shall be
Image: Set and	
establish and maintain situational awareness. In addition, squelch indication shall be integrated to visualize where the where the radio from, supported by coloured	order to
and maintain situational awareness. In addition, squelch indication shall be indication shall be integrated to visualize where the radio radio transmissio n is coming from, supported by coloured	
Image: Set of the set of	
situational awareness. In addition, squelch indication shall be integrated to visualize where the radio transmissio n is coming from, supported by coloured	
Image: Set in the set in	
In addition, squelch indication shall be integrated integrated to visualize where the radio radio transmissio n is coming from, supported by coloured by coloured	
squelch indication shall be integrated to visualize where the radio transmissio n is coming from, supported by coloured	
Image: Solution indication shall be integrated to visualize where the radio radio transmissio n is coming from, supported by coloured by coloured	
Image: Set of the set of	
Image: Set of the set of	shall be
Image: Set of the state of	
Image: Section of the section of th	to visualize
Image: Section of the section of th	where the
Image: Section of the section of th	
h is coming from, supported by coloured	
from, supported by coloured	
supported by coloured	from,
by coloured	
frames	by coloured
	frames





around the
visual
panorama
monitors
and the
InNOVA
EFS.
EF3.
2.1 DLR The
SATI shows
that the
ATCOs trust
the system,
which
includes the
that the
ATCOs
trusted the
required
information.
The PE
questionnai
re also
shows that
a majority
of ATCOs
agreed with
the visual
panorama,
radar and
strip
presentatio
n. This is
also





			reflected in			
			the final			
		c	comment.			
			COOPANS:			
			ATCOs state			
			the			
			simulator			
			(S-m)			
			provided			
			useful data			
			in an			
			understand			
		a	able way			
			and that			
			they rarely			
		r	needed to			
			search for			
		1	information.			
		_				
			ENAV: Most of the			
			controllers			
			agreed or somewhat			
			agreed that			
		d +	they had all			
		L .	the required			
		L .	information			
			to complete			
			their tasks.			
		t	LITEIT LASKS.			





		W2-35-V3- VALP-H11	W2-35- V3-VALP- H11.070	RTS: The majority of ATCOs (83.3%) were aware which aerodrome was placed to which positions of the system. Indra/Avino r: ATCOs confirmed that there was generally no confusion about which aerodromes were displayed on which display. It was only during the first run that ATCOs found difficult to locate the		head down displays shall have the same layout for all the possible aerodrome configurations	allow a flexible display of the airports in the OTW view and in head- down display (no fix position, but the new airports always displayed as the last one. The OTW should underline the border of each displayed airport	n h d d y si h t l ss l a f t t l a c c c	hall ave he ayout or all he ossib erodr me onfig ratio	
--	--	-----------------------	-------------------------------	---	--	---	---	--	--	--





information
after taking
over a new
aerodrome
since the
wind
information
window(s)
did not
automaticall
y follow the
new layout
and could
be
consequentl
y displayed
over the
wrong
aerodrome
display slot.
Indra/HC
PSM: ATCOs
were aware
which
aerodromes
were
presented
on which
parts of the
system.
2.1 DLR The
results





show that
the majority
of
participants
was aware
of the
displayed
aerodromes
and radar
configuratio
ns.
COOPANS:
Majority of
ATCOs
confirm that
there was
no los los los los los los los los los lo
confusion
regarding
where a
certain
aerodromes
was going
to be placed
to be placed
in the visual
presentatio
n (VP).
ENAV:
Majority of
ATCOs
confirm
there is no

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confusion
about which
aerodromes
are
displayed
on which
display,
nevertheles
s they
suggested
to remark
the border defined and
of the
aerodromes
in the OTW
and they
suggested
the line line line line line line line lin
aerodromes
have no fix
position in
the OTW
and in the
Head-down
display





OBJ-PJ05-	CRT-PJ05-	Indra/HC:	ATCOs shall be	The HMI of the RTC	COOPANS: Having same	The	The
W2-35-V3-	W2-35-	The system	supported by a	technical system shall be	layout on the WACOM	HMI	RTC
VALP-H11	V3-VALP-	behaviour	squelch indication	locally assessed and	screen for e-strips for	of the	Supe
	H11.050	during split	and coloured	designed in relation to	single, double and triple	RTC	rviso
		and merge	frames in order to	the specific operational	aerodrome mode.	techni	r or
		increased	quickly distinguish	environment, depending		cal	simil
		the	the aerodromes	on the size and type of		syste	ar
		potential for	and identify	the RTC		m	role
		human	where the call is			shall	shoul
		error by not	coming from.			be	d be
		moving the	These features			locally	able
		MET	shall be			assess	to
		window	integrated both			ed	have
		together	into the Visual			and	а
		with the	Panorama and			design	view
		radar map	the head-down			ed in	over
		and EFS	display.			relatio	funct
		bay. This				n to	ional
		has led to	The system			the	MRT
		the event	behaviour shall be			specifi	M´s
		when a MET	user friendly			С	in
		window was	during an			operat	case
		next to a	aerodrome switch			ional	of an
		different	(i.e. between and			enviro	emer
		aerodrome'	within MRTM).			nment	genc
		s EFS bay,				,	y in
		causing	The MET window			depen	order
		confusion.	shall be linked to			ding	to be
		The	the EFS bay i.e. it			on the	able
		handheld	should move			size	to
		mic with its	together with the			and	trans
		two-button	EFS and radar			type	fer
		layout also	map during an			of the	an
		led to				RTC	airpo

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			errors.	aerodrome		r	rt.
				change.			The
			Indra/Avino	Ũ			атсо
			r: same as				shoul
			W2.PJ05.35				d be
			_ls.1.3.1-2				orovi
							ded
			2.1 DLR For			v	with
			EXE-PJ05-			а	a
			W2-35-V3-			v	visua
			2.1.1 again,			1	
			the SATI				clear
			scores show			i	ndic
			that the				ation
			ATCOs trust			d	de-
			the system				activ
			and the			a	able
			interface.				on
			They see				ATCO
			the				requ
			increased				est of
			human				whic
			error in the			h	
			changed				aero
			role and				drom
			responsibilit				e an
			ies.				nco
							ming
			COOPANS:				radio
			ATCOs				trans
			stated that				missi
			the human				on is
			machine				relat
			interface			e	ed to





could at	in
sometimes	order
increase the	to
potential for	quick
human	ly
error.	distin
ATCOs state	guish
that	the
appropriate	aero
identificatio	drom
n means of	es
displayed	and
airport and	ident
airport	ify
characteristi	wher
cs are in	e the
place.	call is
	comi
ENAV: the	ng
overall	from.
perception	
was that	
human	
error was	
not	
increased in	
terms of	
potential	
and severity	
respect to	
the scenario	
without	
flexible	
allocation	





			being the			
			most of the			
			answers			
			above the			
			tolerable			
			threshold of			
			4, anyway in			
			relation to			
			the HMI			
			ATCOs			
			suggested			
			improveme			
			nts in the			
			position of			
			the			
			handover			
			system			
			commands			
			and in the			
			emergency			
			communicat			
			ion			
			commands			





OBJ-PJ05- CRT-	05- Indra/HC: It	
W2-35-V3- W2-		
VALP-H11 V3-V		
H11		
1111	that it was	
	clear which	
	aerodrome	
	was	
	transferred	
	between	
	the MRTMs.	
	The	
	Supervisor	
	made sure	
	that ATCOs	
	were aware	
	which	
	aerodromes	
	will be	
	affected by	
	the split.	
	Indra/Avino	
	r: All ATCOs	
	confirmed	
	that there	
	was no	
	confusion	
	about which	
	aerodrome	
	will be	
	transferred	
	between	
	the MRTMs.	





The
supervisor
role and the
HMI
supported
ATCOS'
awareness
about which
aerodrome(
s) they were
about to
hand over
or take
over. When
taking over
a new
aerodrome,
ATCOs
could setup
the new
aerodrome
in a "view
only" mode
on the
MRTM,
allowing
them to
prepare to
open a new
aerodrome
or receive a
handover.
Indra/HC





PSM: It was	
unanimousl	
y agreed	
that it was	
clear which	
aerodrome	
was	
transferred	
between	
the MRTMs	
2.1 DLR The	
majority of	
the ATCOS	
were aware	
which	
airport will	
be	
transferred	
and under	
which	
conditions.	
COOPANS:	
Majority of	
the ATCOs	
confirm	
they were	
never	
confused	
witch	
aerodromes	
that was	
going to be	





						transferred. ENAV: ATCOs were always aware of which airport was displayed where.					
Arg. 1.3. 2:	W2.PJ 05.35 _ls.1.3	SUP task s	Closed	OBJ-PJ05- W2-35-V3- VALP-H01	CRT-PJ05- W2-35- V3-VALP-	Indra/HC RTS decided not	-Future validation activities shall assess the	ATCOs and SUP tools shall use actual traffic	The HMI of the RTC	The HMI of the	
Task	.2-1	can		VALF-HOI	H01.020	addressed	timeliness of		technical	RTC	
S		not				this	executing tasks		system shall	techni	
can		be				specifically.	for the supervisor		be locally	cal	
be		achi					position.		assessed	syste	
achi		eve				Indra/Avino			and	m	
eve		d in				r: It was not			designed in	shall	
d in		a time				always possible for			relation to	be locally	
a time		time ly				the			the specific operational	locally assess	
ly		man				supervisors			environmen	ed	
man		ner.				to			t,	and	
ner.		Res				satisfactoril			depending	design	
		ultin				y plan the			on the size	ed in	
		g in				allocation of			and type of	relatio	
		oper				aerodromes			the RTC	n to	
		ator				to MRTMs				the	

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stre	and ATCOs.	ATCOs and	specifi
SS	The	SUP tools	c
(wit	limitations	shall use	operat
h	of the traffic	actual	ional
task	timeline	traffic	enviro
S	tool, the		nment
stac	lack of a		,
king	dedicated		depen
up	planning		ding
and	tool and the		on the
requ	incomplete		size
iring	overview on		and
reca	ATCOs		type
11)	availability		of the
lead	(i.e., roster),		RTC
s to	reduced the		
incr	ability of		ATCOs
ease	the		and
d	supervisors		SUP
hum	to plan the		tools
an	allocation of		shall
erro	aerodromes		use
r	and		actual
prob	prioritize		traffic
abili	their tasks.		
ties			
and	2.1 DLR The		
cons	results		
equ	show that		
ence	the SUP on		
s. At	average was		
syst	only		
em	sometimes		
level	able to		





coul d imp act effic ienc y and safe ty		"priories task". Considering the final comments from the ATCOs this was mainly due to the new approach of the SUP workplace. ENAV: Supervisors were always able to prioritise tasks and no issue was raised in relation to the task prioritizatio n	The DTC		The	The
	OBJ-PJ05- CRT-PJ05- W2-35-V3- W2-35- VALP-H12 V3-VALP- H12.050	number of errors made pr in the disp simulation ar was the	The RTC upervisor role should be rovided with a play presenting n overview of e RTC, including g. MRTM status,		The RTC Super visor role shall access functi	The RTC Supe rviso r or simil ar role





			and was	aerodromes		ons	shoul
			due to the	allocated to		for	d be
			unfamiliarit	MRTMs, traffic		comm	able
			y with the	load, etc. to be		unicat	to
				able to transfer			have
			system.			ing	
			There was	an airport.		the	a
			one time			status	view
			when a			of RTC	over
			Supervisor			and	funct
			mistakenly			aerodr	ional
			turned off			omes	MRT
			and			and	M´s
			switched on			coordi	in
			the airports			nating	case
			in one of			maint	of an
			the active			enanc	emer
			MRTMs,			e (to	genc
			when in fact			be	y in
			he wanted			carrie	order
			to open			d out	to be
			MRTM4			by a	able
			(dummy			qualifi	to
			MRTM) in			ed	trans
			the planning			engin	fer
			tool.			eer/te	an
						chnici	airpo
			Indra/Avino			an).	rt.
			r: same as				
			W2.PJ05.35			Super	The
			_ls.1.3.1-1b			visor	RTC
						planni	Supe
			2.1 DLR			ng	rviso
			Even so, the			tool	r role
			system is			HMI	shoul
			5,5101115				Shoul

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			usable			and	d be
			above			ATCO'	provi
			average the			S	ded
			participant			modul	with
			agreed that			e HMI	а
			changes to			shall	displ
			the SUP role			be	ay
			would			locally	prese
			significantly			assess	nting
			contribute			ed	an
			to human			before	overv
			error. The			the	iew
			human			deplo	of
			error could			yment	the
			be			of the	RTC,
			decreased			RTC	inclu
			with			with	ding
			automation			flexibl	e.g.
			in the SUP			е	MRT
			user			allocat	М
			interface.			ion of	statu
						airpor	s,
			ENAV: No			ts	aero
			critical			betwe	drom
			errors were			en	es
			observed			modul	alloc
			during the			es.	ated
			simulation				to
			execution.				MRT
			Anyway,				Ms,
			supervisor				traffi
			planning				с
			tool HMI				load,
			improveme				etc.





			nts were				to be
			suggested				able
			to have the				to trans
			option of				trans fer
			multiple windows				an
			that could				airpo
			reduce the				rt.
			possibility				11.
			of human				
			error by				
			, having all				
			the needed				
			information				
			displayed at				
			the same				
			time.				
				The RTC		The	The
				Supervisor shall		RTC	RTC
				be provided with a		Super	super
				tool combining		visor	visor
				the information		role	role
				(aerodromes'		shall	may be
				status, meteo, forecasted traffic		access functi	be provi
				load and capacity)		ons	ded
				to facilitate		for	with
				decisions		comm	a
				regarding how to		unicat	tool
				combine		ing	comb
				aerodromes in the		the	ining
				MRTM		status	the
						of RTC	infor
						and	mati





					aerodr	on
					omes	(aero
					and	drom
					coordi	es'
					nating	statu
					maint	s,
					enanc	mete
					e (to	о,
					be	forec
					carrie	asted
					d out	traffi
					by a	с
					qualifi	load
					ed	and
					engin	сара
					eer/te	city)
					chnici	to
					an).	facilit
						ate
						decis
						ions
						regar
						ding
						how
						to comb
						ine
						aero
						drom
						es in
						the
						MRT
						M





			The RTC		The	The
			Supervisor should		RTC	RTC
			be provided with		Super	Supe
			the forecasted		visor	rviso
			demand for all		role	r
			involved		shall	shoul
			aerodromes part		access	d be
			of the RTC.		functi	provi
			or the fire.		ons	ded
					for	with
					comm	the
					unicat	forec
						asted
					ing the	
					the	dem
					status	and
					of RTC	for
					and	all
					aerodr	invol
					omes	ved
					and	aero
					coordi	drom
					nating	es
					maint	part
					enanc	of
					e (to	the
					be	RTC.
					carrie	
					d out	
					by a	
					, qualifi	
					ed	
					engin	
					eer/te	





				chnici an).
OBJ-PJ05- W2-35-V3- VALP-H18	CRT-PJ05- W2-35- RTS: The W3-VALP- H18.010 Supported the SUP to identify peak traffic periods and initiate the split and merge process. On the ATCO side however, the HMI's radar map layout and the EFS bay changed to accommoda te the new aerodrome, but the MET window remained ai the same	aerodromes in the MRTM.		The RTC Super visor shall be provid ed with inform ation to facilita te decisi ons regard ing how to combi ne aerodr omes in the MRT M.

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position	
position	
which led to	
confusion.	
The same	
happened	
even if the	
ATCOs just	
wanted to	
switch the	
places	
within the	
MRTM,	
without any	
split.	
Indra/Avino	
r: same as	
W2.PJ05.35	
_ls.1.3.1-1b	
2.1 DLR The	
majority of	
the ATCOs	
agreed that	
the System	
/ HMI	
supported	
the transfer	
of an	
Aerodrome	
and was in	
accordance	
with the	
operating	





					methodolog y. COOPANS: N/A due to deviation ENAV: No issues raised in relation to the team tasks			
1.3. 05.	2.P.J ATC 5.35 O s.1.3 mig -3a ht focu s on task s at one airp ort negl ecti ng prio ritie s at othe r airp ort	Closed	#N/D	#N/D				

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Arg.	SUP	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	-Future validation
1.3.	S		W2-35-V3-	W2-35-	RTS decided	activities shall the
2:	mig		VALP-H01	V3-VALP-	not	SUP's level of
Task	ht			H01.020	addressed	situation
s	focu				this	awareness
can	s on				specifically.	
be	task					
achi	s at				Indra/Avino	
eve	one				r: same as	
d in	airp				W2.PJ05.35	
a	ort				_ls.1.3.2-1	
time	negl					
ly	ecti				2.1 DLR The	
man	ng				results	
ner.	prio				show that	
	ritie				the SUP on	
	s at				average was	
	othe				only	
	r				sometimes	
	airp				able to	
	ort				"priories	
					task".	
					Considering	
					the final	
					comments	
					from the	
					ATCOs this	
					was mainly	
					due to the	
					new	
					approach of	
					the SUP	
					workplace.	





ENAV:
Situation
awareness
was always
at
acceptable
level and no
issues were
raised in
relation to
the
possibility
to the task
prioritizatio
n line line line line line line line lin





OBJ-PJ05-	CRT-PJ05-	Indra/HC	The RTC	 ENAV: Out of the	Super	The
W2-35-V3-	W2-35-	RTS: The	Supervisor role	window view	visor	RTC
VALP-H12	V3-VALP-	number of	should be	requirements shall be	planni	Supe
	H12.050	errors made	provided with a	refined finally to	ng	rviso
		in the	display presenting	support the	tool	r or
		simulation	an overview of	deployment of the RTC	HMI	simil
		was	the RTC, including	with flexible allocation	and	ar
		negligible	e.g. MRTM status,	of airports between	ATCO'	role
		and was	aerodromes	modules.	S	shoul
		due to the	allocated to		modul	d be
		unfamiliarit	MRTMs, traffic		e HMI	able
		y with the	load, etc. to be		shall	to
		system. The	able to transfer		be	have
		issue	an airport.		locally	а
		mentioned			assess	view
		in Column D			ed	over
		did not			before	funct
		come up			the	ional
		during the			deplo	MRT
		simulation.			yment	M´s
					of the	in
		Indra/Avino			RTC	case
		r: same as			with	of an
		W2.PJ05.35			flexibl	emer
		_ls.1.3.1-1b			e	genc
					allocat	y in
		2.1 DLR:			ion of	order
		same as			airpor	to be
		W2.PJ05.35			ts	able
		_ls.1.3.1-1b			betwe	to
					en	trans
					modul	fer
		ENAV: No			es.	an
		critical				airpo





			errors were			rt.
			observed			
			during the			The
			simulation			RTC
			execution.			Supe
			Anyway,			rviso
			supervisor			r role
			planning			shoul
			tool HMI			d be
			improveme			provi
			nts were			ded
			suggested			with
			to have the			а
			option of			displ
			multiple			ay .
			windows			, prese
			that could			nting
			reduce the			an
			possibility			overv
			of human			iew
			error by			of
			, having all			the
			the needed			RTC,
			information			inclu
			displayed at			ding
			the same			e.g.
			time. No			MRT
			issues were			М
			raised in the			statu
			support to			S,
			the task			aero
			prioritizatio			drom
			n in relation			es
			with the			alloc
			with the			anoc

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			potential for human error			ated to MRT Ms, traffi c load, etc. to be able to trans fer an airpo rt.





		The RTC		The
		Supervisor shall		RTC
		be provided with a		super
		tool combining		visor
		the information		role
		(aerodromes'		may
		status, meteo,		be
		forecasted traffic		provi
		load and capacity)		ded
		to facilitate		with
		decisions		а
		regarding how to		tool
		combine		comb
		aerodromes in the		ining
		MRTM		the
				infor
				mati
				on
				(aero
				drom
				es'
				statu
				s,
				mete
				0,
				forec
				asted
				traffi
				C
				load
				and
				capa
				city)
				to





					facilit ate decis ions regar ding how to comb ine aero drom es in the MRT M
			The RTC Supervisor should be provided with the forecasted demand for all involved aerodromes part of the RTC.		The RTC Supe rviso r shoul d be provi ded with the forec asted dem and for

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								all invol ved aero drom es part of the RTC.
		OBJ-PJ05- W2-35-V3- VALP-H18	CRT-PJ05- W2-35- V3-VALP- H18.010	Indra/HC RTS: The issue mentioned in column D did not come up in	The RTC Supervisor shall be provided with information to facilitate decisions regarding how to		The RTC Super visor shall be provid	
				the simulations. Indra/Avino r: same as	combine aerodromes in the MRTM.		ed with inform ation to	
				W2.PJ05.35 _Is.1.3.1-1b 2.1 DLR: same as			facilita te decisi ons regard	
				W2.PJ05.35 _ls.1.3.1-1b COOPANS:			ing how to combi	
				N/A due to deviation			ne aerodr omes	





						ENAV: No issues raised in relation to the team situation awareness.			in the MRT M.	
Arg. 1.3. 2: Tasl s can be ach eve d in a time ly mar ner.	2	Han dov er can not be achi eve d in a time ly man ner, for exa mpl e in case of an eme rgen cy situ atio n at	Closed	OBJ-PJ05- W2-35-V3- VALP-H02	CRT-PJ05- W2-35- V3-VALP- H02.020	Indra/HC RTS: ATCOs were able to prioritise tasks. According to their feedback, they were ahead of traffic and could organise their work as they wanted. Giving away their other aerodrome was generally not their top priority during an emergency, although there were	Future validation activities shall assess the timeliness of executing tasks for the supervisor position.	ENAV: In case of contingency and in case of emergency it is suggested to delegate to the supervisors all the tasks that can be reduced for the remote tower module ATCO, like coordination tasks with external authorities in case of emergency etc		In case of conti ngen cy and in case of emer genc y part of ATCO s task may be deleg ated to The RTC super visor to

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one	some	redu
aero	exceptions.	ce
dro	Regardless	the
me	of the	workl
requ	timings, the	oad
iring	aerodrome	for
to	with	the
han	emergency	remo
dov	aircraft	te
er	always	towe
the	stayed with	r
othe	them and	mod
r	the other(s)	ule
aero	were split.	ATCO
dro		
me(Indra/Avino	Timin
s) to	r: ATCOs	g of
anot	could not	the
her	always	hand
RTM	prioritize	over
	their tasks	proc
	when the	edur
	traffic level	е
	was too	shoul
	high.	d be
		coor
	2.1 DLR The	dinat
	participants	ed
	average	betw
	answer is 3,	een
	indicating	SUP
	that	and
	participants	ATCO
	had	s as

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difficulties				it's
prioritizing			A	ATCO
task. 22			r	resp
Times out of				onsib
60				ility
participants			t	to
answered				mana
with a 0, 1,				ge
or 2, which				the
shows that				hand
there is still				over
				over
place for				
improveme				
nt. This is				
supported				
by the				
comments.				
ENAV:				
Perceived				
situational				
awareness				
was above				
the				
tolerable				
threshold				
during all				
the				
scenarios,				
including				
the				
the				
simulated				
emergency				
scenarios				





and failure
scenarios
for all the
participatin
g ATCOs,
also ability
to prioritise
task was at
acceptable
level during
all the
simulated
scenarios(n
ominal,
emergency and failure).
In case of
contingency
and in case
of
emergency
it was found
useful to
delegate to
the
supervisors
all the tasks
that can be
reduced for
the remote
tower
module
ATCO, like
coordinatio





	n tasks with external authorities in case of emergency etc.				
W2-35-V3- W2 VALP-H18 V3-	RT-PJ05-Indra/HC2-35-RTS: ATCOs3-VALP-could18.010efficiently manage the emergency situation. Although handing over their "other" aerodrome was generally not their top priority during an emergency, they managed to do it a timely 	Supervisor operating methods for frequently occurring abnormal conditions and emergency situations shall be defined.	COOPANS: Having same layout on the WACOM screen for e-strips for single, double and triple aerodrome mode. ENAV: Emergency button HMI in the ATCO module CWP shall be reviewed for the deployment of the RTC with flexible allocation of airports between modules.	v o ir n d fr n o ir a n c c ic a e s i c s b b	uper isor perat ng netho s for reque tly ccurr ng bnor nal ondit ons nd merg ncy ituati ns hall e efine





	Regardless			
	of the			
	timings, the			
	aerodrome			
	with			
	emergency			
	aircraft			
	always			
	stayed with			
	them and			
	the other(s)			
	were split.			
	Indra/Avino			
	r: same as			
	W2.PJ05.35			
	_ls.1.3.1-1b			
	_15.1.3.1-10			
	2.1 DLR The			
	majority of			
	the ATCOs			
	agreed that			
	the System			
	/ HMI			
	supported			
	the transfer			
	of an			
	Aerodrome			
	and was in			
	accordance			
	with the			
	operating			
	operating			
	methodolog			
	у.			

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	"It fully			
	supports			
	ATCOs and			
	SUP, but			
	there is still			
	place to			
	make it			
	better and			
	increase the			
	reliability."			
	0005416			
	COOPANS:			
	Technical			
	System/HM			
	supported			
	the ATCOs			
	by being			
	accurate,			
	useful for			
	task			
	execution			
	and well			
	integrated.			
	This is not			
	seen as a			
	problem for			
	handovers			
	in degraded			
	mode			
	(emergency			
	not tested)			
	ENAV: the			
	overall			
	Overall			





answers for the support provided by the ATCO system/HMI is positive, but the difference between the threshold and the mean values is not so distant as the other analysed indicators. This is to be seen mainly in relation to to the employed HMI as all the test subjects suggested improveme ths, especially in the position of the			 			
the support provided by the ATCO system/HMI is positive, but the difference between the the thes threshold and the mean values is not so distant as the other analysed indicators. This is to be seen mainly in relation to the employed HMI as all the test suggested improveme from the position to the employed HMI as all the test suggested improveme from the position the pos			trend of the			
provided by the ATCO system/HMI is positive, but the difference between the threshold and the mean values is not so distant as the other analysed indicators. This is to be seen mainly in relation to the employed HMI as all the test subjects suggested improveme the position of the			answers for			
provided by the ATCO system/HMI is positive, but the difference between the threshold and the mean values is not so distant as the other analysed indicators. This is to be seen mainly in relation to the employed HMI as all the test subjects suggested improveme the position of the			the support			
the ATCO system/HMI is positive, but the difference between the threshold and the mean values is not so distant as the other analysed indicators. This is to be seen mainly in relation to the employed HMI as all the test subjects suggested improveme nts, especially in the position of the			provided by			
system/HMI is positive, but the difference between the threshold and the mean values is not so distant as the other analysed indicators. This is to be seen mainly in relation to the employed HMI as all the test suggested improveme improveme ints, especially in the position of the			the ATCO			
is positive, but the difference between the threshold and the mean values is not so distant as the other analysed indicators. This is to be seen mainly in relation to the employed HMI as all the test suggested improveme mts, especially in the position of the						
but the difference between the threshold and the mean values is not so distant as the other analysed indicators. This is to be seen mainly in relation to the employed HMI as all the test subjects suggested improveme nts, especially in the postion of the			is positive,			
difference between the threshold and the mean values is not so distant as the other analysed indicators. This is to be seen mainly in relation to the employed HMI as all the test subjects suggested improveme nts, especially in the position of the						
between the the theshold and the mean values is not so distant as the other analysed indicators. This is to be seen mainly in relation to the employed HMI as all the test subjects suggested improvem nts, especially in the position of the						
the						
threshold and the mean values is not so distant as the other analysed indicators. This is to be seen mainly in relation to the employed HMI as all the test subjects suggested improveme nts, especially in the position of the						
and the mean values is not so distant as the other analysed indicators. This is to be seen mainly in relation to the employed HMI as all the test subjects suggested improveme nts, especially in the position of the position of the position of the position to the position the position to the position the position the position to the p						
Image: Second						
values is not so distant as the other analysed indicators. This is to be seen mainly in relation to the employed HMI as all the test subjects suggested improveme nts, especially in the position of the						
so distant as the other analysed indicators. This is to be seen mainly in relation to the employed HMI as all the test subjects suggested improveme nts, especially in the position of the						
the other analysed indicators. This is to be seen mainly in relation to the employed HMI as all the test subjects suggested improveme nts, especially in the position of the						
Image: State of the state						
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Image: See in the set is the subjects Image: See in the set is the set is the subject is the subject is subj			, indicators.			
seen mainly in relation to the employed HMI as all the test subjects suggested improveme nts, especially in the position of the						
in relation to the employed HMI as all the test subjects suggested improveme nts, especially in the position of the						
Image: State of the state			in relation			
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Image: Section of the section of th			HMI as all			
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Image: Suggested improveme ints, especially in the position of the Image: Suggested improveme ints, especially in the position of the						
Improveme nts, especially in the position of the						
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especially in the position of the						
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			emergency			





button and the handover transfer transfer transfer that were located in the border of the head-down display while the border of the head-down display area.	 			 	 	
handover transfer that were located in the border of the head- down display while the ATCOs would have preferred them integrated in the strip bay area. No issues were raised from supervisor. The RTC Supervisor role should be proview of all systems e.g. the systems e.g. the more supervisor of the system s.g. the sy		butto	n and			
Image: set in the set in the set in the border of the head-down display while the ATCOS would have preferred them integrated in the strip bay area. No issues were raised from supervisor. Image: set in the set in the set in the set in the strip bay area. No issues were raised from supervisor. Image: set in the se		the				
Image: second		hand	over			
Image: selection of the bad- down display while the ATCOS would have preferred them integrated in the strip bay area. No issues were raised form supervisors. Image: selection of the bad- down display while the ATCOS would have preferred them integrated in the strip bay area. No issues were raised form supervisor. Image: selection of the bad- down display while the selection of the bad- down display while the the attrip bay area. Image: selection of the bad- down display while the selection of the bad- down display while the selection of the bad- down display supervisor. Image: selection of the bad- down display supervisor of the should be provided with a technical overview of all systems e.g. the MRTM, camera Image: selection of the should be should be provided with a technical overview of all systems e.g. the should be provided with a technical overview of all systems e.g. the should be should be shoul Image: selection of the should be should be shoul		trans	fer			
Image: second						
Image: search of the border of the head-down display while the ATCOs would have preferred in the strip bay area. No issues were raised from supervisors. Image: search of the head-down display while the ATCOs would have preferred in the strip bay area. No issues were raised from supervisors. Image: search of the head-down display while the ATCOs would have preferred in the strip bay area. No issues were raised from supervisors. Image: search of the head-down display while the ATCOs would have preferred in the strip bay area. No issues were raised from supervisors. Image: search of the head-down display while the ATCOs would have preferred in the strip bay area. No issues were raised from supervisors. Image: search of the head-down display while the ATCOs would have preferred in the strip bay area. No issues were raised from supervisors. Image: search of the head-down display while the ATCOs would have preferred in the strip bay area. No issues were raised from supervisors. Image: search of the head-down display while the ATCOs were were and the ATCOS were						
Image: set in the set in						
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Image: Provide the strip by area. No issues were raised from supervisors. The RTC Supervisor supervisors. The RTC Supervisor role should be provided with a technical overview of all systems e.g. the MRTM, camera Supervisor all systems e.g. the MRTM, camera						
A P P P P P P P P P P P P P P P P P P P						
Image: set in the strip bay area. No issues were raised from supervisors. The RTC Supervisor role should be provided with a technical overview of all systems e.g. the MRTM, camera The RTC Supervisor role should be provi Supervisor role should be provi MRTM, camera Systems e.g. the MRTM, camera						
Image: Provide the state of the state o						
Image: series in the strip bay area. No issues were raised from supervisors. Image: series image						
Image: Problem in the strip bay area. No issues were raised from supervisors. The RTC Image: Problem in the strip bay area. No issues were raised from supervisors. The RTC Image: Problem in the strip bay area. No issues were raised from supervisor. The RTC Image: Problem in the strip bay area. No issues were raised from supervisors. The RTC Image: Problem in the strip bay area. No issues were raised from supervisor role should be provided with a technical overview of all systems e.g. the MRTM, camera Image: Problem in the strip bay area. No issues were raised from supervisor role should be provided with a technical overview of all systems e.g. the MRTM, camera Image: Problem in the strip bay area. No issues were raised from supervisor role should be proview of all systems e.g. the MRTM, camera						
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Image: Sector of the sector of th						
Image: Sector of all systems e.g. the model Image: Sector of all systems e.g.						
d be MRTM, camera						
MRTM, camera provi						
MRTM, camera provi			systems e.g. the			d be
			MRTM, camera			provi
			functionality etc.			ded
in the RTC and of with			in the RTC and of			with
a the aerodrome						
systems e.g. tech						

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			navigational aids,		nical
			lights, emergency		overv
			alerting functions,		iew
			for all involved		of all
			aerodromes part		syste
			of the RTC		ms
					e.g.
					the
					MRT
					М,
					came
					ra
					funct
					ionali
					ty
					etc.
					in
					the
					RTC
					and
					of
					the
					aero
					drom
					е
					syste
					ms
					e.g.
					navig
					ation
					al
					aids,
					lights
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SESAR 2020 SOLUTION 05-35 SPR-INTEROP/OSED V3 - PART IV - HUMAN PERFORMANCE ASSESSMENT REPORT



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						genc
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						, alerti
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						all
						invol
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						aero
						drom
						es
						part
						of
						the
						RTC
			In case of high			
			workload			
			situations, such as			
			an emergency			
			situation, at one			
			of the airports			
			of the airports -			
			significantly			
			increasing the			
			ATCO/AFISO			
			workload and			
			affecting her/his			
			capability to			
			continue to			
			provide ATS to all			
			airports under			
			responsibility -			
			responsibility -			

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the ATCO may perform one of the following actions in order to be able to manage the high workload situation: • Temporarily stopping/delaying traffic at the other/all airport(s); • Transferring the provisioning of ATS for the airport(s) not airport(s) not airport(s) not to another MRTM; • Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Support the controller to	
the following actions in order to be able to manage the high workload situation: • Temporarily stopping/delaying traffic at the other/all airport(s); • Transferring the provisioning of ATS for the airport(s) not affected by the unexpected event unexpected event to another MRTM; • Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Supervisor may support the	the ATCO may
actions in order to be able to manage the high workload situation: • Temporarily stopping/delaying traffic at the other/all airport(s); • Transferring the provisioning of ATS for the airport(s) not affected by the unexpected event to another ATCO to be able to continue the service provision for all aerodromes from the experts may support the	perform one of
actions in order to be able to workload situation: • Temporarily stopping/delaying traffic at the other/all airport(s); • Transferring the provisioning of ATS for the airport(s) not affected by the unexpected event to another ATCO to be bable to continue the service provision for all aerodroms from the extreme the Support the	the following
manage the high workload situation: • Temporarily stopping/delaying traffic at the other/all airport(s); • Transferring the provisioning of ATS for the airport(s) not affected by the unexpected event to another MRTM, • Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Supervisor may support the	actions in order to
workload situation: • Temporarily stopping/delaying traffic at the other/all airport(s); • Transferring the provisioning of ATS for the airport(s) not affected by the unexpected event to another MRTM; • Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the sixting RTM. Note: The RTC Supervisor may support the	be able to
workload situation: • Temporarily stopping/delaying traffic at the other/all airport(s); • Transferring the provisioning of ATS for the airport(s) not affected by the unexpected event to another MRTM; • Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the sixting RTM. Note: The RTC Supervisor may support the	manage the high
 Temporarily stopping/televing traffic at the other/all airport(s) Transferring the provisioning of ATS for the airport(s) not affected by the unexpected event to another MRTM; Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Supervisor may 	
 Temporarily stopping/televing traffic at the other/all airport(s) Transferring the provisioning of ATS for the airport(s) not affected by the unexpected event to another MRTM; Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Supervisor may 	situation:
stopping/delaying traffic at the other/all airport(s): • Transferring the provisioning of ATS for the airport(s) not affected by the unexpected event to another MRTM; • Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Support of may another ATCO	Temporarily
trafic at the other/all airport(5); • Transferring the provisioning of ATS for the airport(5) not affected by the unexpected event to another MRTM; • Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Support of ausympt the	
<pre>airport(s); • Transferring the provisioning of ATS for the airport(s) not affected by the unexpected event to another MRTM; • Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Suppervisor may support the</pre>	
<pre>airport(s); • Transferring the provisioning of ATS for the airport(s) not affected by the unexpected event to another MRTM; • Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Suppervisor may support the</pre>	other/all
 Transferring the provisioning of ATS for the airport(s) not affected by the unexpected event to another MRTM; Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Supervisor may support the 	
ATS for the airport(s) not affected by the unexpected event to another MRTM; • Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Supervisor may support the	
ATS for the airport(s) not affected by the unexpected event to another MRTM; • Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Supervisor may support the	
<pre>airport(s) not affected by the unexpected event to another MRTM; • Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Supervisor may support the</pre>	ATS for the
A Second	
<pre> A set of the set of the</pre>	
Image: Section of Sectio	
• Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Support the	
• Requesting the support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Supervisor may support the	MRTM;
Image: Support of another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Image: Support of aerodromes from the existing RTM. Note: The RTC Support the Support the	
another ATCO to be able to continue the service provision for all aerodromes from the existing RTM. Note: The RTC Supervisor may support the	
Image: Service provision Service provision for all aerodromes from the existing RTM. Note: The RTC Supervisor may Supervisor may support the Support the	
Image: Service provision for all aerodromes from the existing RTM. Note: The RTC Supervisor may support the	be able to
Image: Constraint of the second of the se	continue the
Image: Constraint of the second of the se	service provision
the existing RTM. Note: The RTC Supervisor may support the	
Note: The RTC Supervisor may support the Support the	aerodromes from
Note: The RTC Supervisor may support the Support the	the existing RTM.
Supervisor may support the	
support the	
	controller to





	apply these procedures.		
OBJ-PJ05- W2-35-V3- VALP-H11 V2-35- V3-VALP- H11.020	Indra/HCThe ATCO shall be provided with a system enabling ATCOsATCOsto transfer one of to transfer one of (66.6%)agree with aerodromesaerodromesagree with aerodromesaerodromesthe InNOVA being user- friendly.another MRTMbeing user- friendly.functionality to perform the split and merge was highly appreciated 	training sessi focus on the f To Talk)	on with PTT (Push gency ransfer IMI in the e CWP ewed for ent of the ible airports

EUROPEAN PARTNERSHIP





period.	
Indra/Avino	
r: ATCOs	
confirm the	
usability of	
input	
devices and	
HMI	
controls.	
Nevertheles	
s, the need	
to optimize	
the HMI	
workflow of	
the	
electronic	
flight strips	
was raised	
strips	
because it	
often	
resulted in	
too many	
unnecessary	
clicks.	
2.1 DLR The	
majority of	
nationate	
participants	
agrees that	
the strip	
and	
planning	





tool was	
usable. This	
also applies	
for the SUS	
questionnai	
re score,	
which is	
above the	
medium	
scale value.	
This is also	
reflected in	
the final	
comment.	
COOPANS:	
Majority of	
ATCOs	
confirm the	
usability of	
input	
devices and	
HMI	
controls.	
This is not	
seen as a problem for	
handovers in degraded	
in degraded	
mode	
(emergency	
not tested)	
ENAV: the	





overall	
trend of the	
answers for	
the support	
provided by	
the ATCO	
system/HMI	
is positive,	
but the	
difference	
between	
the	
threshold	
and the	
mean	
values is not	
so distant as	
the other	
analysed	
indicators.	
This is to be	
seen mainly	
in relation	
to the	
employed	
HMI as all	
the test	
subjects	
suggested	
improveme	
nts,	
especially in	
the position	
of the	





						emergency button and the handover transfer that were located in the border of the head- down display while the ATCOs would have			
Arg. 1.3. 3: The leve l of	W2.PJ 05.35 _Is.1.3 .3-1	Exce edin g wor kloa d	Closed	#N/D	#N/D	of the head- down display while the ATCOs			Hand over proc edur e shoul
wor kloa d (ind uce		(incr ease d num ber							d be initia ted in lowe





	6				
d by	of				r
cog	aero				traffi
nitiv	dro				с
е	mes				perio
and	to				d to
/or	be				not
phy	cont				affec
sical	rolle				t
task	d)				ATCO
dem	mig				s
and	ht				workl
s) is	lead				oad
acce	to				and
ptab	erro				situa
le.	rs				tiona
					I I
					awar
					enes
					s in
					nomi
					nal
					condi
					tions





Arg.	W2.PJ	Sim	Closed	#N/D	#N/D		ultaneous	The ATCO should be		Hand
1.3.	05.35	ulta				control	of 3	supported in prioritising		over
3:	_ls.1.3	neo				aerodro	mes shall	tasks (e.g. providing		proc
The	.3-2	us				ensure t	he	landing clearance or		edur
leve		activ				availabil	ity of a	taxi clearance) from a		e
l of		ities				spare co		support tool in the		shoul
wor		at					sistant, in	tactical short term		d be
kloa		diffe				case del				initia
d		rent				traffic o				ted
(ind		aero				termina				in
uce		dro				service i	s not			lowe
d by		mes				locally				r
cog		may				accepta	ble.			traffi
nitiv		over								С
е		load								perio
and		the								d to
/or		ATC								not
phy		0								affec
sical		incr								t
task		easi								ATCO
dem		ng								S
and		thus								workl
s) is		the								oad
acce		pote								and
ptab		ntial								situa
le.		for								tiona
		hum								I
		an								awar
		erro								enes
		rs.								s in
										nomi
										nal
										condi
										tions





							The airport name shall be integrated in the phraseology in order to increase the situational awareness for the ATCOs and pilots.				The airpo rt nam e shoul d be integ rated in the phras eolog y in order to incre ase the situa tiona I
Arg. 1.3. 3: The leve l of wor kloa d (ind uce d by	W2.PJ 05.35 _Ben. 1.3.3- 4	Pote ntial ben efit of dyn amic alloc atio n on the man	Closed	OBJ-PJ05- W2-35-V3- VALP-H04	CRT-PJ05- W2-35- V3-VALP- H04.010	HC/Indra RTS: According to the results ATCOs workload was always at acceptable level. Although	Future validation activities shall assess the timeliness of executing tasks for the supervisor position.	Fatigue tends to accumulate toward the end of the shift and shall be locally assessed before the deployment to establish proper shift length		Fatigu e tends to accum ulate towar d the end of the shift and	

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cog	age		the			shall
nitiv	men		workload			be
е	t of		increased			locally
and	ATC		certain			assess
/or	O's		times,			ed
phy	wor		especially			before
sical	kloa		during the			the
task	d		split and			deplo
dem			merge			yment
and			process, it			to
s) is			only lasted			establi
acce			for a couple			sh
ptab			of minutes.			prope
le.			ATCOs			r shift
10.			preferred to			length
			work in a			length
			2:2			
			aerodrome			
			distribution.			
			distribution.			
			Avinor/Indr			
			a: The			
			workload			
			level was			
			always			
			assessed as			
			tolerable by			
			ATCOs but			
			was not			
			always			
			satisfactory,			
			sometimes			
			resulting in			
			reduced			





spare spare
capacity.
This was the
case when
the traffic
level
exceeded
the capacity
threshold of
8
simultaneou
S
movements
(where VFR
would count
as 1,5).
2.1 DLR
Overall
workload
remained at
a a a a a a a a a a a a a a a a a a a
satisfactory
or tolerable
level. Only
in a second se
approximat
ely 20% of
the line line line line line line line lin
scenarios
ATCOs
reported
high or
above high





workload	
for the	
Bedford	
Scale.	
NASA-TLX	
answers	
show the	
same effect	
for the	
average	
NASA-TLX	
score below	
50. This	
might be	
mitigated	
with more	
time for the	
allocation	
process, as	
stated by	
the final discussion of the fi	
comment.	
COOPANS:	
Majority of	
ATCOs	
assess	
workload at	
tolerable	
level for the	
task.	
Nevertheles	
s, the	
workload	





could
rapidly
increase
from
acceptable
to non-
acceptable
level. In
situations
with
increased
workload
caused by
various
factors,
such as:
high traffic
volume,
high traffic
complexity,
complexity
caused by
combining
aerodromes
with
complex
layouts, etc.
transfer of
the
aerodromes
between
the MRTMs
can help
workload to





					be balanced/re duced.				
1.3. (3:	W2.PJ 05.35 _Is.1.3 .3- Final- WS_1	Fati gue tend s to accu mul ate tow ard the end of the shift and mig ht not be prop erly asse ssed	Open			-	Fatigue tends to accumulate toward the end of the shift and shall be locally assessed before the deployment to establish proper shift length		Fatigu e tends to accum ulate towar d the end of the shift and shall be locally assess ed before the deplo yment to establi





acce ptab le.		in V3					sh prope r shift length	
Arg. 1.3. 3: The	W2.PJ 05.35 _ls.1.3 .3-	Coor dina tion wor	Open		-			
leve l of wor	Final- WS_2	kloa d espe						
kloa d		ciall y for						
(ind uce d by		VFR ight be						
cog nitiv e		sim plifi ed						
and /or		in V3						
phy sical task		and mig ht						
dem and s) is		nee d furt						

EUROPEAN PARTNERSHIP





acce ptab le.		her asse ssm ent in next phas es								
Arg. 1.3. 3: The leve l of wor kloa d (ind uce d by cog nitiv e and /or phy sical task dem and s) is	W2.PJ 05.35 _ls.1.3 .3-3	Pote ntial incr ease in ATC O wor kloa d due to freq uent han dov er of aero dro mes bet wee n	Closed	OBJ-PJ05- W2-35-V3- VALP-H04	CRT-PJ05- W2-35- V3-VALP- H04.010	HC/Indra RTS: According to the results ATCOs workload was always at acceptable level. Although the workload increased certain times, especially during the split and merge process, it only lasted	Future validation activities shall assess the timeliness of executing tasks for the supervisor position.			





acce	MF	RT	for a couple			
ptab	Ms	5	of minutes.			
le.			ATCOs			
			preferred to			
			work in a			
			2:2			
			aerodrome			
			distribution.			
			Avinor/Indr			
			a: same as			
			W2.PJ05.35			
			_Ben.1.3.3- 4			
			4			
			2.1 DLR			
			Overall			
			workload			
			remained at			
			а			
			satisfactory			
			or tolerable			
			level. Only			
			in			
			approximat			
			ely 20% of			
			the			
			scenarios			
			ATCOs			
			reported			
			high or			
			above high			
			workload			
			for the			





		lford		
	Sca	le.		
		SA-TLX		
	an	wers		
		w the		
		ne effect		
	for	the		
		rage		
	NA	SA-TLX		
		re below		
		This		
		ht be		
	mi	igated		
		n more		
		e for the		
		cation		
		cess, as		
		ed by		
	the	final		
		nment.		
	СС	OPANS:		
		ransfer		
		otal have		
	be			
		ated		
		realised		
		ing all 24		
	rui	s. The		
		COs did		
		indicate		
		egative		
		act on		
	we	rkload		
I	WC			





due to
handover of
aerodromes
between
MRTMs.
Transfer of
the
aerodromes
were
initiating
and
realising in
order to
balance the
workload
between
the MRTMs.
Not only
increased
workload,
but also
boredom
was a cause
transfer to
be initiated
and
realised.
No frequent
handovers
were
envisaged
Or performed
performed,
instead they





						were				
						planned and				
						initiated by				
						ATCOs, in				
						order				
						workload to				
						be				
						balanced/re				
						duced.				
						ENAV: The				
						workload				
						was always				
						maintained				
						at				
						acceptable				
						level and no				
						issues were				
						raised about				
						the				
						frequency				
						of the				
						handover				
Arg.		Pote	Closed	OBJ-PJ05-	CRT-PJ05-	HC/Indra	-Future validation		The ATCO	The
1.3.	05.35	ntial		W2-35-V3-	W2-35-	RTS:	activities shall		should be	ATCO
3:	_ls.1.3	incr		VALP-H04	V3-VALP-	According	assess the		supported	shoul
The	.3-3	ease			H04.010	to the	timeliness of		in	d be
leve		in				results	executing tasks		prioritising	supp
l of		ATC				ATCOs	for the supervisor		tasks (e.g.	orted
wor		0				workload	position.		providing	in
kloa		wor				was always			landing	priori
d		kloa				at			clearance or	tising
(ind		d				acceptable			taxi	tasks
uce		due				level.			clearance)	(e.g.





م ام	te	Although		and forecast	provi
d by	to	Although		and forecast	provi
cog	the	the		the traffic	ding
nitiv	resp	workload		demand	landi
е	onsi	increased		from a	ng
and	bilit	certain		support tool	clear
/or	y of	times,		in the	ance
phy	too	especially		tactical	or
sical	man	during the		short term.	taxi
task	У	split and			clear
dem	sim	merge			ance)
and	ulta	process, it			and
s) is	neo	only lasted			forec
acce	us	for a couple			ast
ptab	aero	of minutes.			the
le.	dro	ATCOs			traffi
	mes	preferred to			с
	to	work in a			dem
	be	2:2			and
	cont	aerodrome			from
	rolle	distribution.			а
	d	The traffic			supp
		level was			ort
		therefore			tool
		not high,			in
		and there			the
		were not			tactic
		too many			al
		simultaneou			short
		S			term.
		movements.			
		Avinor/Indr			
		a: same as			
		W2.PJ05.35			
		VV2.1 JUJ.3J			

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		_Ben.1.3.3-			
		_Ben.1.3.3- 4			
		2.1 DLR			
		Overall			
		workload			
		remained at			
		а			
		satisfactory			
		, or tolerable			
		level. Only			
		in			
		approximat			
		ely 20% of			
		the			
		scenarios			
		ATCOs			
		reported			
		high or			
		above high			
		workload			
		for the			
		Bedford			
		Scale.			
		NASA-TLX			
		answers			
		show the			
		same effect			
		for the			
		average			
		NASA-TLX			
		score below			
		50. This			
		might be			





mitigated
with more
time for the
allocation
process, as
process, as
stated by
the final
comment.
COOPANS:
Majority of
ATCOs
assess
workload at
tolerable
level for the
task.
Nevertheles
s, the
workload
could
rapidly
increase
from
acceptable
to non-
acceptable
and this
cannot be
ignored.
Situations
with high
traffic





volume,
traffic
complexity,
complexity
complexity and by
caused by
the
aerodrome
being
combined at
same
MRTM, and
sometimes
transfer
execution
(initiation
and
completion)
etc. are
some of
contributing
factors
workload to
be
increased.
ENAV: In
the scenario
runs with
the flexible
allocation
the
workload
was always
maintained

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a le s w a v f f a w f l w w	at acceptable levels. The scenarios with 3 airports without the flexible allocation was overloaded		
	The ATCO shall be provided with a system enabling to transfer one of the controlled aerodromes to another MRTM		
	In case of high workload situations, such as an emergency situation, at one of the airports - significantly increasing the ATCO/AFISO workload and affecting her/his capability to continue to provide ATS to all airports under		

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responsibility -
the ATCO may
perform one of
the following
actions in order to
be able to
manage the high
workload
situation:
• Temporarily
stopping/delaying
traffic at the
other/all
airport(s);
Transferring the
provisioning of
ATS for the
airport(s) not
affected by the
unexpected event
to another
MRTM;
Requesting the
support of
another ATCO to
be able to
continue the
service provision
for all
aerodromes from
the existing RTM.
Note: The RTC
Supervisor may
support the

EUROPEAN PARTNERSHIP





			controller to apply these procedures.			
			The RTC should			The
			host a locally			RTC
			determined			shoul
			number of MRTMs to be able			d host
			to split			a
			aerodromes.			locall
						y
						, deter
						mine
						d
						num
						ber
						of
						MRT
						Ms
						to be
						able
						to colit
						split aero
						drom
						es.





			The RTC			The
			Supervisor should			RTC
			be provided with			Supe
			the forecasted			rviso
			demand for all			r
			involved			shoul
			aerodromes part			d be
			of the RTC.			provi
						ded
						with
						the
						forec
						asted
						dem
						and
						for
						all
						invol
						ved
						aero
						drom
						es
						part
						of
						the
						RTC.





OBI-	-PJ05- CRT-PJ05-	Indra/HC	Future validation	ENAV: Supervisor role	Super	
	35-V3- W2-35-	RTS: ATCOs	activities shall the	shall assess and balance	visor	
	P-H07 V3-VALP-	all agree	SUP's level of	the workload between	role	
VAL	H07.030		situation	the modules		
	HU7.030	that		the modules	shall	
		providing	awareness		assess	
		ATC for the			and	
		selected			balanc	
		aerodromes			e the	
		was			workl	
		feasible,			oad	
		including			betwe	
		the number			en the	
		of			modul	
		simultaneou			es	
		s				
		movements.				
		Indra/Avino				
		r: All ATCOs				
		confirmed				
		the				
		feasibility				
		and				
		acceptabilit				
		y of				
		providing				
		ATS services				
		to the				
		assigned				
		number of				
		aerodromes				
		, on				
		condition				
		that clear				





capacity	
rules and	
procedures	
were	
established	
to prevent	
overload on	
the	
position.	
When	
merging a	
new	
aerodrome	
on a	
position, it	
is also	
important	
to consider	
the traffic	
situation to	
avoid taking	
over a new	
aerodrome	
at a bad	
moment	
and	
maintain	
situation	
awareness.	
2.1 DLR For	
PR and PE	
the majority	
of	

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participants
confirms
the line line line line line line line lin
feasibility of
the assigned
number of
aerodromes
, the
amount of
traffic and
the traffic
mix. They
also state
that this is
the
maximum
number of
aerodromes
COOPANS:
ATCOs
neither
agree nor
disagree
that
provision of
ATS to three
aerodromes
at a time is
feasible and
acceptable.
The main
contributor





to increased
workload
are the
traffic
volume and
traffic
complexity,
as well as
the amount
of
communicat
ion which
potentially
can increase
the
overlapping
between
the calls,
when
working
simultaneou
s with three
aerodromes
at a time.
ENAV: The
majority of
ATCOs
responses
confirmed
the
feasibility of
providing
ATS up to 3





					aerodromes at the same with the support of the SUP that is in charge of balancing the workload between the modules				
1.3. 05.	 /2.PJ Pote 5.35 ntial 5.1.3 incr -3 ease in SUP wor kloa d due to resp onsi bilit y of seve ral clust ers of airp 	Closed	OBJ-PJ05- W2-35-V3- VALP-H05	CRT-PJ05- W2-35- V3-VALP- H05.010	HC/Indra RTS: Supervisor's reported an acceptable level of workload, even during the split and merge process. Indra/Avino r: The majority of SUPs assess that the workload was at an acceptable level when	Future validation activities shall assess the timeliness of executing tasks for the supervisor position.			





s) is	in			RTC with a			
acce	the			flexible			
ptab	MR			allocation of			
le.	Ms		i	aerodromes			
			1	between			
				MRTMs.			
				The validity			
				of the			
				results is			
				applicable			
				to an			
				assigned			
				number of 4			
				aerodromes			
				to			
			5	supervise.			
				2.1 DLR The			
			1	majority of			
			1	participants			
			,	working at			
			1	the SUP			
				workstation			
				reported a			
				low			
				workload.			
				Bedford and			
				Nasa-TLX			
				were			
				completed			
				in the PR			
				and			
				therefore			
			1	no run can			





be a second seco
categorized
as high
workload.
Even so, the
SUP had to
support up
to 15
airports.
ENAV:
Workload
was always
considered
acceptable
by all the
participatin
g
supervisors
and no issue
was raised
in relation
to the
number of
airports to
be line line line line line line line lin
supervised.
The
simulation
involved 1
cluster of
aerodromes
with 3
airports and





	it was considered acceptable				
OBJ-PJ05- W2-35-V3- VALP-H10 H10.030	Indra/HC RTS: Participatin g ATCOs (in SUP role) unanimousl y agree that the assigned number of aerodromes could be handled efficiently from the SUP position. Indra/Avino r: Majority of Supervisors confirmed the feasibility and	Assess Supervisor workload in scenarios addressing the transfer/ assuming of aerodromes.	ENAV: Assessment of ATCOs coordination tasks that can be delegated to SUP shall be locally (specific for the operational environment) conducted to support the deployment of the RTC with flexible allocation of airports between modules.		In case of conti ngen cy and in case of emer genc y part of ATCO s task may be deleg ated to The RTC super





acceptabilit	visor
y of	to
supervising	redu
the assigned	ce
number of	the
clusters of	workl
aerodromes	oad
. The	for
validity of	the
the results	remo
is applicable	te
to an	towe
assigned	r
number of 4	mod
aerodromes	ule
under	ATCO
supervision.	
2.1 DLR The	
majority of	
participants	
confirms	
the	
feasibility	
and	
acceptabilit	
y of the 15	
assigned	
aerodromes	
ENAV: All	
the	
supervisors	
agreed that	





					the roles and responsibilit ies were acceptable and it was possible the supervision of the assigned number of airports (3				
					in 1 cluster) but they				
					raised the				
					possibility				
					of undertaking				
					some of the				
					coordinatio				
					n tasks				
					currently				
					assigned to				
					the ATCOs				
Arg.	SUP	Closed	OBJ-PJ05-	CRT-PJ05-	HC/Indra	Future validation			
1.3. 3:	task		W2-35-V3- VALP-H05	W2-35- V3-VALP-	RTS:	activities shall assess the			
3: The	s can		VALP-HUS	V3-VALP- H05.010	Supervisor's reported an	timeliness of			
leve	not			105.010	acceptable	executing tasks			
lof	be				level of	for the supervisor			
wor	achi				workload,	position.			
kloa	eve				even during				
d	d in				the split and				
(ind	а				merge				





uce	time	process.		
d by	ly			
cog	man	Indra/Avino		
nitiv	ner.	r: same as		
е	Res	W2.PJ05.35		
and	ultin	_ls.1.3.3-3		
/or	g in			
phy	oper	2.1 DLR The		
sical	ator	majority of		
task	stre	participants		
dem	SS	working at		
and	(wit	the SUP		
s) is	ĥ	workstation		
acce	task	reported a		
ptab	S	low		
le.	stac	workload.		
	king	Bedford and		
	up	Nasa-TLX		
	and	were		
	requ	completed		
	iring	in the PR		
	reca	and		
	II)	therefore		
	lead	no run can		
	s to	be		
	incr	categorized		
	ease	as high		
	d	workload.		
	hum	Even so, the		
	an	SUP had to		
	erro	support up		
	r	to 15		
	prob	airports.		
	abili			





ties and cons equ ence s. At syst em level coul d imp		ENAV: Workload was considered at acceptable level for all the simulated scenarios by all the test subjects			
act effic ienc y and safe ty	OBJ-PJ05- CRT-F W2-35-V3- W2-3 VALP-H10 V3-V/ H10.0	- RTS: LP- Participatin	The RTC Supervisor shall be provided with information to facilitate decisions regarding how to combine aerodromes in the MRTM.		The RTC Super visor shall be provid ed with inform ation to facilita te decisi ons regard ing how to combi ne

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2.1 DLR:	aerodr
same as	omes
W2.PJ05.35	in the
_ls.1.3.3-3	MRT
	М.
ENAV: All	
the	
supervisors	
agreed that	
the roles	
and	
responsibilit	
ies were	
acceptable	
and it was	
possible the	
supervision	
of the	
assigned	
number of	
airports (3	
in 1 cluster)	
but they	
raised the	
possibility	
of	
undertaking	
some of the	
coordinatio	
n tasks	
currently	
assigned to	
the ATCOs	
and no issue	





						of human errors were raised in relation to workload			
Arg. 1.3. 4: The leve I of trus t in the new con cept /the new proc edu res is appr	W2.PJ 05.35 _ls.1.3 .4-1a	The level of trust in the new conc ept and syst em is not appr opri ate for the	Closed	#N/D	#N/D				





opri ate.		ATC O								
Arg.	W2.PJ	The	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	Future validation			
1.3.	05.35	level		W2-35-V3-	W2-35-	RTS: The	activities shall			
4:	_ls.1.3	of		VALP-H14	V3-VALP-	reliability of	address the level			
The leve	.4-1b	trust in			H14.010	the information	of trust in the operations and			
lof		the				provided by	the associated			
trus		new				the timeline	system of the SUP			
tin		conc				should be	-,			
the		ept				further	The SUP shall be			
new		and				improved,	able to identify			
con		syst				as it was not	the traffic peaks,			
cept		em				always	supported by the			
/the		is				precise.	system. Thus the			
new		not suffi				Indra/Avino	timeline shall be precise, by			
proc edu		cien				r:	marking the real			
res		t				Supervisors	simultaneous			
is		for				could not	traffic based on			
appr		the				always trust	updates from			
opri		SUP				the	actual data. The			
ate.						monitoring	predicted			
						and	duration of the			
						planning	overload periods			
						tool to give	should also be			
						them a	transparent.			
						correct				
						picture of				

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Arg	W2.PJ	ATC	Closed	OBJ-PJ05-	CRT-PJ05-	the situation at aerodromes /MRTMs. 2.1 DLR The assessed level of trust in the system is above average. This is supported by the answers to the PE questions. ENAV: Level of trust was considered acceptable and no issue was raised about trust	A harmonised			
Arg. 1.3. 5: Hu man acto rs can	W2.PJ 05.35 _ls.1.3 .5-2	ATC Os/ SUP s mig ht not be	Closed	0ВЈ-РЈ05- W2-35-V3- VALP-H01	W2-35- W3-VALP- H01.010	Indra/HC RTS: The mean scores of the China- Lake metric suggest that SUPs'	A harmonised working method for all aerodromes clustered in a multiple remote tower shall be envisaged.			





mai	able	situational			
ntai	to	awareness			
na	mai	was at			
suffi	ntai	acceptable			
cien	n	level.			
t	Situ				
leve	atio	Indra/Avino			
l of	n	r: same as			
situ	awa	W2.PJ05.35			
atio	rene	_ls.1.3.1-1b			
n	ss if				
awa	ther	2.1 DLR The			
rene	е	majority of			
SS.	are	participants			
	vari	at the SUP			
	ous	workplace			
	oper	indicates a			
	atin	positive SA.			
	g	The PE			
	con	tailor-made			
	ditio	questionnai			
	ns.	re even			
		indicates so			
		much that			
		the			
		participants			
		thought			
		they could			
		also keep			
		the same SA			
		under			
		abnormal			
		condition.			
		condition.			





ENAV: Situation awareness was always maintained at acceptable level. Different operating conditions were tested (e.g. 1 airport without GRP) and no issues were raised in relation to situation awareness		
awareness because of different operating		
conditions	The RTC Supervisor shall be provided with information to facilitate decisions regarding how to combine	The RTC Super visor shall be provid ed with





			aerodromes in		inform	
			the MRTM.		ation	
					to	
					facilita	
					te	
					decisi	
					ons	
					regard	
					ing	
					how	
					to	
					combi	
					ne	
					aerodr	
					omes	
					in the	
					MRT	
					M.	
			The RTC			The
			Supervisor role			RTC
			should be			Supe
			provided with a			rviso
			display presenting			r or
			an overview of			simil
			the RTC, including			ar
			e.g. MRTM status,			role
			aerodromes			shoul
			allocated to			d be
			MRTMs, traffic			able
			load, etc. to be			to
			able to transfer			have
			an airport.			a
						view
						over
						Over





			1	1			
							funct
							ional
							MRT
							M´s
							in
							case
							of an
							emer
							genc
							y in
							order
							to be
							able
							to
							trans
							fer
							an
							airpo
							rt.
							The
							RTC
							Supe
							rviso
							r role
							shoul
							d be
							provi
							ded
							with
							a
							displ
							ay
							prese
1			<u> </u>		<u> </u>	<u> </u>	prese

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						nting
						an
						overv
						iew
						of
						the
						RTC,
						inclu
						ding
						e.g.
						MRT
						М
						statu
						s,
						aero
						drom
						es
						alloc ated
						to
						MRT
						Ms,
						traffi
						c
						load,
						etc.
						to be
						able
						to
						trans
						fer
						an
						airpo
						rt.

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			Indra /UC	-Future validation	
	OBJ-PJ05-	CRT-PJ05-	Indra/HC		
	W2-35-V3-	W2-35-	RTS:	activities shall the	
	VALP-H02	V3-VALP-	Situation	SUP's level of	
		H02.010	awareness	situation	
			was at an	awareness	
			acceptable		
			level when		
			providing		
			ATS to 3		
			aerodromes		
			in parallel		
			according to		
			the SASHA-		
			Q scores.		
			The issue		
			mentioned		
			in column D		
			did not		
			come up.		
			Indra/Avino		
			r: same as		
			W2.PJ05.35		
			_ls.1.3.1-7		
			/		
			2.1 DLR The		
			majority of		
			participants		
			stated an		
			above		
			average situation		
			awareness		
			in the PR		





assessment	
when	
working	
MRTM with	
a flexible	
allocation.	
COOPANS:	
For majority	
of ATCOs	
situation	
awareness	
is at an	
acceptable	
level when	
working in a	
RTC with a	
flexible	
allocation of	
aerodromes	
between	
MRTMs.	
Nevertheles	
s, the SA	
could be	
decreased	
very quickly	
when	
controlling	
three	
aerodromes	
with this	
traffic	
volume,	





hence the
source of
information
is slightly
larger, the
incoming
calls from
aircraft and
vehicles are
increased,
traffic could
become
more
complex, so
that all
these
factors
increase the
time
needed for
scanning of
all systems
in order to
keep SA
updated.
ENAV:
Situation
awareness
was always
maintained
at
acceptable
level.





Arg. 1.3.	W2.PJ 05.35	ATC O/	Closed	OBJ-PJ05- W2-35-V3-	CRT-PJ05- W2-35-	Different operating conditions were tested (e.g. 1 airport without GRP) and no issues were raised in relation to situation awareness because of different operating conditions Indra/HC RTS:	The clustering of aerodromes shall			
5: Hu	_ls.1.3	SUP		VALP-H02	V3-VALP-	Situation	be done taking			
Hu man	.5-3	s mig			H02.010	awareness was at an	into account local factors such as			
acto		ht				acceptable	runway			
rs		not				level when	configurations			
can		be				providing	and prevailing			
mai ntai		able to				ATS to 3 aerodromes	weather conditions			
n a		mai				in parallel				
suffi		ntai				according to				
cien		n				the SASHA-				
t		situ				Q scores.				
leve I of		atio n				The SA levels were				
situ		awa				not				





atio	rene	significantly
n	ss if	lower in the
awa	ther	Low
rene	e	Visibility
SS.	are	procedures
	vari	scenario.
	ous	
	wea	Indra/Avino
	ther	r: same as
	con	W2.PJ05.35
	ditio	_ls.1.3.1-7
	ns	
	(win	2.1 DLR
	d or	same as
	visib	W2.PJ05.35
	ility)	_ls.1.3.5-2
	at	
	the	COOPANS:
	diffe	ATCOs
	rent	agreed that
	airp	the weather
	orts	conditions
		should be
		considered
		as one of
		the most
		important
		part that
		can affect
		both,
		workload
		and SA. No
		severe
		weather





conditions
or sudden
weather
changes
was part of
the
scenarios. A
SVFR
conditions
were
applied at
one of the
combined
aerodromes
. It was
difficult for
ATCOs to
distinguish
if there
were VFR or
SVFR
conditions.
Nevertheles
s, SA was at
acceptable
level during
all 4
scenarios.
ENAV:
Situation
awareness
was always
maintained





 			1	 	,	
	at					
	acceptable					
	level.					
	Different					
	weather					
	conditions					
	were tested					
	(e.g. 1					
	airport with					
	fog) and no					
	issues were					
	raised in					
	relation to					
	situation					
	awareness					
	because of					
	different					
	weather					
	conditions					
		The RTC		г	The	
					RTC	
		Supervisor role				
		shall be able to			Super	
		access functions			visor	
		for the monitoring			role	
		of weather		S	shall	
		conditions for all		k	be	
		aerodromes.			able	
					to	
					access	
					functi	
					ons	
					for the	
					monit	
				C	oring	

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				of weath er condit ions for all aerodr omes.	
		The RTC Supervisor shall be provided with a tool combining the information (aerodromes' status, meteo, forecasted traffic load and capacity) to facilitate decisions regarding how to combine aerodromes in the MRTM	An additional Weather Display and Information is recommended on an additional screen if not available on the VP.	The RTC Super visor role shall access functi ons for comm unicat ing the status of RTC and aerodr omes and coordi nating maint enanc	The RTC super visor role may be provi ded with a tool comb ining the infor mati on (aero drom es' statu s, mete





			Future validation		e (to be carrie d out by a qualifi ed engin eer/te chnici an).	o, forec asted traffi c load and capa city) to facilit ate decis ions regar ding how to comb ine aero drom es in the MRT M
			activities shall the SUP's level of situation awareness			





Arg.	W2.PJ	ATC	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	-Future validation
1.3.	05.35	Os/S		W2-35-V3-	W2-35-	RTS: The	activities shall the
5:	_ls.1.3	UPs		VALP-H01	V3-VALP-	mean	SUP's level of
Hu	.5-4	mig			H01.010	scores of	situation
man		ht				the China-	awareness
acto		not				Lake metric	
rs		be				suggest that	
can		able				SUPs'	
mai		to				situational	
ntai		mai				awareness	
na		ntai				was at	
suffi		n				acceptable	
cien		Situ				level.	
t		atio					
leve		n				Indra/Avino	
lof		awa				r: same as	
situ		rene				W2.PJ05.35	
atio		ss if				_ls.1.3.1-1b	
n		ther					
awa		e is				2.1 DLR The	
rene		а				majority of	
SS.		geo				participants	
		grap				at the SUP	
		hical				workplace	
		diffe				indicates a	
		renc				positive SA.	
		е				The PE	
		bet				tailor-made	
		wee				questionnai	
		n				re even	
		the				indicates so	
		aero				much that	
		dro				the	
		mes				participants	





thought
they could
also keep
the same SA
under
abnormal
condition.
ENAV:
Situation
awareness
was always
maintained
at
acceptable
level.
Tested
environmen
t are
geographica
Ily located
in different
area of Italy
(North,
South) and
no issues
were raised
in relation
to situation
awareness
because of
geographica
I differences





			Future validation			
			activities shall			
			identify system			
			possibilities on			
			the SUP HMI to			
			indicate			
			geographical			
			characteristics			
			and indication of			
			different airports.			
			The diversity of			
			the different			
			aerodromes in			
			terms of			
			geographical			
			specifities and			
			procedures have			
			to be included in			
			the training			
			The RTC		The	
			Supervisor shall		RTC	
			be provided with		Super	
			information to		visor	
			facilitate		shall	
			decisions		be	
			regarding how to		provid	
			combine		ed	
			aerodromes in		with	
			the MRTM.		inform	
					ation	
					to	
					facilita	
					te	
					decisi	

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							ons regard ing how to combi ne aerodr omes in the MRT M.	
		OBJ-PJ05- W2-35-V3- VALP-H02	CRT-PJ05- W2-35- V3-VALP- H02.010	Indra/HC RTS: Situation awareness was at an acceptable level when providing ATS to 3 aerodromes in parallel according to the SASHA- Q scores. The geographica I differences did not seem like an issue for the ATCOs.	Future validation activities shall identify system possibilities on the SUP HMI to indicate different airports.			





Indra/Avino
r: same as
W2.PJ05.35
_ls.1.3.1-1b
_13.1.3.1-10
2.1 DLR
same as
W2.PJ05.35
_ls.1.3.5-2
COOPANS:
The
geographica
l differences
did not
imposed
any issues
on SA for
the ATCOs.
None of
them
experienced
any issues
also
connected
to similarity
between
the
landscapes
and
buildings at
different
aerodromes





						ENAV:				
						Situation				
						awareness				
						was always				
						maintained				
						at acceptable				
						level.				
						Tested				
						environmen				
						t are				
						geographica				
						lly located				
						in different				
						area of Italy				
						(North,				
						South) and				
						no issues				
						were raised				
						in relation				
						to situation awareness				
						because of				
						geographica				
						l differences				
Arg.	W2.PJ	ATC	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	-Future validation			
1.3.	05.35	Os/		W2-35-V3-	W2-35-	RTS: The	activities shall the			
5:	_ls.1.3	SUP		VALP-H01	V3-VALP-	mean	SUP's level of			
Hu	.5-5	s			H01.010	scores of	situation			
man		mig				the China-	awareness			
acto		ht				Lake metric				
rs		be				suggest that				





can	over	r	SUPs'			
mai	look	()	situational			
ntai	ing		awareness			
na	or		was at			
suffi	miss	5	acceptable			
cien	ing		level.			
t	mov					
leve	eme	2	Indra/Avino			
l of	nts		r: same as			
situ	on		W2.PJ05.35			
atio	one		_ls.1.3.1-1b			
n	APT,	· ,				
awa	whil		2.1 DLR The			
rene	e		majority of			
ss.	focu	ı	participants			
	sing		at the SUP			
	on		workplace			
	the		indicates a			
	othe	e	positive SA.			
	r		The PE			
	one.		tailor-made			
			questionnai			
			re even			
			indicates so			
			much that			
			the			
			participants			
			thought			
			they could			
			also keep			
			the same SA			
			under			
			abnormal			
			condition.			





		ENAV: Situation awareness was always maintained at acceptable level for supervisor position.					
OBJ-PJ05- W2-35-V3- VALP-H03	CRT-PJ05- W2-35- V3-VALP- H03.010	HC/Indra RTS: The system supported the RTC team in establishing and maintaining their situational awareness, and the system worked as expected during the split, supporting the teamwork between MRTMs too.	The pan and tilt functionality or VP shall allow the ATCO to scan the remaining part of the CTR	Out of the window view requirements shall be locally refined to support the deployment of the RTC with flexible allocation of airports between modules.	The ATCO may be supported by the system indicating when clearances can be given.	Required information for ATCOs and SUP should be locally assessed before the deployment	Requ ired infor mati on for ATCO s and SUP shoul d be locall y asses sed befor e the depl oyme nt The ATCO





The issue	may
mentioned	be
in column D	supp
did not	orted
come up.	by
	the
Indra/Avino	syste
r: The	m
ATCOs HMI	indic
generally	ating
supported	when
an a	clear
acceptable	ance
level of	s can
team	be
situation	given
awareness.	
The	
supervisors'	The
HMI did not	ATCO
support an	shoul
acceptable	d be
level of	supp
team	orted
situation	in
awareness	priori
because the	tising
information	tasks
about traffic	(e.g.
situation	provi
and	ding
workload at	landi
MRTMs was	ng
not	clear

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sufficient	ance
and not	or
accurate	taxi
enough.	clear
	ance)
2.1 DLR The	and
PE	forec
questionnai	ast
re results	the
show that	traffi
there is still	с
missing	dem
information	and
or	from
information	а
in poor	supp
quality	ort
which	tool
makes the	in
task of	the
splitting and	tactic
	al
merging less. The	short
comments form the	term.
from the	
debriefing fill this sec	
fill this gap	
with ideas	
how the	
improve the	
interface.	
COOPANS:	
HMI	





support an
acceptable
level of
team (ATCO
and ATCO)
situation
awareness
when
working
with a
flexible
allocation of
aerodromes
between
MRTMs.
It was not
noticed by
observers or
reported by
the ATCOs
that this
kind of issue
has been
encountere
d
The ATCOs
agreed that
they had a
clear mental
image about
traffic
situation at
the taken
aerodrome





		prior they				
		confirmed				
		''my				
		control'' at				
		that				
		aerodrome,				
		which				
		correspond				
		ed with the				
		real traffic				
		situation				
		afterwards.				
		ENAV:				
		There were				
		no issues				
		raised about				
		team				
		situation				
		awareness				
		anyway it				
		was				
		suggested				
		that further				
		technology				
		might				
		improve				
		SUP-ATCOs				
		shared				
		situational				
		awareness				
		by				
		duplicating				
		information				
				1		





	in the supervisor working position				
OBJ-PJ05- W2-35-V3- VALP-H12 H12.050	Indra/HC RTS: The number of errors made in the simulation was negligible and was due to the unfamiliarit y with the system. The issue mentioned in Column D did not come up during the simulation. Indra/Avino r: same as W2.PJ05.35	If Radar Labels are to be provided, they shall be available for all aerodromes.		When a handover is initiated or performed all systems and information that belongs to the same aerodrome shall be transferred in a synchronize d way.	Super visor planni ng tool HMI and ATCO' s modul e HMI shall be locally assess ed before the deplo yment of the RTC with flexibl





			1 4 2 4 4				
			_ls.1.3.1-1b			e	
						allocat	
			2.1 DLR			ion of	
			Even so, the			airpor	
			system is			ts	
			usable			betwe	
			above			en	
			average the			modul	
			participant			es.	
			agreed that				
			changes to			When	
			the SUP role			а	
			would			hando	
			significantly			ver is	
			contribute			compl	
			to human			eted	
			error. The			and	
			human			accept	
			error could			ed all	
			be			syste	
			decreased			ms	
			with			and	
			automation			inform	
			in the SUP			ation	
			user			that	
			interface.			belon	
			interface.			gs to	
			ENAV: No			the	
			critical			same	
			errors were			aerodr	
			observed			ome	
			during the			shall	
			simulation			be	
			execution.			accept	

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Anyway,	ed in a
supervisor	single
planning	action
tool HMI	
improveme	
nts were	When
suggested	а
to have the	hando
option of	ver is
multiple	initiat
windows	ed or
that could	perfor
reduce the	med
possibility	all
of human	syste
error by	ms
having all	and
the needed	inform
information	ation
displayed at	that
the same	belon
time.	gs to
	the
	same
	aerodr
	ome
	shall
	be
	transf
	erred
	in a
	synchr
	onized
	way.

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OBJ-PJ05-	CRT-PJ05-	Indra/HC		COOPANS: Having same		Cardi
W2-35-V3-	W2-35-	RTS: The		layout on the WACOM	Cardinal	nal
VALP-H11	V3-VALP-	system		, screen for e-strips for	directions	direc
	H11.050	, behaviour		single, double and triple	on the	tions
		during split		aerodrome mode.	visual	on
		and merge			panorama	the
		increased		ENAV: there is the	should be	visua
		the		need to always properly	displayed	I
		potential for		balance the workload in		pano
		human		order to minimise the		rama
		error by not		impact on human error		shoul
		moving the				d be
		MET				displ
		window				ayed
		together				-
		with the				
		radar map				
		and EFS				
		bay.				
		However,				
		the issue				
		mentioned				
		in column D				
		did not				
		occur				
		during the				
		simulations.				
		Indra/Avino				
		r: same as				
		W2.PJ05.35				
		_ls.1.3.1-2				
		2.1 DLR For				





EXE-PIOS- W2-35-V3- 2.1.1 again, the SATI scores show that the System and the interface. They see the increased human error in the changed role and responsibilit ies. COOPANS: ATCOS SATE SA			
2.1.1 again, the SATU SCOTES SHOW that the ATCDS trust the system and the interface. They see the increased human responsibilit ies. COOPANS: ATCOS stated that the human machine interface could at sometimes increase the potential for human error. This affects the			
the SATI scores show that the ATCOs trust the system and the and the interface. They see the error in the changed role and responsibilit ies. COOPANS: ATCOs stated that the human machine interface could at sometimes increase the potential for human error. This affects the	W2-35-V3-		
<pre>https://www.comment/www.c</pre>	2.1.1 again,		
scores show that the ATCOS trust the system and the interface. They see the increased human error in the changed role and responsibilit ies. COOPANS: ATCOS stated that the human machine interface could at sometimes increase the potential for human error. This affects the	the SATI		
<pre>the ATCOs trust the system and the interface role and responsibilit ies. COOPANS: ATCOs stated that the human machine interface could at sometimes increase the potential for human error. This affects the</pre>			
ATCOs trust the system and the interface. They see the increased human error in the changed role and responsibilit ies. COOPANS: ATCOS stated that the human machine interface could at sometimes increase the increase the increase the increase the increase the increase the increa			
<pre>he by stem and the interface. They see the increased human error in the changed role and responsibilit ie: COOPANS: ATCOs stated that the human machine interface could at sometimes increase the interface could at sometimes increase the interface could at sometimes increase the increase the increase</pre>			
and the interface. They see the increased human error in the changed role and responsibilit ies. COOPANS: ATCOs stated that the human machine interface could at sometimes increase the potential for human error. This affects the			
<pre>interface. They see the increased human error in the changed role and responsibilit ies. COOPANS: ATCOs stated that the human machine interface could at sometimes increase the potential for human error. This affects the</pre>	and the		
They see the the increased human error in the changed role and responsibilit ies. COOPANS: ATCOS stated that the human machine interface could at sometimes increase the potential for human error. This affects the interface			
<pre>the increased human error in the changed role and responsibilit ies.</pre>			
<pre>increased human error in the changed role and responsibilit ies. COOPANS: ATCOs stated that the human machine interface could at sometimes increase the potential for human error. This affects the</pre>			
human error in the changed responsibilit ies. COOPANS: ATCOs stated that the human machine interface could at somes increase the potential for human error. This affects the			
error in the changed role and responsibilities. COOPANS: ATCOs Stated that the human machine interface could at sometimes increase the potential for human error. This affects the			
<pre>changed role and responsibilit ies. COOPANS: ATCOs stated that the human machine interface could at sometimes increase the potential for human error. This affects the</pre>			
role and responsibilit ies. COOPANS: ATCOs stated that the human machine interface could at sometimes increase the potential for human error. This affects the			
Image: Coopans: Coopans: ATCOs stated that the human machine interface could at sometimes increase the potential for human human error. This affects the affects the			
ies. COOPANS: ATCOs stated that the human machine interface could at sometimes increase the potential for human error. This affects the	responsibilit		
COOPANS: ATCOs stated that the human machine interface could at sometimes increase the potential for human error. This affects the			
ATCOs stated that the human machine interface could at sometimes increase the potential for human error. This affects the			
ATCOs stated that the human machine interface could at sometimes increase the potential for human error. This affects the	COOPANS:		
Image: State in the state in the human machine interface could at sometimes increase the potential for human error. This affects the interface in			
Image: Section of the section of th			
Image: Set of the set of			
Image: Set of the set of			
Image: Set of the set of	interface		
Image: Some set in the s			
Image: Section of the section of th			
Image: Section of the section of th			
Image: Second			
error. This affects the			
affects the			
	SA		





negatively,		
see		
recommend		
ation for		
specific		
situation.		
ENAV: the		
overall		
perception		
was that		
human		
error was		
not		
increased in		
terms of		
potential		
and severity		
respect to		
the scenario		
without		
flexible		
allocation		
being the		
most of the		
answers		
above the		
tolerable		
threshold of		
4, the		
ATCOs		
commented		
that there is		
the need to		
	i	1





	always			
	properly			
	balance the			
	workload in			
	order to			
	minimise			
	the impact			
	on human			
	error,			
	meaning			
	that the			
	team			
	human			
	error			
	potential is			
	acceptable			
	if the			
	workload of			
	the			
	operators is			
	acceptable.			
OBJ-PJ05- C	RT-PJ05- Indra/HC	ENAV: there is the		Alerti
W2-35-V3- W	V2-35- RTS:	need to always properly	Alerting	ng
VALP-H02 V	/3-VALP- Situation	balance the workload in	system to	syste
н	l02.010 awareness	order to minimise the	drive the	m to
	was at an	impact on operations	attention of	drive
	acceptable		the ATCO to	the
	level when		a certain	atten
	providing		airport	tion
	ATS to 3		under	of
	aerodromes		certain	the
	in parallel		conditions	ATCO
	according to		(e.g.	to a
	the SASHA-		aerodrome	certa

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Q scores.	highlighted	in
The issue	in case of	airpo
defined in	communicat	rt
Column D	ion; alerts	unde
was not	for a pre-	r
reported,	defined	certa
but the	area) should	in
traffic levels	be provided	condi
were not		tions
excessive.		(e.g.
		aero
Indra/Avino		drom
r: same as		е
W2.PJ05.35		highli
_ls.1.3.1-1b		ghte
		d in
2.1 DLR		case
same as		of
W2.PJ05.35		com
_ls.1.3.5-2		muni
_13.1.3.3-2		catio
COOPANS:		
SA		n; alerts
remained at		for a
acceptable		pre-
level during		defin
all 4		ed
scenarios.		area)
		shoul
ENAV:		d be
Situation		provi
awareness		ded
was always		
maintained		

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						at					
						acceptable					
						level and in					
						the					
						solutions					
						scenario no					
						issues were					
						raised about the					
						possibility					
						of missing					
						movements.					
						Missing of					
						movements					
						were					
						observed in					
						the					
						reference					
						scenario					
						with 3					
						airports					
						allocated to 1 module					
						due to over					
						workload					
Arg.	W2.PJ	Swit	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	The ATCO display	ENAV: Position of		When	
1.3.	05.35	chin		W2-35-V3-	W2-35-	RTS:	should allow a	displayed airports in the	When a	a	
5:	_ls.1.1	g		VALP-H02	V3-VALP-	Situation	flexible allocation	out of the window view	handover is	hando	
Hu	3.5-11	bet			H02.010	awareness	of the position of	and in the CWP head	initiated or	ver is	
man		wee				was at an	the transferred	down displays shall be	performed	compl	
acto		n				acceptable	aerodromes	flexible, i.e. transferred	all systems	eted	
rs		diffe				level when		airport always displayed	and	and	
can		rent				providing		as last one: in the	information	accept	
mai		aero				ATS to 3		bottom for the OTW	that belongs	ed all	

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ntai	dro	aerodromes		and on the right in the	to the same	syste
na	mes	in parallel		head down CWP/Strip	aerodrome	ms
suffi	alloc	according to		bay.	shall be	and
cien	atio	the SASHA-			transferred	inform
t	n in	Q scores.			in a	ation
leve	an	There were			synchronize	that
l of	RTM	some			d way.	belon
situ	coul	occasions				gs to
atio	d	when the			When a	the
n	imp	information			handover is	same
awa	act	passed on			initiated or	aerodr
rene	neg	during			performed	ome
SS.	ativ	handover			all systems	shall
	ely	was not			and	be
	the	complete,			information	accept
	SA	but the			that belongs	ed in a
	(e.g.	difficulties			to the same	single
	, if	ATCO had			aerodrome	action
	the	with the			shall be	
	tran	system			transferred	
	sfer	during split			in a	
	of	and merge			synchronize	
	infor	had the			d way.	
	mati	biggest			-	
	on	impact on				
	duri	situational				
	ng	awareness				
	the	reduction/lo				
	han	ss.				
	dov					
	er is	Indra/Avino				
	not	r: same as				
	com	W2.PJ05.35				
	plet	_ls.1.3.1-1b				





e; if		
ther		
e	2.1 DLR	
are	same as	
conf	W2.PJ05.35	
usio	_ls.1.3.5-2	
ns		
bet	COOPANS:	
wee	SA	
n	remained at	
aero	acceptable	
dro	level during	
mes	all 4	
or	scenarios.	
aero		
dro	ENAV:	
mes	Situation	
char	awareness	
acte	was always	
risti	maintained	
CS	at	
etc.)	acceptable	
	level,	
	nevertheles	
	s the ATCOs	
	complained	
	about the	
	fix position	
	of the	
	airports in	
	the OTW	
	and in the	
	CWP that	
	could affect	





their	
situational	
awareness	
during the	
handover if	
the the	
transferred	
airport had	
the	
"MIDDLE"	
fix position.	
Position of	
displayed	
airports in	
the out of	
the window	
view and in	
the CWP	
head down	
displays	
shall be	
flexible, i.e.	
transferred	
airport	
always	
displayed as	
last one: in	
the bottom	
for the OTW	
and on the	
right in the	
head down	
CWP/Strip	
bay.	





			The airport name should be integrated in the phraseology in order to increase the situational	The ATCO may be supported by the system indicating when clearances can be given.	Cardinal directions on the visual panorama should be displayed	Cardi nal direc tions on the visua I pano rama shoul d be displ ayed The airpo rt nam e shoul d be integ rated in t
						e shoul d be integ
						in the phras eolog
						y in order to incre ase the

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SESAR 2020 SOLUTION 05-35 SPR-INTEROP/OSED V3 - PART IV - HUMAN PERFORMANCE ASSESSMENT REPORT



1						
						situa
						tiona
						I
						The
						ATCO
						may
						be
						supp
						orted
						bv
						by the
						syste
						m
						indic
						ating
						when
						clear
						ance
						s can
						be
						given
						•
						The
						ATCO
						shoul
						d be
						supp
						orted
						in
						priori
						tising
						tasks

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SESAR 2020 SOLUTION 05-35 SPR-INTEROP/OSED V3 - PART IV - HUMAN PERFORMANCE ASSESSMENT REPORT



				1
				(e.g.
				provi
				ding
				landi
				ng
				clear
				ance
				or
				taxi
				clear
				ance)
				and
				forec
				ast
				the
				traffi
				с
				dem
				and
				from
				a
				supp
				ort
				tool
				in
				the
				tactic
				al
				short
				term.





During Transfer of	During
an aerodrome	Transf
both ATCOs shall	er of
be presented with	an
the same	aerodr
information on	ome
the aerodrome	both
being transferred	ATCOs
with all available	shall
technical systems	be
as replicas until	prese
the transfer	nted
process is	with
finished,	the
readiness by	same
overtaking ATCO	inform
is confirmed and	ation
the fully control	on the
over the new	aerodr
aerodrome is	ome
being reported	being
established.	transf
	erred
	with
	all
	availa
	ble
	techni
	cal
	syste
	ms as
	replica
	s until
	the





						transf	
						er	
						proces	
						s is	
						finishe	
						d <i>,</i>	
						readin	
						ess by	
						overta	
						king	
						ATCO	
						is	
						confir	
						med	
						and	
						the	
						fully	
						contro	
						l over	
						the	
						new	
						aerodr	
						ome is	
						being	
						report	
						ed	
						establi	
						shed.	
			 Transfer	 	Visual	Transf	
			procedures (for		Presentatio	er	
			the transfer of an		n and head	proce	
			aerodrome		down	dures	
			between MRTMs)		displays	(for	
			shall be locally		shall have	the	
			Shall be locally		Shall have	the	

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defined with a	the same	
clear description	layout fo	
of the associated	all the	an
roles and	possible	aerodr
responsibilities	aerodron	
and	configura	tio betwe
corresponding	ns	en
coordination		MRT
procedures.		Ms)
		shall
		be
		locally
		define
		d with
		a clear
		descri
		ption
		of the
		associ
		ated
		roles
		and
		respo
		nsibilit
		ies
		and
		corres
		pondi
		ng
		coordi
		nation
		proce
		dures.

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SESAR 2020 SOLUTION 05-35 SPR-INTEROP/OSED V3 - PART IV - HUMAN PERFORMANCE ASSESSMENT REPORT



					Visual Prese ntatio n and head down displa ys shall have the same layout for all the possib le aerodr ome config uratio ns	
			The HMI shall support the ATCO to easily distinguish the input/output devices of each aerodrome for vehicles.			

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Arg.	W2.PJ	The	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	Future validation	ENAV: there is the		
1.3.	05.35	sup	ciosca	W2-35-V3-	W2-35-	RTS:	activities shall	need to always properly		
5:	_Ben.	port		VALP-H02	V3-VALP-	Situation	involve the	balance the workload in		
Hu	1.3.5-	of		VALI HOZ	H02.010	awareness	Supervisor	order to minimise the		
man	1.3.5-	the			1102.010	was at an	position	impact on situation		
acto	12	supe				acceptable	position	awareness		
rs		rvis				level when		awareness		
can		or				providing				
mai		can				ATS to 3				
ntai		impr				aerodromes				
na		ove				in parallel				
suffi		ATC				according to				
cien		O SA				the SASHA-				
t		beca				Q scores. It				
leve		use				stands to				
l of		futu				reason that				
situ		re				the support				
atio		wor				of the SUP				
n		kloa				(and the				
awa		d is				SUP				
rene		bett				planning				
SS.		er				tool) came				
		anti				handy for				
		cipa				the ATCOs				
		ted				to manage				
		and				their				
		mor				workload				
		е				and thus				
		effic				situational				
		ientl				awareness.				
		у								
		man				Indra/Avino				
		age				r: same as				
		d by				W2.PJ05.35				





dyn	_ls.1.3.1-1b	
amic		
alloc	2.1 DLR	
atio	same as	
n of	W2.PJ05.35	
aero	_ls.1.3.5-2	
dro	_15.1.5.5-2	
mes		
	COOPANS:	
	SUP was not	
	part of the	
	validation.	
	(probably	
	will	
	improve).	
	ENAV:	
	situation	
	awareness	
	was always	
	maintained	
	at	
	acceptable	
	level in the	
	scenario	
	with flexible	
	allocation	
	and the	
	supervisor	
	position had	
	a key role in	
	the support	
	of an	
	adequate	





situation awareness level. In the scenario without flexible allocation with 3 airports on 1 module the ATCO situation awareness could not be maintained at acceptable levels.
Future validation activities shall identify system possibilities on the SUP HML to indicate geographical characteristics and indication of different airports.





Arg.	W2.PJ	SA is	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	Future validation	ENAV: there is the		When	
1.3.	05.35	not		W2-35-V3-	W2-35-	RTS:	activities shall	need to always properly	When a	а	
5:	ls.1.1	suffi		VALP-H02	V3-VALP-	Situation	involve the	balance the workload in	handover is	hando	
Hu	3.5-13	cien			H02.010	awareness	Supervisor	order to minimise the	initiated or	ver is	
man		t				was at an	position	impact on situation	performed	compl	
acto		beca				acceptable	•	awareness	all systems	eted	
rs		use				level when			and	and	
can		the				providing			information	accept	
mai		num				ATS to 3			that belongs	ed all	
ntai		ber				aerodromes			to the same	syste	
na		of				in parallel			aerodrome	ms	
suffi		aero				according to			shall be	and	
cien		dro				the SASHA-			transferred	inform	
t		mes				Q scores.			in a	ation	
leve		to				The issue			synchronize	that	
l of		mon				mentioned			d way.	belon	
situ		itor				in column D				gs to	
atio		and/				did not				the	
n		or				come up.				same	
awa		the				ATCOs				aerodr	
rene		num				mostly				ome	
ss.		ber				worked				shall	
		of				with 2				be	
		task				aerodromes				accept	
		s to				in parallel,				ed in a	
		man				only				single	
		age				because				action	
		are				they had					
		too				the (human)					
		imp				resources to				When	
		orta				split 4				а	
		nt,				aerodromes				hando	
		and/				in a 2:2				ver is	
		or				manner.				initiat	

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beca	However,	ed or
use	ATCOs did	perfor
infor	state that in	med
mati	this	all
on/f	simulation	syste
unct	setup it	ms
ions	would have	and
avail	been	inform
able	difficult to	ation
 to	manage 3	that
 the	aerodromes	belon
SUP	for a long	gs to
are	period of	the
not	time.	same
suffi		aerodr
cien	Indra/Avino	ome
 t.	r: same as	shall
	W2.PJ05.35	be
	_ls.1.3.1-1b	transf
		erred
	2.1 DLR	in a
	same as	synchr
	W2.PJ05.35	onized
	_ls.1.3.5-2	way.
	COOPANS:	
	For majority	
	of ATCOs	
	situation	
	awareness	
	is at an	
	acceptable	
	level when	
	working in a	

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RTC with a
flexible
allocation of
aerodromes
between
MRTMs.
Nevertheles
s, the SA
could be
decreased
very quickly
when
controlling
three
aerodromes
with this
traffic
volume,
hence the
source of
information
is slightly
larger, the
incoming
calls from
aircraft and
vehicles are
increased,
traffic could
become
more
complex, so
that all
these
LIIE26





	_
factors	
increase the	
time	
needed for	
scanning of	
all systems	
in order to	
keep SA	
updated.	
ENAV:	
There was	
no issue	
raised for	
situational	
awareness	
in relation	
with the	
number of	
assigned	
airports in	
the	
scenarios	
with flexible	
allocation.	
This was not	
the case in	
the	
scenarios	
without	
flexible	
allocation	
were due to	
overloads	





	there were issue it was not possible to keep the situation awareness at acceptable level when 3 airports were assigned to 1 module					
W2-35-V3- W VALP-H12 V3	CRT-PJ05- Indra/HC N2-35- RTS: The /3-VALP- majority of 112.010 ATCOs did not report anything missing from the SUP system. There was one idea however that is	The RTC Supervisor role shall be provided with an overview of ATCO availability and their valid endorsements		Required information for ATCOs and SUP should be locally assessed before the deployment	Super visor planni ng tool HMI and ATCO' s modul e HMI shall be	Requ ired infor mati on for ATCO s and SUP shoul d be locall y

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worth to	locally asses
consider,	assess sed
i.e. to have	ed befor
a quick	before e the
access for	the depl
view only of	deplo oyme
any airport,	yment nt
so that the	of the
SUP in a RTC	RTC
environmen	with
t could	flexibl
follow an	e
emergency	allocat
situation	ion of
without	airpor
bothering	ts
the ATCO in	betwe
the MRTM.	en
	modul
Indra/Avino	es.
r: literative sector se	
Supervisors	Super
assessed	visor
that they	tool
did not	HMI
always have	shall
all required	displa
information	y the
available to	status
monitor the	of the
traffic	MRT
situation	M and
and	the
workload at	traffic





MRTMs and	load
to plan the	expect
allocation of	ed at
aerodromes	each
	single
The traffic	aerodr
information	ome
presented	under
in the	his/he
"timeline"	r
tool were	super
not always	vision
reliable.	to
Information	prope
presented	rly
in the	establi
"timeline"	sh the
tool were	flexibl
not	e
sufficient	allocat
for the	ion of
supervisors	aerodr
to assess	omes
the traffic	to the
situation	availa
and	ble
workload at	RTC
MRTMs.	Modul
A roster to	es
see ATCOs	
availability	The
was	RTC
missing, and	super
it was	visor





		difficult to			role	
		get an			shall	
		overview of			be	
		ATCOs			provid	
		endorseme			ed	
		nts.			with	
					ATCOs	
		2.1 DLR The			availa	
		results			bility	
		show that			and	
		all			their	
		information'			valid	
		s are			endor	
		available			semen	
		but they are			ts	
		difficult to				
		acquire,				
		especially				
		at a fitting				
		time				
		ENAV: For				
		both the				
		questions "I				
		had all the				
		information				
		I needed to				
		perform my				
		tasks" and				
		"I found the				
		information				
		provided in				
		the SUP				
		Working				

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		Position"			
		one answer			
		is			
		somewhat			
		disagree			
		and the			
		other one is			
		agree. The			
		reason for			
		not			
		achieving a			
		conclusive			
		result is			
		behind the			
		technical			
		limitation of			
		the			
		supervisor			
		planning			
		tool that			
		due to time			
		and			
		resources			
		constraint was not			
		linked to			
		the			
		simulation			
		platform			
		and thus all			
		the			
		calculation			
		were based			
		on a			





planned
traffic
sample
rather than
the live
traffic
managed in
the
simulation
experiment.
For one of
the SUP this
was a big
issue that
was
affecting
the level of
information
provided to
him, while
the other
supervisor
easily
adequate
his working
method to
deal with
the
limitation of
the
supervisor
tool.





		OBJ-PJ05-	CRT-PJ05-	Indra/HC	The RTC		The	The
		W2-35-V3-	W2-35-	RTS: Every	Supervisor shall		RTC	RTC
		VALP-H01	V3-VALP-	participant	be provided with a		Super	super
		VALF-HUI					visor	
			H01.030	agreed that the HMI	tool combining		role	visor
					the information		shall	role
				supported	(aerodromes'			may
				their	status, meteo,		access	be
				situational	forecasted traffic		functi	provi
				awareness	load and capacity)		ons	ded
				and	to facilitate		for	with
				decision-	decisions		comm	а
				making	regarding how to		unicat	tool
				process.	combine		ing	comb
					aerodromes in the		the	ining
				Indra/Avino	MRTM		status	the
				r: same as			of RTC	infor
				W2.PJ05.35			and	mati
				_ls.1.3.1-1b			aerodr	on
							omes	(aero
				2.1 DLR The			and	drom
				majority of			coordi	es'
				the			nating	statu
				participants			maint	s,
				confirms by			enanc	mete
				an above			e (to	о,
				average			be	forec
				SASHA			carrie	asted
				score which			d out	traffi
				indicates an			by a	с
				above			qualifi	load
				average			ed	and
				situation			engin	сара
				awareness.			eer/te	city)
							chnici	to

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			ENAV:			an).	facilit
			Situation			uny.	ate
			awareness			Super	decis
			was always			visor	ions
			maintained			tool	regar
			at			HMI	ding
			acceptable			shall	how
			levels			displa	to
						y the	comb
						status	ine
						of the	aero
						MRT	drom
						M and	es in
						the	the
						traffic	MRT
						load	М
						expect	
						ed at	
						each	
						single	
						aerodr	
						ome	
						under	
						his/he	
						r	
						super	
						vision	
						to	
						prope	
						rly	
						establi	
						sh the	
						flexibl	
						e	

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						allocat ion of aerodr omes to the availa ble RTC Modul es	
			The ATCO shall be provided with a system enabling to transfer one of the controlled aerodromes to another MRTM	The ATCO may be supported by the system indicating when clearances can be given.	The RTC Supervisor or similar role should be able to have a view over functional MRTM's in case of an emergency in order to be able to transfer an airport.	Super visor tool HMI shall displa y the status of the MRT M and the traffic load expect ed at each single aerodr ome under his/he r super	The ATCO may be supp orted by the syste m indic ating when clear ance s can be given The ATCO shoul d be





						vision	cumm
							supp
						to	orted
						prope	in
						rly	priori
						establi	tising
						sh the	tasks
						flexibl	(e.g.
						е	provi
						allocat	ding
						ion of	landi
						aerodr	ng
						omes	clear
						to the	ance
						availa	or
						ble	taxi
						RTC	clear
						Modul	ance)
						es	and
							forec
							ast
							the
							traffi
							с
							dem
							and
							from
							а
							supp
							ort
							tool
							in
							the
							tactic
							al
			<u> </u>	<u> </u>			ui





							short term.
			The RTC	Visual Presentation and		Super	The
			Supervisor role	head down displays shall		visor	RTC
			should be	have the same layout for		tool	Supe
			provided with a	all the possible		HMI	rviso
			technical	aerodrome		shall	r role
			overview of all	configurations		displa	shoul d be
			systems e.g. the MRTM, camera			y the status	
			functionality etc.			of the	provi ded
			in the RTC and of			MRT	with
			the aerodrome			M and	a
			systems e.g.			the	tech
			, navigational aids,			traffic	nical
			lights, emergency			load	overv
			alerting functions,			expect	iew
			for all involved			ed at	of all
			aerodromes part			each	syste
			of the RTC			single	ms
						aerodr	e.g.
						ome	the
						under	MRT
						his/he	Μ,
						r	came
						super	ra functi
						vision	funct
						to	ionali
						prope	ty

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SESAR 2020 SOLUTION 05-35 SPR-INTEROP/OSED V3 - PART IV - HUMAN PERFORMANCE ASSESSMENT REPORT



П						 rhu	oto
						rly	etc.
						establi	in
						sh the	the
						flexibl	RTC
						e	and
						allocat	of
						ion of	the
						aerodr	aero
						omes	drom
						to the	e
						availa	syste
						ble	ms
						RTC	e.g.
						Modul	navig
						es	ation
							al
						Visual	aids,
						Prese	lights
						ntatio	,
						n and	emer
						head	genc
						down	y
						displa	, alerti
						ys	ng
						shall	funct
						have	ions,
						the	for
						same	all
						layout	invol
						for all	ved
						the	aero
						possib	drom
						le e a re dr	es
						aerodr	part

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						ome config uratio ns	of the RTC
			The RTC Supervisor role should be provided with a display presenting an overview of the RTC, including e.g. MRTM status, aerodromes allocated to MRTMs, traffic load, etc. to be able to transfer an airport.	The HMI of the RTC technical system shall be locally assessed and designed in relation to the specific operational environment, depending on the size and type of the RTC		The HMI of the RTC techni cal syste m shall be locally assess ed and design ed in relatio n to the specifi c operat ional enviro nment , depen	The RTC Supe rviso r or simil ar role shoul d be able to have a view over funct ional MRT M's in case of an emer genc y in order





					ding	to be
					on the	able
					size	to
					and	trans
					type	fer
					of the	an
					RTC	airpo
						rt.
						The
						RTC
						Supe
						rviso
						r role
						shoul
						d be
						provi
						ded
						with
						а
						displ
						ay
						prese
						nting
						an
						overv
						iew
						of
						the
						RTC,
						inclu
						ding
						e.g.
						MRT

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						М
						statu
						S,
						aero
						drom
						es
						alloc
						ated
						to
						MRT
						Ms,
						traffi
						C
						load,
						etc. to be
						able
						to
						trans
						fer
						an
						airpo
						rt.
			The RTC	ATCO Planning too shall		The
			Supervisor should	provide accurate and		RTC
			be provided with	reliable traffic		Supe
			the forecasted	information		rviso
			demand for all			r
			involved			shoul
			aerodromes part			d be
			of the RTC.			provi
						ded
						with
						the

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									forec asted dem and for all invol ved aero drom es part of the RTC.
		OBJ-PJ05- W2-35-V3- VALP-H01	CRT-PJ05- W2-35- V3-VALP- H01.010	Indra/HC RTS: The mean scores of the China- Lake metric suggest that SUPs' situational awareness was at acceptable level. Indra/Avino r: same as W2.PJ05.35 _Is.1.3.1-1b	The ATCO shall be able to take over an aerodrome to one MRTM.	ATCOs and SUP tools shall use actual traffic		ATCOs and SUP tools shall use actual traffic	





2.1 DLR The
majority of
participants
at the SUP
workplace
indicates a
positive SA.
The PE
tailor-made
questionnai
re even
indicates so
much that
the
participants
thought
they could
also keep
the same SA
under
abnormal
condition.
ENAV:
Situation
awareness
was always
maintained
at
acceptable
levels





Arg.	W2.PJ	ATC	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	-Future validation	FNA	V: ARWY	The
1.3.	05.35	0	0.0000	W2-35-V3-	W2-35-	RTS: The	activities shall the		ted scan tool	ATCO
5:	ls.1.3	abili		VALP-H02	V3-VALP-	issue	SUP's level of		ks the runway	shoul
Hu	.5-6	ty to			H02.030	mentioned	situation		could further	d be
man		judg				in column D	awareness		ice ATCOs'	supp
acto		e				did not			n awareness	orted
rs		dist				come up in			bly reduce the	in
can		ance				the			, orkload	moni
mai		/sep				simulations.		Out of the	e window view	torin
ntai		arati						reguirem	nents shall be	g the
na		on				Indra/Avino			d finally to	runw
suffi		may				r: same as		sup	port the	ay
cien		be				W2.PJ05.35			ent of the RTC	A
t		imp				_ls.1.3.1-7			ble allocation	RWY
leve		acte						of airpo	orts between	auto
l of		d by				2.1 DLR		m	odules.	mate
situ		com				same as				d
atio		pres				W2.PJ05.35				scan
n		sed				_ls.1.3.1-7				tool
awa		ОТ								that
rene		W				COOPANS:				chec
ss.		pres				ATCOs had				ks
		enta				a possibility				the
		tion.				to choose if				runw
						they want				ay is
						to work in				clear
						single,				may
						double or				supp
						triple mode				ort
						of				ATCO
						presentatio				s in
						n, in order				the
						to allow				RTC
						them as				with





much as	flexib
possible	le
flexibility	alloc
how	ation
aerodromes	betw
to be	een
allocated	
	mod
within the	ules
VP.	
Compressio	
n of the	
aerodromes	
in double	
mode felt	
fine, while	
compressio	
n in triple	
mada	
mode	
(regardless	
the number	
of	
presented	
aerodromes	
), started	
feeling quite	
small.	
ENAV:	
Situation	
awareness	
was always	
maintained	
at	
acceptable	





levels. 2
OTW were
assessed:
120° and
180°. The
120°
required
too many
interaction
with the PTZ
system to
check the
runway was
clear, while
the 180°
improved
the
situation
awareness
as there
was no
need of
interaction
with the PTZ
to check the
runway.
Anyway the
ATCOs
suggested
an
automated
tools to
check the





				runway is clear				
		OBJ-PJ05- W2-35-V3- VALP-H11	CRT-PJ05- W2-35- V3-VALP- H11.020	Indra/HC RTS: Most of the ATCOs (66.6%) agree with the InNOVA being user- friendly. The issue mentioned in column D did not come up. Indra/Avino r: same as W2.PJ05.35 _Is.1.3.2-3b Indra/HC PSM: With regards to		COOPANS: Longer training session with focus on the PTT (Push To Talk) ENAV: Visual panorama view requirements shall be refined finally to support the deployment of the RTC with flexible allocation of airports between modules.		
				the Visual Panorama (OTW), the sharpness and				

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resolution
of the
camera
images
were
positively
regarded,
even
though it
was quite
visible that
Pápa
aerodrome
only had
Full HD
cameras,
and not 4K
like those
other two
aerodromes
(Nyíregyház
a and Győr-
Pér). It
would have
been useful
if the labels
had worked
as needed.
There were
a lot of
labels that
connected
to
unconcerne





d
overflights,
yet due to
radar
coverage
limitations
some of the
arrivals/dep
artures had
no labels.
Without
labels it was
extremely
difficult to
spot the
small VFRs,
which are
visible in
the actual
TWR
building. On
the other
hand, if the
labels
worked for
the arriving
VFRs, it
would be a
major
benefit, as
VFRs from a
certain
distance are
not visible





	from the				
	TWR either				
	The "box				
	and follow'				
	functionalit				
	y (i.e.				
	moving				
	target				
	indicator) is				
	also an				
	improveme				
	nt				
	compared				
	to the				
	convention	a			
	I TWR				
	operation,				
	as this				
	augmented				
	reality				
	solution				
	helps to				
	detect				
	movement				
	on any area				
	of the				
	aerodrome				
	that is				
	selected.				
	sciceleu.				
	2.1 DLR				
	Same as				
	W2.PJ05.35				
	_ls.1.3.2-3k				





			COOPANS:	
			Majority of	
			ATCOs	
			confirm the	
			usability of	
			input	
			devices and	
			HMI	
			controls.	
			ENAV: The	
			Remote	
			Tower	
			Module	
			ATCOs	
			didn't like a	
			dedicated	
			monitor for	
			PTZ function	
			and would	
			have	
			preferred to	
			have a	
			picture in	
			the picture	
			function	
			with	
			command	
			integrated	
			in the strip	
			bay to	
			facilitate	
			the	





interactions
with the
OTW and
the zoom
functions.
Also,
Remote
Tower
Module
ATCOs
suggested
improveme
nts to the
OTW: to
mark the
line
between
the airports
in the OTW
to make
more visible
the borders
between
airports and
to provide
the aircraft
labels on
the OTW
only for
active
flights. Also
they
suggested to avoid fix
to avoid fix





			position for the airports			
		#N/D				





Arg.	W2.PJ	Vari	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	-Future validation	ENAV: Emergency		
1.3.	05.35	ous		W2-35-V3-	W2-35-	RTS: The	activities shall the	button and transfer		
5:	ls1.3.	simil		VALP-H11	V3-VALP-	majority of	SUP's level of	acceptance HMI in the		
Hu	5-10	ariti			H11.070	ATCOs	situation	ATCO module CWP		
man		es				(83.3%)	awareness	shall be reviewed for		
acto		on				were aware		the deployment of the		
rs		the				which		RTC with flexible		
can		airp				aerodrome		allocation of airports		
mai		orts				was placed		between modules.		
ntai		cont				to which				
n a		rolle				positions of				
suffi		d				the system.				
cien		(lan				The issue				
t		dsca				mentioned				
leve		pe,				in column D				
l of		buil				did not				
situ		ding				come up.				
atio		s,								
n		run				Indra/Avino				
awa		way				r: same as				
rene		conf				W2.PJ05.35				
SS.		igur				_ls.1.3.1-7				
		atio								
		n				2.1 DLR The				
		etc.)				results				
		indu				show that				
		ce a				the majority				
		risk				of				
		to				participants				
		mis				was aware				
		mat				of the				
		ch				displayed				
		sign				aerodromes				
		al/c				and radar				





ue	configuratio	
and	ns.	
relat		
e	COOPANS:	
that	Majority of	
to	ATCOs	
the	confirm that	
wro	there was	
ng	no	
airp	confusion	
ort.	regarding	
(con	where a	
figur	certain	
atio	aerodromes	
n of	was going	
airp	to be placed	
ort)	in the visual	
	presentatio	
	n (VP).	
	ENAV: no	
	issues of	
	mismatchin	
	g signal/cue	
	were raised	
	in relation	
	to the	
	Human	
	machine	
	interface,	
	anyway the	
	ATCOs	
	mentioned	
	that	





	Emergency button and transfer acceptance HMI should be improved for both the positions.				
		The diversity of the different aerodromes in terms of geographical specifities and procedures have to be included in the training			
W2-35-V3- W VALP-H11 V	CRT-PJ05- N2-35- RTS: The Sue H11.080 In column D did not come up in the simulations. Indra/Avino r: same as W2.PJ05.35 _Is.1.3.1-7	-Future validation activities shall identify system possibilities on the SUP HMI to indicate different airports.	ENAV: Emergency button and transfer acceptance HMI in the ATCO module CWP shall be reviewed for the deployment of the RTC with flexible allocation of airports between modules.	An additional Weather Display and Information is recommend ed on an additional screen if not available on the VP.	





2.1 DLR The majority of the ATCOS were aware which airport will be
transferred and under which
COOPANS:
Majority of the ATCOs confirm they were
never confused witch
aerodromes that was going to be
transferred. ENAV: no
issues of mismatchin g signal/cue
were raised in relation to the Human





						machine interface, anyway the ATCOs mentioned that Emergency button and transfer acceptance HMI should be improved for both the positions.				
Arg. 2.1. 6: The leve l of trus	W2.PJ 05.35 _Is.2.1 .6-1	ATC Os mig ht not trust in	Closed	OBJ-PJ05- W2-35-V3- VALP-H13	CRT-PJ05- W2-35- V3-VALP- H13.010	No issues raised about level of trust in the different validation exercises	-Future validation activities shall address the level of trust in the operations and the associated system of the SUP			
t in auto mat ed func tion s is appr opri ate.		the syst em if: - the relia bilit y of the sup port		OBJ-PJ05- W2-35-V3- VALP-H13	CRT-PJ05- W2-35- V3-VALP- H13.020	ATCOs trusted in the reliability of the conformanc e monitoring provided by the events in the DFS exercise	The training curricula shall familiarize the ATCOs with the new concept and the corresponding tools (e.g. binoculars), in order to ensure they have an adequate level of trust			





ed	In the DFS
task	exercise
prio	ATCOs rated
ritie	the trust in
s is	the
too	automation
low	support
- the	provided by
relia	the events
bilit	as being
y of	quite
the	helpful.
conf	Alarms and
orm	alerts were
ance	provided for
mon	conflicting
itori	clearances
ng	as well as
is	for non-
too	conformanc
low	es (as
	defined in
	the airport
	safety nets).





Arg.	W2.PJ	The	closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	The ATCO shall,		The	
2.3.	05.35	type	cioseu	W2-35-V3-	W2-35-	RTS: Same	from the remote	ATCOs should be able	binocular	
1:	ls.2.3	of		VALP-H11	VV2-33- V3-VALP-	as	location, apply	to move aerodromes	functionalit	
The	.1-1	infor		VALFIIII	H11.010	as W2.PJ05.35	ICAO Doc 4444 -	also to the C-slot (upper	y should	
-	.1-1	mati			H11.010		Aerodrome		include	
type of						_ls.1.3.1-7		right side), even if there		
-		on				la dua (Audia a	controllers shall	are only two	predefined	
info		prov				Indra/Avino	maintain a	aerodromes (Indra	and user-	
rma		ided				r: same as	continuous watch	specific	definable	
tion		does				W2.PJ05.35	on all flight	recommendation).	automatic	
prov		not				_ls.1.3.1-7	operations on and		scanning	
ided		satis					in the vicinity of	COOPANS: Having same	patterns,	
satis		fy				2.1 DLR	an aerodrome as	layout on the WACOM	such as	
fies		the				Same as	well as vehicles	screen for e-strips for	runway	
the		infor				W2.PJ05.35	and personnel on	single, double and triple	sweeps.	
info		mati				_ls.1.3.1-7	the manoeuvring	aerodrome mode.		
rma		on					area Visual			
tion		requ				COOPANS:	observation shall			
req		irem				ATCOs state	be achieved			
uire		ents				the	through direct			
men		of				simulator	out-of-the-			
ts of		the				(S-m)	window			
the		ATC				provided	observation, or			
hum		Os				useful data	through indirect			
an.		(and				in an	observation			
		SUP)				understand	utilizing a visual			
						able way	surveillance			
						and that	system which is			
						they rarely	specifically			
						needed to	approved for the			
						search for	purpose by the			
						information.	appropriate ATS			
							authority.			
						ENAV:				
						ATCOs did	ATCOs shall be			
						nicos ulu	An eos shan be			

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			not raise any issue in relation to the level of information that were provided	able to read the MET data from the Visual Panorama (wind, RVR in LVP).			





Supervisor shall be provided with a tool combining the information (aerodromes' status, meteo, forecasted traffic load and capacity) to facilitate decisions regarding how to combine aerodromes in the MRTM MRTM MRTM A to facilitate decisions regarding how to combine aerodromes in the MRTM A to facilitate decisions regarding how to combine aerodromes in the facilitate decisions regarding how to combine aerodromes in the facilitate decisions regarding how to combine aerodromes in the facilitate decisions dec					 			
be provided with a tool combining the information (acrodromes' include role role role role role role role rol				The RTC		The	The	The
Image: Section of the information (hereodomes') tool combining the information (hereodomes') automatic shall may status, meteo, forecasted traffic load and capacity) tracking of access be too facilitate decisions regarding how to combine aerodromes in the aminals). status moting aircraft, ons ded aerodromes moving fuel include regarding how to combine aerodromes in the aminals). status to facilitate decisions include regarding how to combine aerodromes in the aminals). status the information aminals).							RTC	RTC
Image: State in the information (aerodromes' (aerodromes' status, meteo, forecasted traffic load and capacity) to facilitate decisions image: State stat				be provided with a		functionalit	Super	super
Image: State in the information (aerodromes' status, meteo, forecasted traffic load and capacity) incite information (aerodromes' status, meteo, forecasted traffic load and capacity) incite information (aerodromes' information (aerodromes' status, meteo, forecasted traffic load and capacity) incite information (aerodromes' information (aerodromes' information				tool combining		y should	visor	visor
status, meteo, tracking of access ber forecasted traffic noving functi provi load and capacity) to facilitate vehicles or for with obstructions comm a (e.g. unicat tof orbite aerodromes in the marinals). status mati aerodromes in the animals). ofter ining animals). status mati aerodromes in the mati aerodromes animals). status mati aerodromes in the marinals status mati aerodromes aerodromes arodromes arodromes arodromes aerodromes arodromes aerodromes arodromes aerodromes						include	role	role
Image: Section of the section of th				(aerodromes'		automatic	shall	may
Image: Section of the section of th				status, meteo,		tracking of	access	be
Image: Section of the section of th				forecasted traffic		moving	functi	provi
Image: Section						-	ons	ded
Image: Single						vehicles or	for	with
Image Image Image Image Image Image Image Image Image Image Image Image Image				decisions		obstructions	comm	а
Image Image Image Image Image Image Image Image Image Image Image Image Image				regarding how to		(e.g.	unicat	tool
Image: Singer								
MRTM animals). status the of RTC infor and mati aerodr on omes (aero) omes (aero) omes (aero) omes (aero) anting status total total total <tdt< td=""><td></td><td></td><td></td><td>aerodromes in the</td><td></td><td></td><td></td><td>ining</td></tdt<>				aerodromes in the				ining
Image: state stat				MRTM				
Image: Single							of RTC	infor
Image: Single							and	mati
Image: Single							aerodr	
A P A P A P A P A P A P A P A P A P A P							omes	
Image: state Image: state Image: state Image: state Image: state Im							and	
Image: state Image: state Image: state Image: state Image: state Image: state							coordi	es'
Image: Solution							nating	statu
Image: state stat								
Image: state stat							enanc	
Image: state stat							e (to	о,
d out traffi by a c								
d out traffi by a c							carrie	asted
by a c								
qualifi load							qualifi	load
ed and								and
engin capa								
eer/te city)								
to							•	





					chnici an).	facilit ate decis ions regar ding how to comb ine aero drom es in the MRT M
			The information on the status of the lights and no- visual aids should be always visible for the controller, making it easy to identify to what aerodrome they correspond to.			





The RTC	The
Supervisor shall	RTC
be provided with	Super
information to	visor
facilitate	shall
decisions	be
regarding how to	provid
combine	ed
aerodromes in	with
the MRTM.	inform
	ation
	to
	facilita
	te
	decisi
	ons
	regard
	ing
	how
	to
	combi
	ne
	aerodr
	omes
	in the
	MRT
	М.





			Indra/IIC	The ATCO shall be		 Cupar	
	OBJ-PJ05-	CRT-PJ05-	Indra/HC	The ATCO shall be		Super	
	W2-35-V3-	W2-35-	RTS: The	presented with		visor	
	VALP-H12	V3-VALP-	majority of	planning		planni	
		H12.010	ATCOs did	information (e.g.		ng	
			not report	forecasted traffic,		tool	
			anything	forecasted		HMI	
			missing	weather, etc.) in		and	
			from the	order to		ATCO'	
			SUP system.	adjust/plan traffic		S	
			There was	to any constraints		modul	
			one idea	or foresee the		e HMI	
			however	need for a split or		shall	
			that is	transfer of the		be	
			worth to	merged		locally	
			consider,	aerodromes		assess	
			i.e. to have			ed	
			a quick	SUP position		before	
			access for	should have a		the	
			view only of	quick access for a		deplo	
			any airport,	"view only"		yment	
			so that the	radar+visual+voic		of the	
			SUP in a RTC	e function of any		RTC	
			environmen	airport. In an		with	
			t could	emergency		flexibl	
			follow an	situation there		e	
			emergency	would be no time		allocat	
			situation	to walk to the		ion of	
			without	MRTM position		airpor	
			bothering	(also leaving the		ts	
			the ATCO in	others without		betwe	
			the MRTM.	SUP is not an		en	
				option) so there		modul	
			Indra/Avino	should be a way		es.	
			r: same as	for the SUP to get			

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W2.PJ05.35 as much	Super
_ls.1.13.5- information as	visor
13 possible about	tool
the situation	HMI
2.1 DLR The without putting	shall
results extra workload on	displa
show that the ATCO.	y the
all	status
information'	of the
s are	MRT
available	M and
but they are	the
difficult to	traffic
acquire,	load
especially	expect
at a fitting	ed at
time	each
	single
ENAV: For	aerodr
both the	ome
questions "I	under
had all the	his/he
information	r
I needed to	super
perform my	vision
tasks" and	to
"I found the	
information	prope
	rly
provided in	establi
the SUP	sh the
Working	flexibl
Position"	e .
one answer	allocat
is	ion of

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somewhat	aerodr
disagree	omes
and the	to the
other one is	availa
agree. The	ble
reason for	RTC
not	Modul
achieving a	es
conclusive	
result is	
behind the	
technical	
limitation of	
the	
supervisor	
planning	
tool that	
due to time	
and	
resources	
constraint	
was not	
linked to	
the	
simulation	
platform	
and thus all	
the	
calculation	
were based	
on a	
planned	
traffic	
sample	

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							-Future validation			
							activities shall			
							identify system			
							possibilities on			
							the SUP HMI to			
							indicate different			
							airports.			
Arg.	W2.PJ	ATC	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	The ATCO shall be		ATCO	
2.3.	05.35	Os		W2-35-V3-	W2-35-	RTS: The	provided with the		shall	
1:	_ls.2.3	are		VALP-H02	V3-VALP-	information	traffic forecast,		be	
The	.1-2	not			H02.030	on the	including vehicles,		provid	
type		awa				arrivals was	at the different		ed	
of		re of				not as	airports in the		with	
info		the				efficiently	MRTM		accura	
rma		traff				presented			te and	
tion		ic				as it could			reliabl	
prov		fore				have been,			е	
ided		cast				thus the			traffic	
satis		and				timeline			and	
fies		thus				was			planni	
the		exp				oftentimes			ng	
info		ecte				switched			inform	
rma		d				off. ATCOs			ation	
tion		wor				turned to			throug	
req		kloa				the strips			h the	
uire		d				instead as it			ATCO	
men		level				contained			Planni	
ts of		at				discrete and			ng	
the		the				more			tool.	
hum		diffe				precise				
an.		rent				data.				
		airp								
		orts				Indra/Avino				
		in				r: same as				





the	W2.PJ05.35
shor	_ls.1.3.1-7
t	
ter	2.1 DLR
m	same as
exec	W2.PJ05.35
utio	_ls.1.3.1-7
n	
phas	COOPANS:
e	ATCOs were
neg	aware
ativ	mostly for
ely	the traffic
affe	forecast. It
ctin	was
	achieved
g ATC	through the
Os'	system (EFS,
situ	RDP, ATCO
atio	planning
n	tool). VFR
awa	and vehicle
rene	traffic were
SS	not
	presented
	at the ATCO
	planning
	tool, so that
	complaints
	were mainly
	based on
	this
	disadvantag
	e. This could





increase the
workload in
a very short
period, so
the ATCOs
SA, might
also be
reduced.
Nevertheles
s, the SA
was on an
acceptable
level for all
four
scenarios.
ENAV:
Situation
awareness
was always
maintained
at
acceptable
level and no
issues were
raised about
the traffic
forecast and
expected
workload
levels in the
solution
scenarios
Scenarios





			with flexible allocation			





OBJ-PJ05-	CRT-PJ05-	HC/Indra		COOPANS: Further		
W2-35-V3-	W2-35-	RTS: The		development of the	ATCO	
VALP-H11	V3-VALP-	timeline		ATCO planning tool	Planning	
VALP-HII					-	
	H11.060	used as a		with focus on reliability,	too shall	
		short-term		accuracy and complex	provide	
		planning		traffic is needed.	accurate	
		tool was not			and reliable	
		preferred.		ENAV: Emergency	traffic	
		ATCOs		button and transfer	information	
		turned to		acceptance HMI in the		
		the strips		ATCO module CWP		
		instead as it		shall be reviewed for		
		contained		the deployment of the		
		discrete and		RTC with flexible		
		more		allocation of airports		
		precise		between modules.		
		data.				
		Indra/Avino				
		r: ATCOs				
		could not				
		always rely				
		on the				
		traffic				
		forecast				
		tool to				
		anticipate				
		the traffic				
		sequence or				
		assess the				
		future				
		traffic load.				
		The timeline				
		was not				

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always
accurate in
reflecting
the traffic
sequence as
executed by
the
simulator
environmen
t. In
addition,
when the
number of
simultaneou
S S
movements
was high it
was not
possible to
see all
flights at
the same
time
without
scrolling.
scioning.
2.1 DLR The
majority of
the ATCOs
found the
tool useful
in terms of
short-term
planning





		 1		 		
			and its			
			different			
			aspects.			
			aspects.			
			COODANIC			
			COOPANS:			
			ATCOs state			
			that the			
			ATCO			
			planning			
			tool was			
			useful, it is			
			however in			
			need of			
			further			
			developmen			
			t in order to			
			be a reliable			
			and trustful			
			tool.			
			ENAV:			
			Overall			
			usability			
			and utility			
			was			
			considered			
			acceptable,			
			and no			
			issues were			
			raised for			
			traffic			
			forecast.			





Arg.	W2.PJ	Wro	Closed	#N/D	#N/D				
Arg. 2.3.	05.35	ng							
2:	_ls.2.3	APT							
Inpu	.2-1	inpu							
t		t							
devi		devi							
ces		ce is							
(e.g.		used							
key		to							
boar		cont							
d,		rol							
mou		func							
se,		tion							
touc		in							
h		the							
scre		diffe							
en)		rent							
corr		APT.							
esp		Som							
ond		e							
to		erro							
HF		rs							
prin		wou							
cipl		ld							
es.		be							
[V1:		read							
AIR		ily							
only		iden							
]		tifie							
		d							
		and							
		corr							
		ecte							
		d,							





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A	If ATC					
C	Os					
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c	cont					
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n	ng					
n	mor					
e	e than					
t	than					
C	one APT					
A	APT					
t	they					
n	may					
h	hav					
e	e diffe					
C	diffe					
r	rent					
	inpu					
t	t devi					
f	ces for					
	diffe					
r	rent					
	APT,					
t	thes					
e	e					
n	may					
10	lead					
t	to					





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end					
user					
can					
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	a task.								
2.3. 05.35 3: _ls.2.3 Visu .3-1 al disp lays and othe r type s of out put devi ces adh ere	Visu Close al close al displ ays and othe r outp ut devi ces usab ility lack, for exa mpl e ther	d OBJ-PJ05- W2-35-V3- VALP-H11	CRT-PJ05- W2-35- V3-VALP- H11.070	INDRA OSED Discussion: There were some concerns raised by ATCOs when working on the OSED as it could increase workload and impact situational awareness if the aerodromes are	The ATCO shall observe visual communication from aircraft that are within the ATCO visual range, i.e.	The RTC Supervisor or similar role should be able to have a view over functional MRTM's in case of an emergency in order to be able to transfer an airport.	The visual panorama and the ATCO head- down display shall allow a user- friendly flexible allocation of the position of the transferred aerodromes established by ATCOs	The visual panor ama and the ATCO head- down displa y shall allow a user- friendl y flexibl e allocat	





cipl	be a	risk	positi
es.	conf	mitigation	on of
[V1:	usio	proposal	the
AIR	n	was to	transf
only	with	enable the	erred
]	rega	ATCO to	aerodr
	rds	place the	omes
	to	aerodromes	establi
	whic	in the	shed
	h	MRTM as	by
	aero	s/he sees	ATCOs
	dro	fit.	
	me	Furthermor	
	is	e, basic	
	displ	rules that	
	ауе	the busiest	
	d on	aerodrome	
	whic	should be	
	h	placed in	
	visu	the middle	
	al	row in the	
	displ	exercise	
	ay.	might	
		mitigate the	
		issue.	
		Indra/Avino	
		r: same as	
		W2.PJ05.35	
		_ls.1.3.1-7	
		2.1 DLR The	
		results	
		show that	





		the majority			
		of			
		participants			
		was aware			
		of the			
		displayed			
		aerodromes			
		and radar			
		configuratio			
		ns.			
		COODANG			
		COOPANS:			
		Majority of			
		ATCOs			
		confirm that			
		there was			
		no			
		confusion			
		regarding			
		where a			
		certain			
		aerodromes			
		was going			
		to be placed			
		in the visual			
		presentatio			
		n (VP).			
		ENAV: No			
		issues were			
		raised about			
		possible			
		confusion of			
		which			
		willen			





	aerodrome was displayed on which display				
W2-35-V3- W VALP-H11 V3	CRT-PJ05- N2-35- RTS: It was (3-VALP- unanimousl 111.080 y agreed that it was clear which aerodrome was transferred between the MRTMs The Supervisor made sure that ATCOs were aware which aerodromes will be affected by the split.	aerodromes are active shall be available (e.g. grey out, removing the inactive one).	ENAV: Out of the window view requirements shall be refined finally to support the deployment of the RTC with flexible allocation of airports between modules.		





			W2.PJ05.35			
			_ls.1.3.1-7			
			2.1 DLR The			
			majority of			
			the ATCOS			
			were aware			
			which			
			airport will			
			be			
			transferred			
			and under			
			which			
			conditions.			
			COOPANS:			
			Majority of			
			the ATCOs			
			confirm			
			they were			
			never			
			confused			
			witch			
			aerodromes			
			that was			
			going to be			
			transferred.			
			ENAV:			
			Remote			
			Tower			
			Module			
			ATCOs			
			suggested			
1						





			improveme			
			nts to the			
			OTW: to			
			mark the			
			line			
			between			
			the airports			
			in the OTW			
			to make			
			more visible			
			the borders			
			between			
			airports and			
			to provide			
			the aircraft			
			labels on			
			the OTW			
			only for			
			active			
			flights. Also			
			they			
			suggested			
			to avoid fix			
			position for			
			the airports			





0	BJ-PJ05- CRT-P	05- Indra/HC	The ATCO should	COOPANS: Longer		When	The
N N	V2-35-V3- W2-3	- RTS: Most	be provided with	training session with	When a	а	bord
V	ALP-H11 V3-VA	LP- of the	an indication of a	focus on the PTT (Push	handover is	hando	er of
	H11.0	20 ATCOs	radio	To Talk)	initiated or	ver is	each
		(66.6%)	transmission		performed	compl	displ
		agree with	related to an	ENAV: Out of the	all systems	eted	ayed
		the InNOVA	aerodrome, e.g.	window view	and	and	aero
		being user-	either in in the	requirements shall be	information	accept	drom
		friendly.	visual	refined finally to	that belongs	ed all	е
		The issue	presentation or	support the	to the same	syste	shoul
		mentioned	the flight strip	deployment of the RTC	aerodrome	ms	d be
		in column D	system	with flexible allocation	shall be	and	mark
		did not		of airports between	transferred	inform	ed in
		come up.	ATCOs shall be	modules.	in a	ation	the
		ATCOs were	supported by a		synchronize	that	Visua
		always	squelch indication		d way.	belon	1 I
		aware	and coloured			gs to	Pano
		which	frames in order to			the	rama
		airport is	quickly distinguish			same	and
		being	the aerodromes			aerodr	head
		displayed	and identify			ome	-
		on which	where the call is			shall	dow
		monitor.	coming from.			be	n
		However, it	These features			accept	displ
		would be	shall be			ed in a	ays
		easier to	integrated both			single	with
		draw a	into the Visual			action	possi
		coloured	Panorama and				ble
		frame	the head-down				colou
		around the	display (i.e. this is			When	r
		airport	a solution for the			а	codin
		radar map,	requirement			hando	g for
		EFS bay and	above-			ver is	the
		visual	AF01.0001).			initiat	differ

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			nanarama			ad ar	ont
			panorama			ed or	ent
			displays, so			perfor	positi
			that it's			med	ons
			easier to			all	or
			create a			syste	aero
			mental			ms	drom
			model			and	es.
			about the			inform	The
			aerodrome			ation	ATCO
			placement			that	shoul
			on the			belon	d be
			monitors.			gs to	provi
						the	ded
			Indra/Avino			same	with
			r: same as			aerodr	а
			W2.PJ05.35			ome	visua
			_ls.1.3.2-3b			shall	I
			-			be	clear
			2.1 DLR			transf	indic
			Same as			erred	ation
			W2.PJ05.35			in a	de-
			_ls.1.3.2-3b			synchr	activ
						onized	able
			COOPANS:			way.	on
			Majority of				ATCO
			ATCOs				requ
			confirm the				est of
			usability of				whic
			input				h
			devices and				aero
			HMI				drom
			controls. No				e an
			confusion				inco
			regarding				ming





			where			radio
			which			trans
			aerodrome			missi
			was placed.			on is
						relat
						ed to
			ENAV: the			in
			overall			order
			trend of the			to
			answers for			quick
			the support			Iy
			provided by			, distin
			the ATCO			guish
			system/HMI			the
			is positive,			aero
			but the			drom
			difference			es
			between			and
			the			ident
			threshold			ify
			and the			wher
			mean			e the
			values is not			call is
			so distant as			comi
			the other			ng
			analysed			from.
			indicators.			
			This is to be			
			seen mainly			
			in relation			
			to the			
			employed			
			HMI as all			
			the test			





subjects
suggested
improveme
nts,
especially in
the position
of the
emergency
button and
the
handover
transfer
that were
located in
the border
of the head-
down
display while the
while the
ATCOs
would have
preferred
them
integrated
in the strip
bay area.
ATCOs also
suggested
to mark the
boarder
between
the
displayed
airports in





OBJ-PJ05- W2-35-V3- VALP-H11 CRT-PJ05- W2-35- V3-VALP-H11	RTS: The	The display of aerodromes shall allow the ATCO to easily distinguish which information is related to which	COOPANS: Further development of the ATCO planning tool with focus on reliability, accuracy and complex traffic is needed.	Required information for ATCOs and SUP should be locally	Requ ired infor mati on for ATCO
	the potential for	aerodrome (VP, radar, EFSS etc.)	ENAV: the prioritization tool algorithm itself	assessed before the	s and SUP
	human		would need to be	deployment	shoul
	error by not	ATCOs shall be	enriched with as many		d be
	moving the	supported by a	cases as possible in		locall
	MET	squelch indication	order to be able to		У
	window	and coloured	perform its task in most		asses
	together	frames in order to	situations, perhaps by		sed

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with the quickly distinguish	associating artificial	befor
radar map the aerodromes	intelligence and	e the
and EFS and identify	machine learning	depl
bay. This where the call is	technology with this	oyme
has led to coming from.	tool.	nt
the event These features		
when a MET shall be		
window was integrated both		
next to a into the Visual		
different Panorama and		
aerodrome' the head-down		
s EFS bay, display (i.e. this is		
causing a solution for the		
confusion. requirement		
The above-		
handheld HPdesign_3).		
mic with its		
two-button		
layout also		
led to		
errors.		
Indra/Avino		
r: same as		
W2.PJ05.35		
_ls.2.3.1-2		
2.1 DLR The		
majority of		
the ATCOs found the		
found the		
tool useful		
in terms of		
short-term		

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planning	
and its	
different	
aspects.	
aspects.	
COORANG .	
COOPANS:	
ATCOs state	
that the	
ATCO	
planning	
tool was	
useful, it is	
however in	
need of	
further	
developmen	
t in order to	
be a reliable	
and trustful	
tool.	
ENAV:	
ATCOs	
confirm the	
adequacy of	
the usability	
and utility	
of flight list	
traffic	
forecast and	
prioritisatio	
n function	
integrated	
in the EFPS	





	syste				
	the n	ext			
	actio	to be			
	perfo	med.			
	Desp				
	most	of the			
		ers are			
	posit				
	there				
	some	were			
	scena	rios			
	that o				
	not r				
		ctory			
	value				
	Indee				
	durin	the			
	debri	fing,			
	the A				
	were				
	really				
	enthu	siastic			
	abou	the			
	provi				
	supp	rt and			
	even	f they			
	judge				
	usefu	there			
	was r				
	much				
	inter				
	it. Th				
	comr				
	can a				
	can a	50			

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explain the
answers to
the post
simulation
questions
provided
below. It
has to be
considered,
when
reading
these
results, that
ATCOs
involved in
the exercise
were not
familiar
with the
EFSP
system, so
the HMI
indication
processed
by the ATCO
Planning
Tool
algorithm
was not
always
obvious as
supporting
information.
Moreover,

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			the					
			algorithm					
			itself would					
			need to be enriched					
			with as					
			many cases					
			as possible					
			in order to					
			be able to					
			perform its					
			task in most					
			situations,					
			perhaps by					
			associating					
			artificial					
			intelligence					
			and					
			machine					
			learning					
			technology with this					
			tool.					
	OBJ-PJ05-	CRT-PJ05-	Indra/HC	If Radar Labels	COOPANS: Having same		EFS	
	W2-35-V3-	W2-35-	RTS: The	are to be	layout on the WACOM	When a	shall	
	VALP-H11	V3-VALP-	system	provided, they	screen for e-strips for	handover is	be	
		H11.050	behaviour	shall be available	single, double and triple	initiated or	provid	
			during split	for all	aerodrome mode.	performed	ed to	
			and merge	aerodromes.		all systems	suppo	
			increased		ENAV: Out of the	and	rt	
			the		window view	information	ATCOs	
			potential for		requirements shall be	that belongs	mana	
			human		refined finally to	to the same	ging	
			error by not		support the	aerodrome	the	

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moving the	deployment of the RTC shall	II be remot
MET		nsferred e
window	of airports between in a	a tower
together		chronize modul
with the	dw	
radar map		
and EFS		When
bay. This		а
has led to		hando
the event		ver is
when a MET		compl
window was		eted
next to a		and
different		accept
aerodrome'		ed all
s EFS bay,		syste
causing		ms
confusion.		and
The		inform
handheld		ation
mic with its		that
two-button		belon
layout also		gs to
led to		the
errors.		same
		aerodr
Indra/Avino		ome
r: same as		shall
W2.PJ05.35		be
_ls.1.3.1-2		accept
		ed in a
2.1 DLR For		single
EXE-PJ05-		action
W2-35-V3-		





		 		1	1		
		2.1.1 again,					
		the SATI				When	
		scores show				а	
		that the				hando	
		ATCOs trust				ver is	
		the system				initiat	
		and the				ed or	
		interface.				perfor	
		They see				med	
		the				all	
		increased				syste	
		human				ms	
		error in the				and	
		changed				inform	
		role and				ation	
		responsibilit				that	
		ies.				belon	
						gs to	
		COOPANS:				the	
		ATCOs				same	
		stated that				aerodr	
		the human				ome	
		machine				shall	
		interface				be	
		could at				transf	
		sometimes				erred	
		increase the				in a	
		potential for				synchr	
		human				onized	
		error.				way.	
		-				,	
		ENAV: the					
		overall					
		perception					
 1		perception					





was that
human
error was
not
increased in
terms of
potential
and severity
respect to
the scenario
without
flexible
allocation
being the
most of the
answers
above the
tolerable
threshold of
4, anyway in
relation to
the HMI
ATCOs
suggested
improveme
nts in the
position of
the
handover
system
commands
and in the
emergency
communicat





				ion commands				
					The HMI shall support the ATCO to easily distinguish the input/output devices of each aerodrome for vehicles.		Required information for ATCOs and SUP should be locally assessed before the deployment	Requ ired infor mati on for ATCO s and SUP shoul d be locall y asses sed befor e the depl oyme nt
		OBJ-PJ05- W2-35-V3-	CRT-PJ05-	2.1 DLR For EXE-PJ05-	The ground frequency push	COOPANS: Further development of the	The ATCO may be	The ATCO
		VALP-H11	W2-35- V3-VALP-	W2-35-V3-	frequency push buttons have to	colour scheme for	supported	may
			H11.040	2.1.1 the	be integrated in	alerts	in	be
				majority of	the CWP in a way		monitoring	supp
				the ATCOs	that they are	 ENAV: Emergency	conformanc	orted

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confirms	easily	button and transfer	e to	in
that the	distinguishable	acceptance HMI in the	clearances	moni
alarms and	between airports	ATCO module CWP	on ground	torin
alerts were	(e.g. if airports are	shall be reviewed for		g
applicable	represented side	the deployment of the		conf
in the	by side the push	RTC with flexible		orma
situations.	buttons shall be	allocation of airports		nce
But	respectively	between modules.		to
additional	located on each			clear
features for	side).			ance
the safety				s on
net are				grou
essential.				nd
COOPANS:				The
Partially				ATCO
covered as				may
only alerts				be
was used				supp
during				orted
validation.				by
ATCOs				the
confirmed				syste
the usability				m,
and utility				indic
of the				ating
alerts.				situa
However				tions
the ATCOs				when
wanted to				contr
change the				adicti
runway				ve
alert from				(inco
red to some				mpat





			other			ible)
			colour. This			clear
			based on			ance
			that the			s are
			alert only			deliv
			stated that			ered.
			a vehicle or			
			aircraft was			
			on the			
			runway and			
			not that			
			there was a			
			direct risk			
			for a			
			conflict.			
			ENAV:			
			About the			
			alarms and			
			alerts, there			
			were			
			different			
			perception:			
			1 ATCO			
			agreed that			
			alarms and			
			alerts were			
			effective			
			and not			
			intrusive,			
			one			
			somewhat			
			agreed and			
			a last one			





Neither agreed nor disagreed. ATCOs raised during the debriefing that the emergency button location and HMI could be improved to avoid any confusion		
-Future validation activities shall involve the Supervisor position		
When ATS is performed to more than one aerodrome simultaneously from one MRTM, the ATCO shall be able to listen to all aeronautical mobile service (air-ground communications) communication	The ATCO may be warned by the surveillance system about an aircraft or vehicle entering the runway without clearance.	The ATCO may be warn ed by the surve illanc e syste m abou

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							channels for all aerodromes being served.			t an aircr aft or vehic le enter ing the runw ay
Arg. 2.3. 3: Visu al disp lays and othe r type s of out put devi ces adh ere to	W2.PJ 05.35 _Is.2.3 .3-1	The visu al displ ays do not suffi cien tly sup port the acco mpli shm ent of appr	Closed	OBJ-PJ05- W2-35-V3- VALP-H18	CRT-PJ05- W2-35- V3-VALP- H18.010	Indra/HC RTS: Approach tasks were not simulated in the HC exercise. Indra/Avino r: same as W2.PJ05.35 _ls.1.3.1-1b 2.1 DLR: same as W2.PJ05.35 _ls.1.3.1-1b	When Tower and Approach services are combined within the same MRTM, the tools for each service shall be easily available.	COOPANS: Having same layout on the WACOM screen for e-strips for single, double and triple aerodrome mode.	When Tower and Appro ach servic es are combi ned within the same MRT M, the tools for each servic e shall	with out clear ance.





prin cipl es. [V1: AIR only]	h tasi s wh n pro idir g ATS to mu iple aer dro me	le ov n S Ilt e ro o		COOPANS: Technical System/HMI supported the ATCOs by being accurate, useful for task execution and well integrated. ENAV: Approach tasks not simulated			easily availa ble.	





Arg.	W2.PJ	The	Closed	#N/D	#N/D	The current MET	An additional Weather
2.3.	05.35	visu	closed			report, actual	Display and Information
3:	ls.2.3	al				wind information.	is recommended on an
Visu	.3-2	pres				actual QNH and, if	
al	.5 2	enta				measured for the	available on the VP.
disp		tion				particular airport	
lays		does				and relevant, RVR	
and		not				values shall	
othe		cont				continuously be	
		ain				presented to the	
r						ATCO for all	
type		com					
s of		plet				aerodromes being controlled from	
out		e					
put		infor				the MRTM.	
devi		mati		#N/D	#N/D	The ATCO shall	
ces		on				have access to a	
adh		and				visual	
ere		ther				presentation of	
to		efor				flight operations	
HF		e				on and in the	
prin		imp				vicinity of the	
cipl		acti				aerodrome as	
es.		ng				well as vehicles	
[V1:		the				and personnel on	
AIR		dete				the manoeuvring	
		ctio				area. Note	





only n, reco gniti on, iden tific atio n and rang ing of obje cts rele vant for servi	#N/D	#N/D	The ATCO shall observe visual communication from aircraft that are within visual range on the aerodrome manoeuvring area, i.e.	If the pan and tilt functionality is available then a feature that would allow the camera to return to a "fixed" position should be available.	The information on the status of the lights and no-visual aids should be always visible for the controller, making it easy to identify to what aerodrome they correspond	
ce prov ision	#N/D #N/D	#N/D #N/D	The visual presentation shall provide a smooth and regular impression of moving objects to the human eye. the ATCO's ability to perform the ATS service shall not be affected by the time delay between image/data	The binocular functionality should include predefined and user definable automatic scanning patterns, such as runway sweeps The binocular functionality should include automatic tracking of moving aircraft, vehicles or obstructions (e.g. personnel or large	to.	

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			presentation on the visual presentation			
	#N/D	#N/D	The visual reproduction may be augmented with additional (digital) information to provide the ATCO a greater level of situational awareness.	If the automatic binocular function is available, an indication should be visible to show which a/c or vehicle is selected on the automatic binoculars.	The visual presentatio n should include meteorologi cal and other operationall y relevant overlaid information.	
			The filtering option shall ensure the provided image remains realistic and does not mislead the ATCOs.		The RTC Supervisor role should be provided with a technical overview of all systems e.g. the MRTM, camera functionalit y etc. in the RTC and of the aerodrome	The RTC Supe rviso r role shoul d be provi ded with a tech nical overv iew of all

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					systems e.g.	syste
					navigational	ms
					aids, lights,	e.g.
					emergency	the
					alerting	MRT
					functions,	Μ,
					for all	came
					involved	ra
					aerodromes	funct
					part of the	ionali
					RTC	ty
						etc.
						in
						the
						RTC
						and
						of
						the
						aero
						drom
						e
						syste
						ms
						e.g.
						navig
						ation
						al
						aids,
						lights
						,
						emer
						genc
						y alerti
						alerti

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						ng funct ions, for all invol ved aero drom es part of the RTC
			The ATCO shall be provided with a functionality corresponding to the binoculars in a traditional Tower, giving the possibility to zoom/enlarge specific areas and objects in the visual presentation.			
			The visual presentation provided by the binocular functionality shall be of sufficient quality (image			





sharpness, magnification, contrast) to support the related ATCO tasks.	
The binocular functionality shall be as simple, quick and easy to use as manually operated binoculars (in a local tower).	
The pan and tilt functionality or VP shall allow the ATCO to scan the remaining part of the CTR	
All MRTMs in a RTC shall be unified harmonised in terms of HMI and equipment (in order to contribute to the overall improvement of	

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		uniformity of ATM services). Image: Comparison of the service of t
#N/D	#N/D	The RTC Supervisor or similar role shall in the state be able to access in the state functions for the in the state monitoring of in the state weather in the state conditions for all aerodromes.
#N/D	#N/D	The RTCSupervisor orsimilar role shallaccess functionsforcommunicatingthe status of RTCand aerodromesand coordinatingmaintenance (tobe carried out bya qualifiedengineer/technician).

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Arg.	W2.PJ	The	Closed	#N/D	#N/D	Т	The overlay		The RTC	The
2.3.	05.35	visu	closed				options shall be		Supervisor	RTC
3:	_ls.2.3	al					embedded on the		role should	Supe
Visu	.3-3	pres					VP using HF		be provided	rviso
al		enta					design principles.		with a	r role
disp		tion					The overlays need		display	shoul
lays		for					a toggle on/off		presenting	d be
and		mult					functionality.		an overview	provi
othe		iple							of the RTC,	ded
r		aero							including	with
type		dro							e.g. MRTM	а
s of		mes							status,	displ
out		sho							aerodromes	ay
put		uld							allocated to	prese
devi		inco							MRTMs,	nting
ces		rpor							traffic load,	an
adh		ate							etc. to be	overv
ere		over							able to	iew
to		laid							transfer an	of
HF		infor							airport.	the
prin		mati								RTC,
cipl		on								inclu
es.		to								ding
[V1:		indic								e.g.
AIR		ate /								MRT
only		high								М
]		light								statu
		spec								s,
		ific								aero
		part								drom
		s of								es
		the								alloc
		aero								ated
		dro								to

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sı a: ru w s, ta w s, o s, o r t e t t t t t	un vay axi vay , in orde to enh ince he NTC D and						MRT Ms, traffi c load, etc. to be able to trans fer an airpo rt.
si at at at at s s s s s s s s	iUP) itu itio nal iwa ene s, pec fical	#N/D	#N/D	The ATCO shall be provided with UTC clock in the MRTM. The UTC clock might be presented in the visual presentation.			
ly da n aı lo vi ili	y in lark ness nd ow risib lity con	#N/D	#N/D	It shall be possible for the ATCO to toggle on/off as well as adjust in light intensity any overlaid information in the visual			





ditio ns			each ae	iction for rodrome ely toggle			
	#N/D	#N/D	shall be present overlay to the c directio for each	ed as an in relation perating ns in use n RWY both RWY			





Arg.	W2.PJ	Situ	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	The ATCO display			
2.3.	05.35	atio	closed	W2-35-V3-	W2-35-	RTS: Flexible	should allow a	ENAV: Out of the		
3:	ls.2.3	n		VALP-H02	V3-VALP-	allocation	flexible allocation	window view		
Visu	.3-4	awa			H02.030	was not	of the position of	requirements shall be		
al		rene				preferred	the transferred	refined finally to		
disp		SS				due to	aerodromes or	support the		
lays		neg				system	The system	deployment of the RTC		
and		ativ				behaviour	behaviour should	with flexible allocation		
othe		ely				(see CRT-	be user friendly	of airports between		
r		affe				PJ05-W2-	, during an	modules.		
type		cted				35-V3-VALP-	aerodrome switch			
s of		by				H02.030 for	(i.e. between and			
out		the				more	within MRTM).			
put		flexi				detail).	The MET window			
devi		ble				Because the	should be linked			
ces		posi				HMI got	to the EFS bay i.e.			
adh		tioni				mixed up	it should move			
ere		ng				once ATCOs	together with the			
to		of				had	EFS and radar			
HF		aero				modified	map during an			
prin		dro				the layout	aerodrome			
cipl		mes				of the	change.			
es.		in				MRTM, they				
[V1:		the				decided to				
AIR		visu				keep				
only		al				aerodromes				
]		displ				where they				
		ay				originally				
		(In				appeared				
		RTC				on the				
		whe				screens.				
		re				Thus it was				
		ther				often the				
		e is				case that a				





the	bigger
nee	aerodrome
d to	was a second sec
alloc	displayed
ate	on a smaller
mor	screen on
e	the Visual
than	Panorama.
3	However,
airp	ATCOs
orts	suggested
(e.g.	that they
4) it	rather have
is	this setup
not	than having
poss	their head-
ible	down
to	display
mai	mixed up,
ntai	which
n	negatively
the	affected
sam	their
e	situational
posi	awareness.
tion	
of	Indra/Avino
the	r: same as
aero	W2.PJ05.35
dro	_ls.1.3.1-7
mes	
in	2.1 DLR
the	same as
visu	W2.PJ05.35





al		_ls.1.3.1-7			
displ					
ay)		COOPANS:			
-//		Not more			
		than three			
		aerodromes			
		have been			
		simultaneou			
		sly			
		presenting			
		in the VP.			
		The system			
		allowed			
		ATCOs to			
		self-decide			
		where to			
		allocate the			
		taken			
		aerodrome			
		in the			
		MRTM VP.			
		During			
		releasing of			
		one of the			
		three			
		aerodromes			
		, the system			
		allowed			
		ATCOs			
		(optional),			
		the			
		remained			
		two			
		aerodromes			





to be kept
at the same
position as
prior the
transfer
occurred.
All other
systems
automaticall
y have
followed
the current
aerodrome
allocation.
This was
considering
as very
important
feature with
positive
impact on
SA.
ENAV: fix
position
was
considered
as an issue
rather than
a support of
the
situation
awareness.
The
THC





collected
feedback
was that the
fix position
had an
opposite
effect,
especially
when the
transferred
airport was
a third
airport in
the middle
fix position:
during the
transfer
allocating
the airport
in the
middle
caused a
temporary
disorientati
on of the
ATCOs that
required a
few times to
recap the
exact
position of
the airports.
They would
have
110AC





						preferred to receive the transferred airport always occupying the last position in all the screen i.e. on the bottom of the displays for the external view and on the right on the head down CWP displays.								
--	--	--	--	--	--	---	--	--	--	--	--	--	--	--





	OBJ-PJ05- CRT-	PJ05- Indra/HC	The system	Supervisor planning tool	Pre-sets should be	EFS	The
V	W2-35-V3- W2-3	35- RTS:	behaviour shall be	shall use up-to-date and	defined for the	shall	ATCO
V	/ALP-H18 V3-V	ALP- Whenever	user friendly	real time data to proper	aerodrome radar maps	be	shoul
	H18.	010 the ATCO	during an	support the short term	in order to support the	prov	d d be
		received/ga	aerodrome switch	workload assessment.	ATCO to efficiently	ed to	provi
		ve away an	(i.e. between and		manage flexible	supp	o ded
		aerodrome	within MRTM).		allocation.	rt	with
		due to the				ATCO)s a
		split and	After		COOPANS: Having same	man	a visua
		merge (or	switch/split/merg		layout on the WACOM	ging	1
		changed the	e, the new head-		screen for e-strips for	the	clear
		setup of the	down display		single, double and triple	remo	t indic
		MRTM via	setup shall not		aerodrome mode.	e	ation
		flexible	cover important			towe	r de-
		allocation),	information on			mod	ul activ
		there was a	the radar map.			е	able
		short period					on
		when most	The MET window			Supe	r ATCO
		of them lost	shall be linked to			visor	requ
		their	the EFS bay i.e. it			plan	ni est of
		situational	should move			ng	whic
		awareness.	together with the			tool	h
		It was	EFS and radar			shall	aero
		because of	map during an			use	drom
		the way the	aerodrome			up-te	- e an
		head-down	change.			date	inco
		system				and	ming
		behaved:	ATCOs shall be			real	radio
		the radar	supported by a			time	trans
		maps	squelch indication			data	missi
		shifted to a	and coloured			to	on is
		different	frames in order to			prop	e relat
		place on the	quickly distinguish			r	ed to
		display with	the aerodromes			supp	o in

EUROPEAN PARTNERSHIP





a changing	and identify		rt	the	order
view. To	where the call is		sh	nort	to
make	coming from.		te	erm	quick
matters	These features		w	orkl	ly
worse, the	shall be		08	ad	distin
MET	integrated both		as	ssess	guish
displays	into the Visual		m	nent.	the
remained in	Panorama and				aero
the previous	the head-down				drom
positions.	display.				es
This caused					and
major					ident
confusion					ify
and					wher
temporary					e the
loss of SA.					call is
Essentially					comi
the					ng
situation					from.
awareness					Pre-
ATCOs built					sets
for					shoul
themselves					d be
via the					defin
head-down					ed
display got					for
massively					the
impacted					aero
during such					drom
a change. It					е
took some					radar
time to set					maps
the air					in
situation					order





			display and			to
			the MET			supp
			windows			ort
			after the			the
			split/merge.			ATCO
			op,			to
			Indra/Avino			effici
			r: same as			ently
			W2.PJ05.35			
						mana
			_ls.1.3.1-1b			ge
						flexib
			2.1 DLR:			le
			same as			alloc
			W2.PJ05.35			ation
			_ls.1.3.1-1b			
			COOPANS:			
			Technical			
			System/HMI			
			supported			
			the ATCOs			
			by being			
			accurate,			
			useful for			
			task			
			execution			
			and well			
			integrated.			
			integrateu.			
			ENAV: fix			
			position			
			was			
			considered			
			as an issue			





rather than
a support of
the
situation
awareness.
The
collected
feedback
was that the
fix position
had an
opposite
effect,
especially
when the
transferred
airport was
a third
airport in
the middle
fix position:
during the
transfer
allocating
the airport
in the
middle
caused a
temporary
disorientati
on of the
ATCOs that
required a
few times to









Arg.	W2.PJ	ATC	Closed	OBJ-PJ05-	CRT-PJ05-	2.1 DLR For	The ATCO shall be	 The ATCO may be	The RTC	If any	The
2.3.	05.35	O do		W2-35-V3-	W2-35-	EXE-PJ05-	notified about	warned by the	Supervisor	Safety	ATCO
4:	_ls.2.3	not		VALP-H11	V3-VALP-	W2-35-V3-	any technical	surveillance system	should be	net is	may
Alar	.4-1	noti			H11.040	2.1.1 the	status of systems	about an aircraft or	provided	availa	be
ms		ce				majority of	that can affect	vehicle entering the	with the	ble in	warn
and		or				the ATCOs	the safety or	runway without	forecasted	curren	ed by
alert		wro				confirms	efficiency of flight	clearance.	demand for	t	the
s		ngly				that the	operations and/or		all involved	tower	surve
hav		inter				alarms and	the provision of		aerodromes	enviro	illanc
е		pret				alerts were	air traffic service.	COOPANS: Further	part of the	nment	е
bee		alar				applicable		development of the	RTC.	(e.g.	syste
n		ms				in the		colour scheme for	If any Safety	conflic	m
dev		and				situations.		alerts	net is	ting	abou
elop		alert				But			available in	cleara	t an
ed		S				additional		ENAV: Emergency	current	nces	aircr
ассо		prov				features for		button and transfer	tower	alerts	aft or
rdin		ided				the safety		acceptance HMI in the	environmen	etc.) it	vehic
g to		by				net are		ATCO module CWP	t (e.g.	shall	le
HF		the				essential.		shall be reviewed for	conflicting	be	enter
prin		syst						the deployment of the	clearances	availa	ing
cipl		em				COOPANS:		RTC with flexible	alerts etc.)	ble in	the
es.						Partially		allocation of airports	it shall be	the	runw
[V1:						covered as		between modules.	available in	RTC.	ay
AIR						only alerts			the RTC.		with
only						was used					out
]						during					clear
						validation.					ance.
						ATCOs					
						confirmed					The
						the usability					ATCO
						and utility					may
						of the					be
						alerts.					supp
						However					orted





the ATCOs		by
wanted to		the
change the		syste
runway		m,
alert from		indic
red to some		ating
other		situa
colour. This		tions
based on		when
that the		contr
alert only		adicti
stated that		ve
a vehicle or		(inco
aircraft was		mpat
on the		ible)
runway and		clear
not that		ance
there was a		s are
direct risk		deliv
for a		ered.
conflict.		
		The
ENAV:		RTC
About the		Supe
alarms and		rviso
alerts, there		r
were		shoul
different		d be
perception:		provi
1 ATCO		ded
agreed that		with
alarms and		the
alerts were		forec
effective		asted





		and not intrusive, one somewhat agreed and a last one Neither agreed nor disagreed. ATCOs raised during the debriefing that the emergency button location and HMI could be improved to avoid any confusion	Alarms and alerts	In case stop bars		dem and for all invol ved aero drom es part of the RTC.
			shall be developed in line with HF design principles.	and/or ground sensors are available, there should be a visual indication when stop bar overrun occurs.		

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							The same type of alarms and alerts used shall be available on all aerodromes clustered for multiple remote tower operations. Future validation activities shall involve the Supervisor position			
Arg. 2.3. 4: Alar ms and alert s hav e bee n dev elop ed acco rdin g to HF prin cipl	W2.PJ 05.35 _Is.2.3 .4-2	SUP do not noti ce or wro ngly inter pret alar ms and alert s prov ided by the syst em	Closed	OBJ-PJ05- W2-35-V3- VALP-H12	CRT-PJ05- W2-35- V3-VALP- H12.040	ENAV: Supervisor was informed about emergency situation through the handover system addressed in criteria CRT-PJ05- W2-35-V3- VALP- H12.020. This system was judged as adequate and usable	Alarms and alerts shall be presented in the same way for all aerodromes available within the same MRTM.			





es. [V1: AIR only]								
Arg. W2.PJ 2.3. 05.35 6: _ls.2.3 The .6-1 usa bilit y of the user	The Closed usab ility of the user inter face is		#N/D	Working Environment (noise, temperature etc shall be accordin to national regulations for normal office establishments.	3	The information on the status of the lights and no-visual aids should be always visible for the controller, making it easy to identify to what aerodrome they correspond to.		
inte rfac e (inp ut devi ces, visu al disp lays /out put devi ces, alar m& alert s) is acce	not acce ptab le (e.g. displ ay of two APT on APT on one scre en at the sam e time is	#₩ /D	#N/D	-Future validation activities shall involve the Supervisor position				





ptab le. [V1: AIR only]	not acce ptab le)							
Arg. W2.PJ 2.3. 05.35 6: _Is.2.3 The .6-2 usa bilit y of the	The han dlin g of inpu t devi ces	Closed	₩N/Ð	#N/Ð		The possibility to create flight strips (e.g. with electronic pen) should be available.		
user inte rfac e (inp ut devi ces, visu al disp lays /out put devi ces, alar m& alert s) is	for mor e than one airp ort is not acce ptab le		₩N/Ð	#N/D		The ATCO may be supported in monitoring conformance to clearances on ground		The ATCO may be supp orted in moni torin g conf orma nce to clear ance s on grou nd





acce						ATCO
ptab						may
le.						be
[V1:						supp
AIR						orted
only						by
1						the
1						syste
						m,
						indic
						ating
						situa
						tions
						when
						contr
						adicti
						ve
						(inco
						mpat
						ible)
						clear
						ance
						s are
						deliv
						ered.
		#N/D	#N/D		The ATCO may be	The
					supported in	ATCO
					monitoring	may
					conformance to	be
					clearances for airborne	supp
					movements	orted
						in
						moni
						torin

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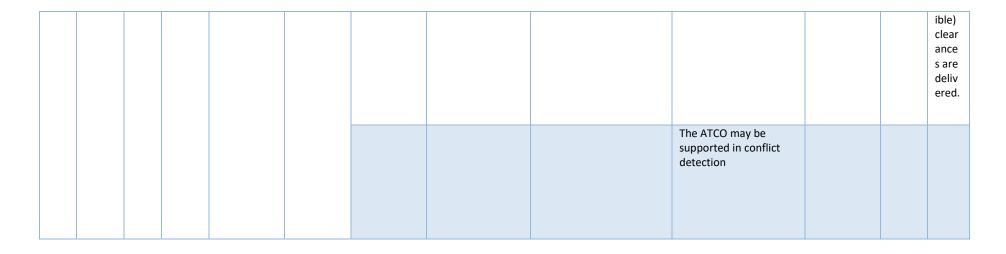
						g
						conf
						orma
						nce
						to
						clear
						ance
						s for
						airbo
						rne
						move
						ment
						S
						The
						ATCO
						may
						be
						supp
						orted
						by
						the
						syste
						m,
						indic
						ating
						situa
						tions
						when
						contr
						adicti
						ve
						(inco
						mpat

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SESAR 2020 SOLUTION 05-35 SPR-INTEROP/OSED V3 - PART IV - HUMAN PERFORMANCE ASSESSMENT REPORT





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Arg.	W2.PJ	Inpu	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	The HMI shall	COOPANS: Longer	Visual	The
0	05.35	t		W2-35-V3-	W2-35-	RTS: Most	support the ATCO	training session with	Prese	ATCO
6:	ls.2.3	devi		VALP-H11	V3-VALP-	of the	to easily	focus on the PTT (Push	ntatio	shoul
The	_ .6-3	ces			H11.020	ATCOs	distinguish the	To Talk)	n	d be
usa		and				(66.6%)	input/output	,	requir	provi
bilit		нмі				agree with	devices of each	ENAV: Out of the	ement	ded
y of		cont				the InNOVA	aerodrome for	window view	s shall	with
the		rols				being user-	vehicles.	requirements shall be	be	а
user		usab				friendly.		refined finally to	locally	visua
inte		ility				However,	The next one is	support the	refine	I I
rfac		do				there were	already a	deployment of the RTC	d to	clear
e		not				functions	requirement from	with flexible allocation	suppo	indic
(inp		sup				they had	Wave 1	of airports between	rt the	ation
ut		port				difficulties	(HPdesign_10):	modules.	deplo	de-
devi		ATC				with.	ATCOs should be		yment	activ
ces,		Os				Similarly,	able to transmit to		of the	able
visu		in				the two-	individual		RTC	on
al		the				button	aerodromes (G/G		with	ATCO
disp		smo				design of	comm) in an		flexibl	requ
lays		oth				the mic was	intuitive and		e	est of
/out		and				unfamiliar	efficient manner.		allocat	whic
put		effic				and not	This could be		ion of	h
devi		ient				intuitive,	achieved by		airpor	aero
ces,		exec				which	having the ground		ts	drom
alar		utio				paved the	frequency push		betwe	e an
m&		n of				way for	buttons		en	inco
alert		task				unnoticed	integrated in the		modul	ming
s) is		S				errors.	CWP in a way that		es.	radio
acce							they are easily			trans
ptab						Indra/Avino	distinguishable			missi
le.						r: same as	between airports			on is
[V1:						W2.PJ05.35	(e.g. if airports are			relat
AIR						_ls.1.3.2-3b	represented side			ed to
							by side the push			in

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only		Indra /HC	buttons shall be		order
]		PSM: 66%	respectively		to
		of the	located on each		quick
		ATCOs	side).		ly
		agreed that			distin
		the IRTOS	The ground bay of		guish
		video	the head-down		the
		functionaliti	display shall not		aero
		es were	contain aircraft		drom
		user-	that just received		es
		friendly. A	their ATC		and
		number of	Clearance.		ident
		design			ify
		issues have	The system		wher
		been	behaviour shall be		e the
		mentioned,	user friendly		call is
		and	during an		comi
		potential	aerodrome switch		ng
		solutions	(i.e. between and		from.
		have been	within MRTM).		
		discussed.			
		The biggest	After		
		concern was	switch/split/merg		
		the way	e, the new head-		
		ATCOs had	down display		
		to go back	setup shall not		
		to 'airport	cover important		
		selection'	information on		
		whenever	the radar map.		
		they			
		wanted to	The MET window		
		work with	shall be linked to		
		any of the	the EFS bay i.e. it		
		video	should move		

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			system	together with the			
			functions at	EFS and radar map			
			another	during an			
			airport, and	aerodrome			
			this issue	change.			
			was even	-			
			more	ATCOs shall be			
			pronounced	supported by a			
			, when the	squelch indication			
			activity was	and coloured			
			imminent.	frames in order to			
			The	quickly distinguish			
			following	the aerodromes			
			steps	and identify			
			describe	where the call is			
			what the	coming from.			
			ATCO had	These features			
			to do when	should be			
			s/he was	integrated both			
			looking at	into the Visual			
			the video	Panorama and the			
			wall and	head-down			
			decided to	display.			
			focus on an	uispidy.			
			area/flight	ATCOs shall not be			
			with the PTZ	required to			
			at one	explicitly select			
			aerodrome	between			
			(e.g. Pápa).				
			Importantly,				
			the PTZ	particular			
			function	aerodrome's HMI			
			was active	controls.			
			at another	Therefore no			
1	1	1					

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Γ				airport, e.g.	dedicated window			
				Nyíregyháza	is needed.			
				. The ATCO	is needed.			
				had to				
				1. first look				
				down at the				
				InNOVA				
				screen,				
				select Pápa,				
				2. then				
				select the				
				PTZ				
				function,				
				3. and then				
				move the				
				cursor up to				
				the video				
				wall,				
				4. and				
				select the				
				area s/he				
				wanted to				
				zoom in.				
				The				
				integrated				
				IRTOS				
				(video				
				system)				
				window was				
				huge and				
				covered a				
				considerabl				
				e part of the				
				e pur or the				

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			InNOVA			
			radar			
			display			
			when it was			
			opened.			
			There were			
			other HMI			
			issues that			
			are detailed			
			in the VALR,			
			but those			
			are not			
			specific to			
			the flexible			
			allocation of			
			aerodromes			
			2.1 DLR			
			Same as			
			W2.PJ05.35			
			_ls.1.3.2-3b			
			_13.1.3.2-30			
			COOPANS:			
			Majority of			
			ATCOs			
			confirm the			
			usability of			
			input			
			devices and			
			HMI			
			controls.			
			ENAV: The			

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			Remote			
			Tower			
			Module			
			ATCOs			
			didn't like a			
			dedicated			
			monitor for			
			PTZ function			
			and would			
			have			
			preferred to			
			have a			
			picture in			
			the picture			
			function			
			with			
			command			
			integrated			
			in the strip			
			bay to			
			facilitate			
			the			
			interactions			
			with the			
			OTW and			
			the zoom			
			functions.			
			Also,			
			Remote			
			Tower			
			Module			
			ATCOs			
			suggested			
			improveme			
			mproveme			

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			nts to the OTW: to mark the line between the airports in the OTW to make more visible the borders between airports and to provide			
			the airports			
			in the OTW			
			to make			
			more visible			
			airports and			
			to provide			
			the aircraft			
			labels on			
			the OTW			
			only for active			
			flights.			

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Arg. 2.3. 7:	W2.PJ 05.35 _Is.2.3	Conf usio n of	Closed	#N/D	#N/D	The ATCO shall provided with th Airport name		The full airport name should be displayed both in the Visual	ATCOs shall be	The airpo rt
The	.7-1	whic				(spelled out or	systems and operational	Presentation (VP) and	traine	nam
user		h				designator or	environment	the radar display in	d in	е
inte		infor				both) for each		order to easily link OTW	order	shoul
rfac		mati				aerodrome in		view, radar display and	to	d be
е		on				operation in the		EFSS info.	achiev	integ
desi		(e.g.				MRTM.			е	rated
gn		strip							famili	in
red		s,							arity	the
uces		met							with	phras
hum		eo							the	eolog
an		etc.)							RTC	y in
erro		is							syste	order
r as		linke							ms	to
far		d to							and	incre
as		whic							operat	ase
poss		h							ional	the
ible.		APT.							enviro	situa
[V1:		This							nment	tiona
AIR		coul								1





only	d	#N/D	#N/D	The ground	The RTC Supervisor role	The
]	incr			frequency push	should be provided	RTC
	ease			buttons have to	with a technical	Supe
	the			be integrated in	overview of all systems	rviso
	pote			the CWP in a way	e.g. the MRTM, camera	r role
	ntial			that they are	functionality etc. in the	shoul
	for			easily	RTC and of the	d be
	hum			distinguishable	aerodrome systems e.g.	provi
	an			between airports	navigational aids, lights,	ded
	erro			(e.g. if airports	emergency alerting	with
	r, as			are represented	functions, for all	а
	ATC			side by side the	involved aerodromes	tech
	Os			push buttons shall	part of the RTC	nical
	may			be respectively		overv
	give			located on each		iew
	the			side).		of all
	wro					syste
	ng					ms
	infor					e.g.
	mati					the
	on,					MRT
	instr					М,
	ucti					came
	on					ra
	to					funct
	wro					ionali
	ng					ty
	a/c					etc.
	at					in
	anot					the
	her					RTC
	aero					and
	dro					of
	me.					the





Ther					aero
efor					drom
					e
e, this					syste
coul					ms
d					e.g.
hav					navig
ea					ation
pote					al
ntial					aids,
neg					lights
ativ					
					, emer
e imp					genc
act					y
on					alerti
syst					ng
em					funct
safe					ions,
ty.					for
cy.					all
					invol
					ved
					aero
					drom
					es
					part of
					the
					RTC
					RIC





#N/D	#N/D	-Sufficient writing space shall be available in the MRTM to the ATCO in order to make manual notes.	ATCOs shall be trained in order to achieve familiarity with the RTC systems and operational environment	ATCOs shall be traine d in order to achiev e famili arity with the RTC syste ms and operat ional enviro nment
#N/D	#N/D	The RTC Supervisor role shall access functions for the planning, coordination and monitoring of the upcoming and present traffic flow, in the purpose of tactical opening and closure of		

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						MRTMs and allocation of airports to them.			
Arg. 2.3. 8: The user inte rfac e sup port s a suffi cien t leve l of indi vidu al situ atio n awa rene	W2.PJ 05.35 _ls.2.3 .8-2	Sim ulta neo us radi o calls on diffe rent freq uen cies (dec oupl ed) mig ht lead to the loss of infor	Closed	#N/D	#N/D	The ATCO shall be able to listen to all surface movement control service (communications for the control of vehicles other than aircraft on manoeuvring areas at controlled aerodromes) communication channels for all aerodromes being served.			

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ss. [V1: AIR only]		mati on.							
Arg. 2.3. 8:	W2.PJ 05.35 _ls.2.3	Cou plin g of	Closed	#N/D	#N/D	When ATS is performed to more than one			
The user	.8-3	freq uen				aerodrome simultaneously			
inte		cies				from one MRTM,			
rfac		mig				the ATCO shall for			
e sup		ht lead				the aeronautical mobile service			
port		to				(air-ground			
sa		ATC				communications),			
suffi		0,				be able to			
cien		pilot				transmit to "all			
t		and				aerodromes"			
leve		vehi				being served from			
l of		cle				the MRTM,			





in ali	ب العام		#NI /D					
indi	driv	#N/D	#N/D	When ATS is				
vidu	er`s			performed to				
al	conf			more than or	2			
situ	usio			aerodrome				
atio	n.			simultaneous	y			
n	(ref			from one MR	M,			
awa	er to			aeronautical				
rene	Arg.			mobile servic	• ·			
SS.	1.3.			(air-ground				
[V1:	1)			communicati	ins)			
AIR	_,			shall be	,			
only				retransmitted	/			
1				relayed betw				
1				all aerodrom				
				being served	rom			
				that MRTM.	•			
		#N/D	#N/D	The ATCO sha				
				use aeronaut	cal			
				fixed service				
				(ground-grou	nd			
				communicati	ns)			
				extended to d	over			
				communicati	ins			
				with all units				
				relevant for a	1			
				aerodromes l				
				served.				
		I		Scrucu.		1		





				#N/D	#N/D	The ATCO shall, for the surface movement control service (communications for the control of vehicles other than aircraft on manoeuvring areas at controlled aerodromes), be able to transmit to individual aerodromes.			
Arg. 2.3. 8: The user inte rfac e sup port s a suffi cien t leve I of indi vidu al	W2.PJ 05.35 _Is.2.3 .8-4	Conf usio n relat ing to whic h pilot at whic h APT, ATC O is com mun icati ng /	Closed	#N/D	#N/D				





situ atio n		How to ensu									
awa rene ss.		re that the									
[V1: AIR		ATC O									
only		und									
]		erst and									
		whic									
		h aircr									
		aft is									
		calli									
		ng.									
Arg. 2.3.	W2.PJ 05.35	The supe	Closed	OBJ-PJ05- W2-35-V3-	CRT-PJ05- W2-35-	Indra/HC decided not	-Future validation activities shall	The RTC Supervisor should be provided	When a	Super visor	
8:	_ls.2.3	rvis		VALP-H01	V3-VALP-	addressed	involve the	with the forecasted	handover is	tool	
The	.9-1	or is			H01.040	this	Supervisor	demand for all involved	initiated or	HMI	
user inte		not awa				specifically. Regarding	position	aerodromes part of the RTC.	performed all systems	shall displa	
rfac		re of				the actual			and	y the	
е		the				issue		ENAV: The RTC	information	status	
sup port		task load				defined here, the		Supervisor should be provided with the	that belongs to the same	of the MRT	
sa		of				SUP was		forecasted demand for	aerodrome	Mand	
suffi		the				aware of		all involved aerodromes	shall be	the	
cien		ATC				the ATCOs'		part of the RTC based	transferred	traffic	
t		0				task load as		on latest available data	in a	load	
leve I of		infor mati				s/he had the SUP			synchronize d way.	expect ed at	





indi on Planning each vidu avail system. If single	gle
al all all all all all all all all all	odr
al able the SUP had aeron	our
situ to to any doubts ome	e
atio the about the under	der
n SUP traffic his/h	/he
awa is situation, he r	
rene not walked over supe	ber
ss. suffi to the vision	
[V1: cien MRTM to to	
AIR t or check on prop	pe
only not the ATCO's rly	
] pres system. estat	
ente sh th	
d in Indra/Avino flexit	
a r: e	
suit W2.PJ05.35 alloc	ocat
able _ls.1.3.1-1b ion o	
way aero	
) 2.1 DLR ome	
to th	
and tailor-	
maid results ble	
show that RTC	
that the Mod	
participants es	
were able	
to divide Whe	ien
their	
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and keep SA	
on an com	
adequate	
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ENAV: SUPs	ed all
state that	syste
situation	ms
awareness	and
was at an	inform
acceptable	ation
level when	that
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RTC with a	gs to
flexible	the
allocation of	same
aerodromes	aerodr
between	ome
MRTMs,	shall
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improveme	single
nts were	action
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for the	
supervisor	When
tool.	а
Although it	hando
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ir ir si p a a p th a c c n t t t t t t t t t t	cool was not ntegrated n the simulation blatform and thus providing the forecast and computatio n of workload on the planned traffic rather than the real		ati tha be gs the sar ae om sha be tra err in syr	at lon to me rodr ne all nsf red	
tł tr ra tł	he planned traffic rather than		erri in a syr on wa Required RT information Su for ATCOs vis and SUP sha should be be locally pro assessed ed before the wit deployment inf ati to	ed a hochr ized y. e C per or all ovid th orm on with	Requ ired infor mati on for ATCO s and SUP shoul d be locall
			te de on	cisi s	y asses sed befor e the

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				ing how to combi ne aerodr omes in the MRT M.	depl oyme nt
		The RTC Supervisor shall be provided with a tool combining the information (aerodromes' status, meteo, forecasted traffic load and capacity) to facilitate decisions regarding how to combine aerodromes in the MRTM		The RTC Super visor role shall access functi ons for comm unicat ing the status of RTC and aerodr omes and coordi nating maint enanc	The RTC super visor role may be provi ded with a tool comb ining the infor mati on (aero drom es' statu s, mete

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						e (to be carrie d out by a qualifi ed engin eer/te chnici an).	o, forec asted traffi c load and capa city) to facilit ate decis ions regar ding how to comb ine aero drom es in the MRT M
	OBJ-PJ05- W2-35-V3- VALP-H12	CRT-PJ05- W2-35- V3-VALP- H12.010	Indra/HC RTS: The majority of ATCOs did not report anything missing from the	The ATCO/RTC Supervisor shall be able to verify the status of an aerodrome and its related systems, before taking on		The ATCO/ RTC Super visor shall be able	

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JP system. responsibility for	to	
nere was providing ATS to	verify	
ne idea the aerodrome.	the	
owever	status	
at is	of an	
orth to	aerodr	
insider,	ome	
e. to have	and its	
quick	relate	
cess for	d	
ew only of	syste	
iy airport,	ms,	
that the	before	
JP in a RTC	taking	
ivironmen	on	
could	respo	
llow an	nsibilit	
nergency	y for	
uation	provid	
ithout	ing	
othering	ATS to	
e ATCO in	the	
e MRTM.	aerodr	
	ome.	
dra/Avino		
same as		
2.PJ05.35		
s.1.13.5-		
3		
1 DLR The		
sults		
ow that		





information'
s are
available
but they are
difficult to
acquire,
especially
at a fitting
time
ENAV: For
both the
questions "I
had all the
information
I needed to
perform my
tasks" and
"I found the
information
provided in
the SUP
Working
Position"
one answer
is
somewhat
disagree
and the
other one is
agree. The
reason for
not
achieving a





conclusive
result is
behind the
technical
limitation of
the
supervisor
planning
tool that
due to time
and
resources
constraint
was not
linked to
the
simulation
platform
and thus all
the
calculation
were based
on a
planned
traffic
sample
rather than
the live
traffic
managed in
the
simulation
experiment.
For one of





the SUP this
The RTC Supervisor or Supervisor or similar role shall be provided an overview of ATCO availability and their valid endorsements endorsements





OBJ-PJ05-	CRT-PJ05-	Indra/HC	There needs to be	ENAV: Supervisor		The	Ther
W2-35-V3-	W2-35-	RTS: Whilst	a local	planning tool shall use	1	RTC	е
VALP-H12	V3-VALP-	the utility of	assessment to	up-to-date and real	9	Super	need
	H12.030	the SUP	determine the	time data to proper	N	visor	s to
		planning	number of	support the short term	ı I	role	be a
		tool is	endorsements an	workload assessment.	5	shall	local
		unquestiona	ATCO working in	Supervisor planning	ä	access	asses
		ble, there	an MRTM can	tool HMI and ATCO's	f	functi	smen
		were some	have, taking into	module HMI shall be	(ons	t to
		issues with	account the split/	reviewed for the	f	for	deter
		the	merge and	deployment of the RTC	(comm	mine
		reliability of	transfer	with flexible allocation	L	unicat	the
		the timeline	possibilities.	of airports between	i	ng	num
		data. The		modules.	t	the	ber
		interaction	The SUP shall be		9	status	of
		with the	able to identify		(of RTC	endo
		system was	the traffic peaks,		á	and	rsem
		regarded as	supported by the		ä	aerodr	ents
		intuitive.	system. Thus the		(omes	an
			timeline shall be		ć	and	ATCO
		Indra/Avino	precise, by		(coordi	worki
		r:	marking the real		1	nating	ng in
		Improveme	simultaneous		1	maint	an
		nts were	traffic based on			enanc	MRT
		considered	updates from			e (to	М
		necessary to	actual data. The			be	can
		make the	predicted		(carrie	have,
		planning	duration of the		(d out	takin
		tool more	overload periods			ру а	g
		useful.	shall also be			qualifi	into
		The traffic	transparent.		6	ed	ассо
		timeline				engin	unt
		was found				eer/te	the
		useful to			(chnici	split/

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			anticipate			an).	mora
			the future			an).	merg
						C	e and
			traffic load			Super	trans
			at MRTMs,			visor	fer
			even			planni	possi
			though			ng	bilitie
			improveme			tool	s.
			nts were			shall	
			considered			use	The
			necessary			up-to-	RTC
			as			date	super
			mentioned			and	visor
			in the			real	role
			results of			time	may
			CRT-PJ05-			data	be
			W2-35-V3-			to	provi
			VALP-			prope	ded
			H12.010.			r	with
			The			suppo	а
			possibility in			rt the	tool
			the			short	comb
			"planning"			term	ining
			view to			workl	the
			simulate			oad	infor
			clusters of			assess	mati
			aerodromes			ment.	on
			and				(aero
			visualize				drom
			what the				es'
			traffic				statu
			timelines				
			would look				S, moto
							mete
			like, was				0, (
			found				forec





			useful.			asted
			The			traffi
			"planning"			с
			view was			load
			lacking			and
			functionaliti			сара
			es for the			city)
			supervisor			to
			to be able			facilit
			to schedule			ate
			the future			decis
			allocation of			ions
			aerodromes			regar
			to MRTMs			ding
			and ATCOs.			how
			A roster to			to
			see ATCOs			comb
			availability			ine
			was also			aero
			missing, and			drom
			it was			es in
			difficult to			the
			get an			MRT
			overview of			M
			ATCOs			101
			endorseme			
			nts.			
			1103.			
			2.1 DLR The			
			majority of			
			the			
			participants			
			confirmed			
			that the			





SUP HMI
supported
them in
split/merge
procedures.
ENAV: the
supervisor
planning
tool
resulted
easy to use
considering
that most of
the
responses
are positive.
Nevertheles
s, several
improveme
nts were
recommend
ed for the
supervisor
planning
tool in order
to achieve a
better HMI
and an
improved
interaction
and a
satisfactory
user





experience.
This is also
understand
able looking
at the
contradictor
y answers of
the post
simulation
result. The
supervisors
during the
debriefing
complained
about the
HMI of the
supervisor
planning
tool that
could be
enhanced
displaying
multiple
windows,
which
currently
was not the
case, and
using a
more
friendly and
intuitive
code for
understandi





						ng the airports displayed in the traffic sample plots.					
Arg. 2.3. 9: The user Inte rfac e desi gn sup port	W2.PJ 05.35 _ls.2.3 .9-1	The flexi ble freq uent alloc atio n of aero dro mes gen	Closed	OBJ-PJ05- W2-35-V3- VALP-H03	CRT-PJ05- W2-35- V3-VALP- H03.010	HC/Indra RTS: The system supported the RTC team in establishing and maintaining their situational awareness,	-Future validation activities shall involve the Supervisor position	The RTC Supervisor should be provided with the forecasted demand for all involved aerodromes part of the RTC.	When a handover is initiated or performed all systems and information that belongs to the same aerodrome shall be	When a hando ver is compl eted and accept ed all syste ms and	





s a	erat		and the		transferred	inform
suffi	es		system		in a	ation
cien	conf		worked as		synchronize	that
t	usio		expected		d way.	belon
leve	n		during the		,	gs to
l of	affe		split,			the
tea	ctin		supporting			same
m	g		the			aerodr
situ	the	1	teamwork			ome
atio	tea		between			shall
nal	m	1	MRTMs too.			be
awa	situ	-	The only			accept
rene	atio		downside			ed in a
ss.	n	١.	was the			single
[V1:	awa		ATCO's			action
AIR	rene		HMI: the			
only	SS		layout			
]	with		changed			When
	а	1	unexpectedl			а
	poss		y during a			hando
	ible		switch, but			ver is
	incr		the MET			initiat
	ease	\ \	windows			ed or
	of	1	remained in			perfor
	hum		the previous			med
	an		positions.			all
	erro		This led to			syste
	r		confusion,			ms
	and		error and			and
	wor		significant			inform
	kloa		increase in			ation
	d		workload,			that
			loss of			belon
		9	situational			gs to

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			awareness.			the	
						same	
			Indra/Avino			aerodr	
			r: same as			ome	
			W2.PJ05.35			shall	
			_ls.1.3.5-5			be	
			_13.1.3.3-5			transf	
			2.1 DLR The			erred	
			PE			in a	
			questionnai			synchr	
			re results			onized	
			show that			way.	
			there is still				
			missing				
			information				
			or				
			information				
			in poor				
			quality				
			which				
			makes the				
			task of				
			splitting and				
			merging				
			less. The				
			comments				
			from the				
			debriefing				
			fill this gap				
			fill this gap				
			with ideas				
			how the				
			improve the				
			interface.				





	COOPANS: Check W2.PJ05.35 _Is.2.3.3-4 ENAV: No issues were raised for team situation awareness in relation with the frequency of the handover that was considered adequate					
OBJ-PJ05- W2-35-V3- VALP-H03		The ATCO/RTC Supervisor shall be able to verify the status of an aerodrome and its related systems, before taking on responsibility for providing ATS to the aerodrome.		Required information for ATCOs and SUP should be locally assessed before the deployment	The ATCO/ RTC Super visor shall be able to verify the status of an aerodr	Requ ired infor mati on for ATCO s and SUP shoul d be locall y asses

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			The HMI shall			ome and its relate d syste ms, before taking on respo nsibilit y for provid ing ATS to the aerodr ome.	sed befor e the depl oyme nt The
			support the ATCO to easily distinguish the input/output devices of each aerodrome for vehicles.		The ATCO should be provided with a visual indication of which aerodrome an incoming radio transmissio n is related to. The visual indications may be		ATCO shoul d be provi ded with a visua l clear indic ation de- activ able

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					e and	ATCO
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						e the
						call is

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			The DTC			comi ng from.
	OBJ-PJ05- W2-35-V3- VALP-H18	CRT-PJ05- W2-35- V3-VALP- H18.020	The RTC Supervisor or similar role shall be provided an overview of ATCO availability and their valid endorsements			
			There needs to be a local assessment to determine the number of endorsements an ATCO working in an MRTM can have, taking into account the split/			Ther e need s to be a local asses smen t to deter
			merge and transfer possibilities.			mine the num ber of endo rsem ents an

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										ATCO worki ng in an MRT M can have, takin g into acco unt the split/ merg e and trans fer possi bilitie s.
Arg. 3.2.	W2.PJ 05.35	The task	Closed	OBJ-PJ05- W2-35-V3-	CRT-PJ05- W2-35-	COOPANS: Technical	-Future validation activities shall	COOPANS: Having same layout on the WACOM	Handover	Hand over
2:	_ls.3.2	alloc		VALP-H18	V3-VALP-	System/HMI	involve the	screen for e-strips for	procedure	proc
The	.2-1	atio			H18.010	supported	Supervisor	single, double and triple	may be	edur
pro		n for the				the ATCOs	position	aerodrome mode.	supported by the	e
pos ed		SUP				by being accurate,			technical	may be
task		/AT				useful for			system in	supp
alloc		со				task			silent	orted
atio		is				execution			transfer and	by
n bet		not				and well			acceptance	the





weeportnedhumbyantechactonicars issystsupemsport/edthebyHMItech	h al t s	ENAV: no issues raised in relation to task allocation and the support provided by the		of the split and merge		nical syste m in silent trans fer and acce ptanc e of the
nical syst ems /the HMI		technical system.	of an RTMs) Illy n a otion iated ties ng n		Transf er proce dures (for the transf er of an aerodr ome betwe en MRT Ms) shall be locally	split and merg e

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								d with a clear descri ption of the associ ated roles and respo nsibilit ies	
Arg. 3.2. 2: The pro pos ed task alloc atio n bet wee n hum an acto rs is sup port ed by	W2.PJ 05.35 _Is.3.3 .2-1	APT s havi ng the sam e or simil ar RWY desi gnat ors coul d lead to conf usio n. (the inclu	Closed	#N/D	#N/D	Coordination procedures between the TWR ATCO and the aerodrome personnel shall be locally defined. (linked to REQ- 05.00- SPRINTEROP- CO03.0004/ SR12, SR 13, SR14)			





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	1)				





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Arg.	W2.PJ	Not	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	The HMI shall		Visual	The
3.3.	05.35	clea		W2-35-V3-	W2-35-	RTS:	support the ATCO		Prese	ATCO
2:	_ls.3.3	r on		VALP-H02	V3-VALP-	Situation	to easily		ntatio	shoul
The	.2-2	whic			H02.010	awareness	distinguish the		n	d be
phra		h				was at an	input/output		requir	provi
seol		airp				acceptable	devices of each		ement	ded
ogy		ort				level when	aerodrome for		s shall	with
sup		is				providing	vehicles.		be	а
port		the				ATS to 3			locally	visua
s		fligh				aerodromes	ATCOs shall be		refine	1
com		t				in parallel	supported by a		d to	indic
mun		that				according to	squelch indication		suppo	ation
icati		is				the SASHA-	and coloured		rt the	of
on		rece				Q scores.	frames in order to		deplo	whic
in		iving				The issue	quickly distinguish		yment	h
all		clea				mentioned	the aerodromes		of the	aero
ope		ranc				in column D	and identify		RTC	drom
rati		es				was not	where the call is		with	e an
ng		(Als				prominent,	coming from.		flexibl	inco
con		0				however, it	These features		е	ming
ditio		affe				was	shall be		allocat	radio
ns.		ctin				explicitly	integrated both		ion of	trans
		g				suggested	into the Visual		airpor	missi
		Arg.				to include	Panorama and		ts	on is
		1.3.				the squelch	the head-down		betwe	relat
		5)				indication	display.		en	ed
		,				as a system	. ,		modul	to.
						requiremen			es.	The
						t when the				visua
						solution				1
						gets				indic
						deployed. It				ation
						is for the				s
						opposite				may
						opposite				may

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reason- the	be
squelch	custo
could	misa
indicate	ble
where the	and
transmissio	switc
n is coming	hed
from.	on-
	off
Indra/Avino	on
r: same as	ATCO
W2.PJ05.35	's
_ls.1.3.1-7	requ
	est
2.1 DLR	
same as	
W2.PJ05.35	
_ls.1.3.5-2	
COOPANS:	
ATCOs were	
aware	
about to	
which A/c	
they were	
giving	
instructions	
to, which	
A/c	
holonand to	
belonged to	
which	
aerodrome	
and to what	
aerodrome	





		they were giving instructions to. ENAV: ATCOs did not raise any issue in relation with the ability to distinguish with which aircraft, vehicle at which aerodrome the ATCO is communicat ing with				
OBJ-PJ05- W2-35-V3- VALP-H11	CRT-PJ05- W2-35- V3-VALP- H11.070	Indra/HC: The majority of ATCOs (83.3%) were aware which aerodrome was placed to which positions of the system (but see the	The airport name should be integrated in the phraseology in order to increase the situational			The airpo rt nam e shoul d be integ rated in the phras eolog

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evidence	y in
gathered for	order
Arg. 1.3.5)	to
	incre
Indra/Avino	ase
r: same as	the
W2.PJ05.35	situa
_ls.1.3.1-7	tiona
	1
2.1 DLR The	
results	
show that	
the majority	
of	
participants	
was aware	
of the	
displayed	
aerodromes	
and radar	
configuratio	
ns.	
COOPANS:	
Majority of	
ATCOs	
confirm that	
there was	
no	
confusion	
regarding	
where a	
certain	
aerodromes	

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	was going			
	was going			
	to be placed			
	in the visual			
	presentatio			
	n (VP).			
	ENAV			
	:ATCOs did			
	not raise			
	any issue in			
	relation			
	with the			
	ability to			
	distinguish			
	with which			
	aircraft,			
	vehicle at			
	which			
	aerodrome			
	the ATCO is			
	communicat			
	ing with			





W2-35-V3- VALP-H08 V3-VALP- H08.010 feedback phraseology in the order to increase e	am houl
VALP-H08 V3-VALP- on the integrated in the rt H08.010 feedback phraseology in na na the order to increase e e	t am houl
H08.010 feedback phraseology in the order to increase e	am houl
the order to increase e	houl
	houl
	be
	nteg
	ated
ATCO in in	
	ne
	hras
	olog
	in
	rder
degraded to	<u>ر</u>
in modes in	ncre
as as	se
Indra/Avino th	ne
r: All ATCOs si	itua
tio	ona
that the	
phraseology	
when when	
providing	
ATS services	
to multiple	
aerodromes	
was	
efficient	
under both	
normal and	
abnormal	
operating	





conditions.
A method,
consisting
of
systematical
ly including
the
aerodrome
name in the
callsign of
vehicles
during
communicat
ions, was
used to
avoid
confusion
when a
same and a same a s
vehicle
callsign
number was
in use on
two
different
aerodromes
Since air
frequency
were
coupled, it
was
discussed
that adding





aerodrome
name for
take-off and
landing
clearances
could be a
need to
avoid any
risk of
confusion
for pilots.
2.1 DLR The
ATCOs
agreed that
they were
able to
apply the
appiy the
phraseology independen
t from the
operating
conditions.
This is only
ok with the
adaption
that no
abnormal
and
degraded
modes were
part of the
validation.





COOPANS:	
This criteria	
was partly	
covered by	
the	
validation	
exercise,	
since there	
were not	
tested any	
abnormal	
situation.	
The ATCOs	
agreed that	
phraseology	
was	
acceptable	
when	
providing	
simultaneou	
s ATS to	
three	
aerodromes	
in normal	
and	
degraded	
operating	
conditions.	
They also	
agreed that	
phraseology	
worked well	
while	
performing	





transfer of
aerodromes
between
the
modules.
They clearly
confirm
"my control
at
(aerodrome
name)''
when they
took control
over an
aerodrome
after
completing
the transfer.
ENAV: No
issues
neither
specific
comments
were raised
about the
current
employed
phraseology
hillascology





OBJ-PJ05-	CRT-PJ05-	Indra/HC		COOPANS: Having same	The
W2-35-V3-	W2-35-	RTS: Same		layout on the WACOM	ATCO
VALP-H11	V3-VALP-	as		screen for e-strips for	shoul
	H11.010	W2.PJ05.35		single, double and triple	d be
		_ls.1.3.1-7		aerodrome mode.	provi
		_			ded
		Indra/Avino			with
		r: same as			а
		W2.PJ05.35			visua
		_ls.1.3.1-7			1
					indic
		2.1 DLR			ation
		Same as			of
		W2.PJ05.35			whic
		_ls.1.3.1-7			h
					aero
		COOPANS:			drom
		ATCOs state			e an
		the			inco
		simulator			ming
		(S-m)			radio
		provided			trans
		useful data			missi
		in an			on is
		understand			relat
		able way			ed
		and that			to.
		they rarely			The
		needed to			visua
		search for			
		information.			indic
					ation
		ENAV			S
		:ATCOs did			may





Arg.	W2.PJ	The	Closed	OBJ-PJ05-	CRT-PJ05-	not raise any issue in relation with the ability to distinguish with which aircraft, vehicle at which aerodrome the ATCO is communicat ing with HC/Indra		The overlapping of air-	Garried	The	be custo misa ble and switc hed on- off on ATCO 's requ est Grou
Arg. 3.3.	W2.PJ 05.35	The amo	Closed	OBJ-PJ05- W2-35-V3-	CRT-PJ05- W2-35-	HC/Indra RTS: The		fhe overlapping of air- ground communication	Ground	The overla	Grou nd
4:	_ls.3.3	unt		VALP-H04	V3-VALP-	amount of		shall be minimized for	vehicles	pping	vehic
The	.4-1	of			H04.020	communicat		the ATCO.	should be	of air-	les
com		com				ion was			properly	groun	shoul
mun		mun				judged to			trained to	d	d be
icati		icati				be			become	comm	prop
on		on				acceptable.			familiar	unicat	erly
load		and							with the	ion	train
of		time				Indra/Avino			fact that the	shall	ed to
tea		on				r: All			ATCO is	be	beco
m		the frog				participants confirmed			communicat ing also	minim ized	me famili
me mbe		freq uen				that the			with other	for	ar
rs is		су				amount of			aerodromes	the	with
acce		can				communicat			including	ATCO.	the
ptab		be a				ion and			ground		fact
le in		bott				time on the			vehicles		that
nor		lene				frequency					the
mal		ck in				were					ATCO





and	situ	acceptable.	is
abn	atio		com
orm	ns	2.1 DLR: The	muni
al	with	results	catin
con	high	show that	g
ditio	task	the majority	also
ns	load	of the	with
and	,	ATCOs	other
degr	, rath	working	aero
ade	er	MRTM find	drom
d	than	the	es
mod	wor	different	inclu
e of	kloa	types of	ding
ope	d or	communicat	grou
rati	situ	ion and the	nd
ons.	atio	frequency	vehic
	n	acceptable,	les
	awa	even in	
	rene	situations	
	SS	with 3	
	and	active	
	sho	airports on	
	uld	one MRTM.	
	be		
	furt	COOPANS:	
	her	The	
	eval	workload is	
	uate	negatively	
	d at	impacted by	
	V3	the amount	
	level	of	
		simultaneou	
		s calls. This	
		increase the	





potential for
misundersta
ndings
caused by
the
overlapping
calls.
Communica
tion with
VFR traffic
and vehicles
was
appointed
as much
more
challenging
than
communicat
ion with the
IFR traffic.
ENAV: R/T
load was
considered
acceptable
in the
solution
scenario. It
was not
acceptable
in the
reference
scenario
with 3





						airports allocated and without the flexible allocation			
Arg.	W2.PJ	The	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	-Future validation	Number of aerodromes	Numb
4.1.	05.35	conc		W2-35-V3-	W2-35-	RTS: See	activities shall	in the RTC and	er of
1:	_ls.4.1	ept		VALP-H07	V3-VALP-	W2.PJ05.35	involve the	allocated to each	aerodr
Cha	.1-1	and			H07.010	_ls.1.1.2-1.	Supervisor	supervisor shall be	omes
nges		resu				ATCOs can	position	locally assessed as it	in the
in		lting				accept the		depends on the	RTC
role		cha				suggested		complexity of the	and
S		nges				roles and		aerodromes	allocat
and		in				responsibilit			ed to
resp onsi		role s &				ies, based on the			each
biliti		resp				outcomes of			super visor
es		onsi				the			shall
are		biliti				simulation.			be
acce		es				Simulation.			locally
ptab		are				Indra/Avino			assess
le to		not				r: Same as			ed as
the		acce				W2.PJ05.35			it
affe		ptab				_ls.1.1.2-1			depen
cted		le to							ds on
hum		the				2.1 DLR The			the
an		affe				results			compl
acto		cted				show that			exity
rs.		acto				the majority			of the
		rs				of			aerodr
						participants			omes
						finds the			





changes clear, clear, consistent, acceptable, and applicable. log
COOPANS: ATCOs roles and responsibilit ies
introduced by the multiple remote tower concept
when working working intervention with a intervention flexible intervention allocation of intervention aerodromes intervention
between the modules the modules the modules do not the modules change, the modules only the the modules amount of the modules
areas in which the roles and





		responsibilit ies are executed multiply with each tower.			
		ENAV: Changes and concept were found feasible and acceptable			
OBJ-PJ05- W2-35-V3- VALP-H09	CRT-PJ05- W2-35- V3-VALP- H09.010	Indra/HC RTS: Same as in W2.PJ05.35 _Is.1.2.1-1 Indra/Avino r: Same as W2.PJ05.35 _Is.1.2.1-1			
		2.1 DLR Same as W2.PJ05.35 _Is.1.2.1-1 ENAV: Changes and concept were found			

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	feasible and acceptable			

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Arg.	W2.PJ	New	Closed	OBJ-PJ05-	CRT-PJ05-	Indra/HC	Future validation	COOPANS:A		Capaci	Addit
4.2.	05.35	MRT		W2-35-V3-	W2-35-	RTS: Some	activities shall	understanding and	Capacity of	ty of	ional
1:	_ls.4.2	М		VALP-H15	V3-VALP-	ATCOs also	involve the	familiarity of the	MRTM shall	MRT	skills
Kno	.1-1	syst			H15.010	mentioned	Supervisor	system as well as	be locally	М	may
wle		em				that it hurt	position	knowledge about the	assessed as	shall	be
dge,		mig				their pride		different aerodromes	it depends	be	need
skill		ht				that an		such as geography,	on the	locally	ed:
and		requ				aerodrome		gates, stands etc. was	complexity	assess	•
exp		ire				has been		seen by ATCOs as	of the	ed as	Team
erie		new				taken away		important skills and	aerodromes	it	work
nce		kno				from them,		knowledge in order to	in the RTC	depen	skills
req		wle				even		be able to operate		ds on	(TRM
uire		dge,				though they		multiple aerodromes		the),
men		skills				felt that		simultaneously.		compl	depe
ts		and				they could		Operational		exity	nding
for		exp				have		environment is		of the	on
hum		erie				continued		intended to include all		aerodr	the
an		nce				to provide		the aspects of the RTC,		omes	cont
acto						ATS for that		including teamwork,		in the	ext
rs						one as well.		methods and		RTC	•
hav						Thus ATCOs		procedures regarding			SUP
e						should bear		prioritisation, transfers			shoul
bee						in mind that		and regulations			d
n						the split and		connected to number			have
iden						merge is		of movements allowed			а
tifie						there for		is also seen as a			back
d.						optimising		requirement in order to			grou
						workload.		safely operate multiple			nd in
						Only the		aerodromes.			contr
						Supervisor					ol
						has all the					towe
						RTC-related					r
						information					
						in his/her					

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			possession,			
			so ATCOs			
			should not			
			question			
			his/her			
			decision.			
			In terms of			
			the role of			
			the SUP, the			
			first group			
			pointed out			
			that			
			sectorisatio			
			n is not part			
			of the			
			(HungaroCo			
			ntrol) Tower			
			Supervisor's			
			current			
			duties, so			
			this task			
			was a little			
			unusual.			
			They also			
			suggested			
			that			
			motivation			
			and affinity			
			are the key			
			skills and			
			requiremen			
			ts for			
			becoming a			
			Centre SUP.			

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				The SUP			
				should be			
				confident in			
				"ordaining"			
				the split, yet			
				s/he should			
				explain the			
				reason for a			
				split briefly			
				just as a			
				SUP would			
				do in ACC,			
				so that			
				ATCOs also			
				understand			
				that it is due			
				to e.g. a			
				predicted			
				traffic levels			
				and not due			
				their			
				performanc			
				e. As one of			
				the			
				participatin			
				g ATCO put			
				it, by so			
				doing the			
				SUP would			
				not			
				"trample on			
				the ATCO's			
				feelings".			
			1				

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		Indra/Avir	0			
		r: Some				
		knowledg				
		and skills				
		needs cou	d			
		be				
		identified				
		for ATCOs				
		The				
		familiarity				
		, with the				
		system an	Ł			
		a very goo				
		local	-			
		knowledg				
		about eac	1			
		aerodrom				
		characteri				
		cs were				
		cited as				
		important				
		skills/trair	in			
		g				
		requireme	n			
		ts to be al	le			
		to operate				
		multiple				
		aerodrom	es			
		Cognitive				
		skills such				
		as visual				
		scanning	f			
		informatio	n			

EUROPEAN PARTNERSHIP





			or			
			multitasking			
			are also			
			important			
			to build up			
			to ensure			
			human			
			performanc			
			e in a multi			
			context.			
			However,			
			they were			
			considered			
			by ATCOs as			
			to already			
			be a part of			
			their tasks			
			in today's			
			tower.			
			Clear rules			
			regarding			
			maximum			
			capacity at			
			MRTMs			
			need to be			
			established			
			and known			
			by both			
			, ATCOs and			
			supervisors			
			to prevent			
			overloads			
			and			
			anticipate			

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			when split			
			of			
			aerodromes			
			should be			
			performed.			
			COOPANS:			
			Knowledge,			
			skills and			
			experience			
			requiremen			
			ts was			
			identified			
			both from			
			ATCOs and			
			also from			
			observers.			
			ENAV: It's			
			not fully			
			clear from			
			the			
			conducted			
			discussion			
			and the			
			collected			
			responses if			
			skill and			
			recruitment			
			requiremen			
			ts need to			
			be adapted			
			to handle			
			the new			

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			concept of the flexible allocation, as not all the answers are aligned on the positive or negative responses for the supervisors and the ATCOs. The overall trend in the discussion was that no real new requiremen t or skill is needed, but adaptation to the new way of working would be required			

EUROPEAN PARTNERSHIP





Arg. 4.3. 2: The	W2.PJ 05.35 _ls.4.3 .2-1	The maxi mu m	Closed	#N/D	#N/D	st de	ocal assessment hall be done to etermine shift engths			
imp		shift								
act		leng								
on		th of								
shift		an								
orga		ATC								
nisa		0								
tion		mig								
is		ht								
iden		be								
tifie		redu								
d.		ced								
		with								
		Mul								
		tiple Rem								
		ote								
		Tow								
		er								
		com								
		pare								
		d to								
		singl								
		e								
		rem								
		ote								
		tow								
		er								





Arg.	W2.PJ	The	Closed	OBJ-PJ05-	CRT-PJ05-	HC/Indra:	The diversity of	COOPANS: An		
4.5.	05.35	train	5,0500	W2-35-V3-	W2-35-	No special	the different	understanding and		
1:	_ls.4.5	ing		VALP-H15	V3-VALP-	training	aerodromes in	familiarity of the		
The	.1-1	does			H15.020	need was	terms of	system as well as		
cont		not			1110.020	identified	geographical	knowledge about the		
ent		suffi				for the SUP	specifities and	different aerodromes		
of		cien				role.	procedures have	such as geography		
trai		tly				Regarding	to be included in	gates, stands etc. was		
ning		cont				the ATCO	the training	seen by ATCOs as		
for		ain a				role, after		important skills and		
eac		tech				four days		knowledge in order to		
h		nical				ATCOs		be able to operate		
acto		part				shared that		multiple aerodromes		
r		on				they		simultaneously.		
grou		the				needed this		· · · · · · · · · · · · · · · · · · ·		
p is		new				time to get				
spec		MRT				comfortable				
ified		м				with the				
. (V3		The				simulated				
only		ATC				environmen				
)		Os/				t (four				
		SUP				airports and				
		s are				the system).				
		not				It is				
		suffi				important				
		cien				to bear in				
		tly				mind that				
		fami				the civilian				
		liaris				ATCOs at				
		ed				HungaroCon				
		with				trol are				
		the				used to				
		aero				providing				
		dro				ATS at				





me	Budapest,
(phy	which is a
sical	medium-
char	sized
acte	airport.
risti	Therefore
CS,	they felt
proc	that it may
edur	have been
es,	easier for
oper	them to
atin	adjust to
g	the
con	simulated
ditio	traffic level-
ns	albeit it
etc.)	wasn't too
The	high for
ATC	their
0/	standards-,
SUP	then for
s is	someone
not	who comes
suffi	from a small
cien	aerodrome
tly	with 1-2
fami	VFRs/day.
liaris	In terms of
ed	training on
with	the system,
the	it is easier
tech	to get
nical	accustomed
beh	to a system





avio	0	which was
ur o	of	tailored to
the		the given
cam	n	context of
era		use. The
and		system used
othe		in this
r RT	г	validation
spec	ec	was
ific		designed to
tech	h	the needs of
nica	al	the Avinor
com	n	end-users.
pon	n	Whilst the
ents	S	behaviour
		of the
		system may
		have been
		intuitive for
		that group
		of users, the
		same design
		did not
		meet the
		mental
		model of
		the
		Hungarian
		ATCOs.
		Indra/Avino
		r: Some
		training





needs could	
be	
identified	
for ATCOs.	
The	
familiarity	
with the	
system and	
the local	
knowledge	
of each	
aerodrome	
characteristi	
cs were	
mentioned	
as	
important	
skills/trainin	
g to ensure	
human	
performanc	
e when	
operating	
multiple	
aerodromes	
The need	
for	
dedicated	
training on	
ATCO/SUP	
teamwork	
to deal with	
abnormal	





situation or
degraded
modes was
also raised
by both
ATCOs and
supervisors.
COOPANS:
Training
needs was
identified
by both
ATCOs and
observers.
ENAV: Both
the
supervisors
and the
ATCOs
agreed that
the ATCOs
and
supervisor
should be
extensively
trained to
undertake
the new
role for the
supervisor
and the new
responsibilit





			ies for the ATCOs				
				Local assessment			
				shall be done to determine shift			
				lengths			





Split and merge procedures shall be locally defined with a clear description of the associated roles and responsibilities and corresponding coordination	
The training curricula shall familiarize the ATCOs with the new concept and the corresponding tools (e.g. binoculars), in order to ensure they have an adequate level of trust	
Future validation activities shall involve the Supervisor position	

Table 17: 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





	Maturity checklist for finalising the V3 assessment									
ID	Question	Answer	Comments							
1	Has a Human Performance Assessment Report been completed? Have all relevant arguments been addressed and appropriately supported?	Yes	See sections 4.1.5, 4.2.1 and 4.4.1							
2	Are the benefits and issues in terms of human performance and operability related to the proposed solution sufficiently assessed (i.e. on the level required for V3)?	Yes	See sections 4.2.1 and 4.4.1							
3	Have all the parts of the solution/concept been considered?	Yes	See sections 4.1.1, 4.1.2, 4.1.5, 4.2.1 and 4.4.1							
4	Have potential interactions with related projects/concepts been considered and addressed?	Yes	No interactions identified; previous solution have been considered in the change assessment.							
5	Is the level of human performance needed to achieve the desired system performance for the proposed solution consistent with human capabilities?	Yes	See section 4.4.1, but recommendations and requirements have been identified for the system performances							
6	Are the assessments results in line with what is targeted for that concept? If not, has the impact on the overall strategic performance objectives/targets been analysed?	Yes	- See section 4.4.1							
7	Has the proposed solution been tested with end-users and under sufficiently realistic conditions, including abnormal and degraded conditions?	Yes	See section 4.3.1							
8	Do validation results confirm that the interactions between human and technology are operationally feasible, and consistent with agreed human performance requirements?	Yes	- See section 4.4.1							

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9	Have all relevant SESAR documentation been updated according to the HP activities outcomes (OSED, SPR)?	Yes	OSED and SPR are updated to take into account HPAR results
10	Do the outcomes satisfy the HP issues/benefits in order to reach the expected KPA?	Yes	See Section 4.4.1
11	Have HP recommendations and HP requirements correctly been considered in HMI design, procedures/documentation and training?	Yes	See Section 4.4.1 Appendix B and C
12	Have the major factors that can influence the transition feasibility (e.g. changes in competence requirements, recruitment and selection, training needs, staffing requirements, and relocation of the workforce) been addressed? Are there any ideas on how to overcome any issues?	Yes	See Section 4.4.1 Appendix B and C
13	Have any impacts been identified that may require changes to regulation in the area of HP/ATM? This includes changes in roles & responsibilities, competence requirements, or the task allocation between human & machine.	Yes	See Section 4.4.1 Appendix B and C
14	Has the next V-phase sufficiently been prepared (additional testing conditions, open HP issues to be addressed)?	Yes	See Section 4.4.1 Appendix B and C All issues are considered as closed



5 References

Human Performance

- [1] Human Performance Assessment Process V1 to V3 including VLDs
- [2] SESAR Solution PJ05-03 Validation Plan (VALP) Template for V2 Part IV Human Performance Assessment Plan
- [3] SESAR Solution PJ.05-W2-35 SPR-INTEROP/OSED for V3 Part I
- [4] SESAR Solution 05-03 SPR/INTEROP-OSED V2 Part IV Human Performance Assessment Report
- [5] 06.09.03 D28 Remotely Provided Air Traffic Services For Two Low Density Airports Appendix F: HP Assessment Report
- [6] SESAR Solution PJ05.02 SPR-INTEROP/OSED for V3 Part I
- [7] SESAR Solution PJ05.02 SPR-INTEROP/OSED for V3 Part IV
- [8] SESAR Solution PJ05_02-V3 VALR (3_13)
- [9] SESAR Solution PJ05_03 D3_1_007 VALR (2_24)
- [10]SESAR PJ05_03 D3_1_005 HP assessment plan (1_2)
- [11]SESAR Solution Wave 2 PJ05 35- D2.7.020 VALP Part IV
- [12]SESAR Solution Wave 2 PJ05 35--D2.1.060 V 3 VALR

[13]SESAR Solution Wave 2 PJ05 35--D2.1 OSED Part I



Appendix A – Additional HP activities conducted

None





Appendix B – HP Recommendations Register

This section includes the final recommendations identified to mitigate the issues and benefits identified for the solution. These recommendations have been identified considering the results of the conducted HP related activities. Most of them are then moved to the Part I SPR-INTEROP/OSED. Recommendations that are left only in the HPAR are intended to drive the further assessment needed at human performance level during a local deployment for a RTC with flexible allocation of aerodromes between MRTMs, this as support when performing the mandatory Safety Assessment according to 373 regulation with support of EASA guidance Material for Remote Towers.

Recommendations validated at V3 level in previous phase have not been included in this HPAR, but for traceability reasons they can be found in the HP-Log.

Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
PJ05.35_HP_1 became OSED REQ-05.35- SPRINTEROP- AL01.0001	Ŷ	Human Performan ce	The ATCO should be supported in monitoring the runway	The ATCO should be supported in monitoring the runway. <i>How</i> this support should be provided, should be locally assessed. If available, a ground surveillance system is desirable.	Workshop W2	Accepted		

The following Recommendations scope is related to "Ground" and are relevant to Pj05.35 concept:





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
PJ05.35_HP_10	Ν	Human Performan ce	The border of each displayed aerodrome should be marked in the Visual Panorama and head-down displays with possible colour coding for the different positions or aerodromes.	Borders between the displayed airports should be highlighted to easily distinguish the frame related to each aerodrome in the visual panorama and in the head down displays	W2 RTS/Worksh op	Accepted		It is recommended to allow a flexible display of the airports in the OTW view and in head-down display (no fix position, but the new airports always displayed as the last one. The OTW should underline the border of each displayed airport





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
PJ05.35_HP_11	N	Human Performan ce	The ATCO should be provided with a visual clear indication de- activable on ATCO request of which aerodrome an incoming radio transmission is related to in order to quickly distinguish the aerodromes and identify where the call is coming from.	ATCOs should be supported by a visual indication and coloured frames in order to quickly distinguish the aerodromes and identify where the call is coming from. These features shall be integrated both into the Visual Panorama and the head-down display and activable on request by ATCO. It could be useful especially at the beginning when the concept is introduced as ATCOs are still getting used to it and pilots might not be used yet to	W2 RTS/Worksh op	Rejected		Already addressed in HP_116





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
				always identifying the airport they are calling to in any call.				
PJ05.35_HP_114 became OSED REQ-05.35- SPRINTEROP- SR01.0003	Υ	Human Performan ce	The RTC Supervisor or similar role should be able to have a view over functional MRTM's in case of an emergency in order to be able to transfer an airport.	Emergency situations should be known by the role responsible of the allocation of aerodromes between modules in order to be able to transfer the airport interested by the emergency	W2 RTS/Worksh op	Accepted		

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Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
PJ05.35_HP_116	N	Human Performan ce	The ATCO should be provided with a visual indication of which aerodrome an incoming radio transmission is related to. The visual indications may be customisable and switched on-off on ATCO's request	To prevent the flexible frequent allocation of aerodromes generates confusion affecting the team situation awareness with a possible increase of human error and workload	W2 RTS/Worksh op	Accepted		To highlight, in the out of the window view, the frame related to the airport where pilots are transmitting.





PJ05.35_HP_12	Ν	Human	In case of	E.g. like	W2	Accepted	ENAV: In case
		Performan	contingency and in	coordination tasks	RTS/Worksh		of contingency
		ce	case of emergency	with external	ор		and in case of
			part of ATCOs task	authorities in case			emergency it is
			may be delegated	of emergency might			suggested to
			to The RTC	be delegated to the			delegate to the
			supervisor to	supervisor to			supervisors all
			reduce the	reduce ATCo			the tasks that
			workload for the	workload in case of			can be reduced
			remote tower	emergency			for the remote
			module ATCO				tower module
							ATCO, like
							coordination
							tasks with
							external
							authorities in
							case of
							emergency etc









ATCOs should
be able to
move
aerodromes
also to the C-
slot (upper
right side),
even if there
are only two
aerodromes
(Indra specific
recommendat
on).
,
COOPANS:
Having same
layout on the
WACOM scree
for e-strips fo
single, double
and triple
aerodrome
mode.





PJ05.35 became REQ-05. SPRINTE TM01.00	OSED 35- ROP-	Y	Human Performan ce	Pre-sets should be defined for the aerodrome radar maps in order to support the ATCO to efficiently manage flexible allocation.	Pre-sets should be defined for the aerodrome radar maps in order to support the ATCO to efficiently manage flexible allocation.	W2 RTS/Worksh op	Accepted		Pre-sets should be defined for the aerodrome radar maps in order to support the ATCO to efficiently manage flexible allocation. COOPANS: Having same layout on the WACOM screen for e-strips for single, double and triple aerodrome mode.
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Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
PJ05.35_HP_23 became OSED REQ-05.35- SPRINTEROP- SR01.0002	Y	Human Performan ce	The handover procedure initiation should be responsibility of the RTC supervisor role.	Supervisor should be responsible of initiating the handover as he/she has the overview of the expected traffic load and workload expected at each aerodrome and the relevant information like status of the aerodromes, endorsements and ATCO availability. The ATCO can always request a handover	W2 RTS/Worksh op	Accepted		The handover procedure initiation should be responsibility of the supervisor role.
PJ05.35_HP_24	Ν	Human Performan ce	A local assessment should be conducted to establish supervisor and ATCOs responsibilities in the remote tower centre with the	Local assessment is recommended to establish if part of ATCOs task of coordination with other entities can be delegated to the supervisor e.g. the	W2 RTS/Worksh op	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
			flexible allocation depending on the available level of automation and the RTC size	coordination with other entities might be delegated to the supervisor rather than the ATCOs.				
PJ05.35_HP_25 became OSED REQ-05.35- SPRINTEROP- TM01.0001	Y	Human Performan ce	ATCO shall be able to request a transfer even if he/she is not holding the RTC supervisor role	If an ATCOs need a transfer he/she needs to be allowed to request it	W2 RTS/Worksh op	Accepted		
PJ05.35_HP_26 became OSED REQ-05.35- SPRINTEROP- TM01.0010	Υ	Human Performan ce	The time the ATCO works on each airport should be automatically monitored to ensure that the minimum required amount of hours (and therefore the endorsement) is maintained.	As the ATCOs have different endorsements in order to work in the RTC, there is the need to automatically check the number of hours worked on each aerodrome in order to ensure the endorsements are maintained	W2 RTS/Worksh op	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
PJ05.35_HP_27 became OSED REQ-05.35- SPRINTEROP- TM01.0005	Y	Human Performan ce	Operating procedure for the handover should foresee a period dedicated to the monitoring including frequency monitoring before the actual handover and a coordination between the ATCOs	There is the need to dedicate a time period to building- up the situational awareness before finalising the split and merge procedure	W2 RTS/Worksh op	Accepted		
PJ05.35_HP_28	Ν	Human Performan ce	Handover procedure should be initiated in lower traffic period to not affect ATCOs workload and situational awareness in nominal conditions	Handover should happen in a lower traffic period, when the ATCOs have spare capacity for the handover process and to build up the situational awareness.	W2 RTS/Worksh op	Accepted		
PJ05.35_HP_30	N	Human Performan ce	Cardinal directions on the visual panorama should be displayed	The aerodromes layout and runways geography of the different aerodromes	W2 RTS/Worksh op	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
				assigned to each module can have different directions even if displayed at the same way. There is the need for the ATCOs to always know where the cardinal directions are in order to avoid any misleading interpretation of the visual panorama displays				
PJ05.35_HP_32	Ν	Human Performan ce	Required information for ATCOs and SUP should be locally assessed before the deployment	High level requirements for RTC information to be provided to both ATCOs and SUP positions are defined at solution level, but they need to be locally assessed and customised based	W2 RTS/Worksh op	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
				on the specific environment needs				
PJ05.35_HP_33	Ν	Human Performan ce	Alerting system to drive the attention of the ATCO to a certain airport under certain conditions (e.g. aerodrome highlighted in case of communication; alerts for a pre- defined area) should be provided	Additional alerting system to catch ATCOs attention might further support ATCOs situation awareness considering they need to divide the attention to different aerodromes	W2 RTS/Worksh op	Accepted		Alerting system to draw the attention of the ATCO to a certain airport under certain conditions (e.g. aerodrome highlighted in case of communication ; alerts for a pre-defined area) should be provided





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
PJ05.35_HP_36 became OSED REQ-05.35- SPRINTEROP- CO01.0003	Y	Human Performan ce	Ground vehicles should be properly trained to become familiar with the fact that the ATCO is communicating also with other aerodromes including ground vehicles	To avoid confusion on ground frequency, ground vehicles operators shall be aware that the ATCOs is communicating with different aerodromes vehicles. Also, ground frequency shall not be mixed with aircraft frequency	W2 RTS/Worksh op	Accepted		Ground vehicles should have their own frequency and should be trained on the fact that the ATCO is communicating also with other airports
PJ05.35_HP_4	Ν	Human Performan ce	The ATCO may be warned by the surveillance system about an aircraft or vehicle entering the runway without clearance.	It would be beneficial for the situation awareness of ATCO to have a warning for aircraft or vehicles entering the runway	W2 RTS/Worksh op	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
PJ05.35_HP_43 became OSED REQ-05.35- SPRINTEROP- TM01.0007	Y	Human Performan ce	The ATCO displays shall retain the predefined ATCOs Set-up when receiving a new aerodrome for the handover	If the ATCO has customised his/her displays (e.g. radar map, Visual Presentation etc.) this should be maintained also after the handover for the aerodromes that are under control.	W2 RTS/Worksh op	Accepted		The ATCO display should retain the predefined ATCOs Set-up after the switch and merge
PJ05.35_HP_47 became OSED REQ-05.35- SPRINTEROP- TR01.0002	Υ	Human Performan ce	Additional skills may be needed: • Teamwork skills (TRM), depending on the context • SUP should have a background in control tower	Working in a RTC with flexible allocation may be very different by working in a very small airport and this might require additional skills	W2 RTS/Worksh op	Accepted		
PJ05.35_HP_48	N	Human Performan ce	Handover procedure may be supported by the technical system in silent transfer and acceptance of the split and merge	The handover procedure may not need phone call confirmation but may be completed and confirmed via system interaction	W2 RTS/Worksh op	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
PJ05.35_HP_53	N	Human Performan ce	The RTC supervisor role may be provided with a tool combining the information (aerodromes' status, meteo, forecasted traffic load and capacity) to facilitate decisions regarding how to combine aerodromes in the MRTM	The supervisor is responsible of the allocation of the aerodromes between the modules. The allocation shall be established depending on the aerodromes and traffic conditions (e.g. meteo, load etc.). The supervisor shall be supported by a tool providing the required information in order to establish the aerodrome allocation	W2 RTS/Worksh op	Accepted		
PJ05.35_HP_6 became OSED REQ-05.35- SPRINTEROP- CO01.0001	Y	Human Performan ce	The airport name should be integrated in the phraseology in	Airport name is to be used in the communication exchange to	W2 RTS/Worksh op	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
			order to increase the situational	enhance situational awareness				
PJ05.35_HP_9 became REQ- 05.35- SPRINTEROP- TM01.0003	Υ	Human Performan ce	Timing of the handover procedure should be coordinated between SUP and ATCOs as it's ATCO responsibility to manage the handover	It should be the ATCOs' responsibility to manage the handover between themselves, thus the timing of the split should be coordinated between SUP and ATCOs.	W2 RTS/Worksh op	Accepted		It should be the ATCOs' responsibility to manage the handover between themselves, thus the timing of the split should be coordinated between SUP and ATCOs.
REQ.05.03_HPop s_4	Ν	Operation al	There needs to be a local assessment to determine the number of endorsements an	To ensure rostering is acceptable and feasible for the control of multiple aerodromes (take	Previous wave - Activities	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
			ATCO working in an MRTM can have, taking into account the split/ merge and transfer possibilities.	into account the possibility of split and merge)				
REQ.05.03_HPval _ 02	N	Validation	Assess Supervisor workload in scenarios addressing the transfer/ assuming of aerodromes.	The workload of the supervisor has to be further evaluated.	Previous wave - Activities	Rejected	Assesse d in Wave 2	-
REQ.05.03_HPval _03	N	Validation	Assess Supervisor acceptance of operating methods in scenarios addressing transferring of aerodromes.	The acceptance of operating methods shall be further evaluated.	Previous wave - Activities	Rejected	Assesse d-in Wave 2	-
REQ-05.02- SPRINTEROP- CO01.0005	Y	Operation al, Safety	The RTC should host a locally determined number of MRTMs to be able to split aerodromes.	Splitting of aerodromes to separate MRTMs as a backup procedure allows safe provision of ATS in case that traffic or	Previous wave - Activities	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
				other factors				
				increase workload				
				to an amount that				
				does not allow				
				provision of ATS to				
				multiple				
				aerodromes.				
				Assessments at				
				local level, based				
				on				
				complexity/volume				
				s of traffic,				
				simultaneity of				
				movements, etc.				
				should be done to				
				confirm the				
				appropriate				
				number of modules				
				to be considered in				
				a RTC.				





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
REQ-05.03- SPRINTEROP- AF01.0002	Υ	design	The ATCO may be supported in monitoring conformance to clearances on ground	Support in ground monitoring can support that ground clearances are followed. A ground monitoring support tool is envisaged to be especially useful in a multiple environment and could be an enabler to support certain operational contexts in multiple mode of operation. REC.05.00_HPdesig n13: In case stop bars and/or ground sensors are available, there should be a visual indication when stop bar overrun occurs. Rationale:	Previous wave - Activities	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
				REC.05.00_HPdesig n13: The indication				
				could be either in				
				the panorama				
				and/or the planning tool (e.g. the label				
				could turn red or if				
				possible it could be				
				linked to the				
				electronic planning				
				tool that blocks the				
				occupied section).				
				The following				
				safety				
				requirement(s) of				
				[SAR] comply with				
				this OSED				
				requirement: SR-				
				36, SR-37.				
				Initially addressed				
				in SESAR1 REQ- 06.09.03-OSED-				
				FN03.3006 & REQ-				
				06.09.03-OSED-				
				FN03.3007.				





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
REQ-05.03- SPRINTEROP- AF01.0003	Υ	Operation al	The ATCO may be supported in monitoring conformance to clearances for airborne movements	Support in air monitoring can support the ATCO in monitoring that given clearances are followed. An air monitoring support tool is envisaged to be especially useful in a multiple environment and could be an enabler to support certain operational contexts in multiple mode of operation.	Previous wave - Activities	Accepted		
REQ-05.03- SPRINTEROP- AF01.0004	Y	Operation al	The ATCO may be supported by the system, indicating situations when contradictive (incompatible) clearances are delivered.	Conflicting clearance alerts for controllers (CATC) can support the ATCO to be warned if contradictive (incompatible) clearances are given.	Previous wave - Activities	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
REQ-05.03- SPRINTEROP- AF01.0005	Y	Human Performan ce	The ATCO may be supported by the system indicating when clearances can be given.	Situation awareness may be increased and potential conflicting situations may be avoided if the system indicated when clearances can be given. This helps if the ATCO is focussing on one aerodrome while a clearance can be given at another aerodrome.	Previous wave - Activities	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
REQ-05.03- SPRINTEROP- AP01.0002	Y	Human Performan ce	The ATCO should be supported in prioritising tasks (e.g. providing landing clearance or taxi clearance) and forecast the traffic demand from a support tool in the tactical short term.	A task prioritisation tool can support ATCO in Human Performance working in a complex Multiple Remote Tower environment.	Previous wave - Proposed rewording to be discussed	Accepted		The ATCO should be supported in prioritising tasks (e.g. providing landing clearance or taxi clearance) from a support tool in the tactical short term.
REQ-05.03- SPRINTEROP- SP02.0004	Y	Design	The RTC Supervisor role should be provided with a technical overview of all systems e.g. the MRTM, camera functionality etc. in the RTC and of the aerodrome systems	There is a need for the RTC supervisor to have an overview over status of technical equipment to support to which ATCO and MRTM aerodromes can be	Previous wave - Activities	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
			e.g. navigational aids, lights, emergency alerting functions, for all involved aerodromes part of the RTC	allocated to. The following safety requirement(s) of [SAR] comply with this OSED requirement: SR- 27. Initially addressed in SESAR1 < <partly>> REQ- 06.09.03-OSED- SUP3.0012</partly>				
REQ-05.03- SPRINTEROP- SP03.0002	Y	Human Performan ce	The RTC Supervisor should be provided with the forecasted demand for all involved aerodromes part of the RTC.	The supervisor planning tool aims to support the RTC Supervisor to balance workload and plan for e.g. work, such as maintenance at the aerodromes or the RTC. The following safety requirement(s) of	Previous wave - Activities	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requireme nt	Consolidated Requirement description/Rewor ding or New Requirement	Rationale	Assessmen t source + Reference report	Requireme nt status	Rationa le in case of rejectio n	Comments
				[SAR] comply with this OSED requirement: SR- 27. Initially addressed in SESAR1 REQ- 06.09.03-OSED- SUP3.0010				
REQ-05.03- SPRINTEROP- TM03.0002	Y	Design	The RTC Supervisor role should be provided with a display presenting an overview of the RTC, including e.g. MRTM status, aerodromes allocated to MRTMs, traffic load, etc. to be able to transfer an airport.	The RTC Supervisor should have a clear overview of the RTC and all connected aerodromes in order to plan and manage resources and assist or initiate aerodrome transfers. The following safety requirement(s) of [SAR] comply with this OSED requirement: SR- 27.	Previous wave - Activities	Accepted		





Table 18: HP recommendations





Appendix C – HP Requirements Register

This section includes the final requirements identified to mitigate the issues and benefits identified for the solution. These requirements have been identified considering the results of the conducted HP related activities. Most of them are then moved to the Part I SPR-INTEROP/OSED. Requirements that are left only in the HPAR are intended to drive the further assessment needed at human performance level during a local deployment for a RTC with flexible allocation of aerodromes between MRTMs, this as support when performing the mandatory Safety Assessment according to 373 regulation with support of EASA guidance Material for Remote Towers.

Requirements validated at V3 level in previous phase have not been included in this HPAR, but for traceability reasons they can be found in the HP-Log.

Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
REQ-05.03- SPRINTEROP- TM03.0007	Ŷ	Design	The ATCO/RTC Supervisor shall be able to verify the status of an aerodrome and its related systems, before taking on responsibility for providing ATS to the aerodrome.	The validation activities- up to date have not included the supervisor position. The V3 validation activities shall clarify the roles and responsibilities and corresponding tasks for the supervisor position,	Previous wave	Accepted		

The following Requirements scope is related to "Ground" and are relevant to Pj05.35 concept:





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
				in normal, abnormal and degraded modes of operations.				
REQ-05.03- SPRINTEROP- TM02.0005	Y	< Operational>, <safety>, <human performance=""></human></safety>	Transfer procedures (for the transfer of an aerodrome between MRTMs) shall be locally defined with a clear description of the associated roles and responsibilities and corresponding coordination procedures.	To ensure all actors involved are aware of their responsibilities and associated tasks. This REQ originates from [HPAR] REQ.05.00_HPtraini ng_32. The following safety requirement(s) of [SAR] comply with this OSED requirement: SR- 20.	Previous wave	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
REQ-05.03- SPRINTEROP- TM02.0004	Y	operational	During Transfer of an aerodrome both ATCOs shall be presented with the same information on the aerodrome being transferred with all available technical systems as replicas until the transfer process is finished, readiness by overtaking ATCO is confirmed and the fully control over the new aerodrome is being reported established.	There is a need for both ATCOs to have a correct overview of aerodromes to be transferred between MRTMs in order to maintain a correct situational awareness. The overtaking ATCO shall confirm ready to take over the control of the transferred aerodrome and the fully control on it to be reported established. The following safety requirement(s) of [SAR] comply with this OSED requirement: SR- 20.	Workshop/ SESAR I	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
				Initially addressed in SESAR1 REQ- 06.09.03-OSED- RTC3.0007				
REQ-05.03- SPRINTEROP- TA01.0001	Y	Operational, Safety	When Tower and Approach services are combined within the same MRTM, the tools for each service shall be easily available.	During specific periods (e.g. during low-traffic periods) there may be a need to combine TWR and APP services from the same MRTM. It is paramount that this service can be provided with access to relevant tools to support situational awareness. It is also important that the ATCO can keep track of traffic	Previous wave	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
				on the aerodrome(s) and in the APP area simultaneously.				
REQ-05.03- SPRINTEROP- SP02.0003	Y	Design	The RTC Supervisor role shall be able to access functions for the monitoring of weather conditions for all aerodromes.	The following safety requirement(s) of [SAR] comply with this OSED requirement: SR- 29. Initially addressed in SESAR1 REQ- 06.09.03-OSED- SUP3.0013	Workshop/ SESAR I	Accepted		
REQ-05.03- SPRINTEROP- SP01.0001	Y	Design	The RTC Supervisor role shall access functions for communicating the status of RTC and aerodromes and coordinating maintenance (to	Initially addressed in SESAR1 REQ- 06.09.03-OSED- SUP3.0014	Workshop/ SESAR I	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
			be carried out by a qualified engineer/technici an).					
REQ-05.03- SPRINTEROP- TM03.0003	Y	<operational>,<safety></safety></operational>	The RTC Supervisor shall be provided with information to facilitate decisions regarding how to combine aerodromes in the MRTM.	RTC supervisor need an overview over capacity and demand at the connected aerodromes in order to find a suitable balance for the ATCOs in the different MRTMs. Considerations shall be done regarding e.g. traffic levels, traffic complexity, airport layout, geographical difference, daylight conditions, weather conditions, work in progress on the	Previous wave	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
				airport, etc. The following safety requirement(s) of [SAR] comply with this OSED requirement: SR- 27.				
REQ.05.03_HPv al_08	N	Validation	Future validation activities shall address the level of trust in the operations and the associated system of the SUP	The trust of the SUP shall be assess in validation activities	Previous wave	Rejected	A ssess ed in W2	-
REQ.05.03_HPv al_07	N	Validation	Future validation activities shall the SUP's level of situation awareness	The SA of the SUP shall be assess in validation activities	Previous wave	Rejected	Assess ed in W2	-





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
REQ.05.03_HP∨ a l_07	H	Human Performance	Future validation activities shall the SUP's level of situation awareness	Future validation activities shall the SUP`s level of situation awareness	Previous wave	Rejected	Assess ed in W2	PJ05.35 part-of validation exercises included RTC supervisor role
REQ.05.03_HPv al_06	N	Validation	Future validation activities shall assess the timeliness of executing tasks for the supervisor position.	Human Machine Interface design can support ATCO in situational awareness by presenting visual and/or sound to enhance Voice Com transmissions from the aerodromes connected to the MRTM. The following safety requirement(s) of [SAR] comply with this OSED	Workshop/ SESAR I	Rejected	Assess ed in W2	-





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
REQ.05.03_HPv al_06	ħ	Human Performance	Future validation activities shall assess the timeliness of executing tasks for the supervisor position.	requirement: SR- O6. REQ.05.00_HPdesig n_8: As for the visual input, the ATCOs shall be able to easily distinguish the information associated to each of the aerodromes they are controlling. Future validation activities shall assess the timeliness of executing tasks for the supervisor position.	Previous wave	Rejected	Assess ed in W2	PJ05.35 part of validation exercises included RTC supervisor role
REQ.05.03_HPv al_05	N	Validation	Future validation activities shall identify system possibilities on the SUP HMI to	System possibilities for the SUP position shall be investigated.	Previous wave	Rejected	Assess ed in W2	-





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
			indicate geographical characteristics and indication of different airports.					
REQ.05.03_HPv al_05	N.	Human Performance	Future validation activities shall identify system possibilities on the SUP HMI to indicate geographical characteristics and indication of different airports.	Future validation activities shall identify system possibilities on the SUP HMI to indicate geographical characteristics and indication of different airports.	Previous wave	Rejected	Assess ed in W2	PJ05.35 part of validation exercises included RTC supervisor role
REQ.05.03_HPv al_05	N	Human Performance	Future validation activities shall identify system possibilities on the SUP HMI to indicate geographical characteristics and indication of different airports.	Future validation activities shall identify system possibilities on the SUP HMI to indicate geographical characteristics and indication of different airports.	Previous wave	Rejected	Assess ed in W2	PJ05.35 part of validation exercises included RTC supervisor role





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
REQ.05.03_HPv al_04	Ν	Validation	Supervisor operating methods for frequently occurring abnormal conditions and emergency situations shall be defined.	The supervisor related operating methods shall be defined.	Previous wave	Accepted		
REQ.05.03_HPv al_01	N	Human Performance	Future validation activities shall involve the Supervisor position	Future validation activities shall involve the Supervisor position	Previous wave	Rejected	Assess ed in W2	PJ05.35 part of validation exercises included RTC supervisor role
REQ.05.03_HPv al_01	N	Human Performance	Future validation activities shall involve the Supervisor position	Future validation activities shall involve the Supervisor position	Previous wave	Rejected	Assess ed in W2	PJ05.35 part of validation exercises included RTC





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
								supervisor role
REQ.05.03_HPv al_01	N	Validation	Future validation activities shall involve The RTC supervisor position	The validation activities - up to date have not included the supervisor position. The V3 validation activities shall clarify the roles and responsibilities and corresponding tasks for the supervisor position, in normal, abnormal and degraded modes of operations.	Previous wave	Rejected	A ssess e d in W2	Future validation activities shall involve the Supervisor position





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
PJ05.35_HP_8	Ν	Human Performance	Checklist for the handover shall be defined	The transfer procedure shall be defined locally and a checklist is needed to support the handover phase and to conclude the split and merge	Workshop W2	Accepted		
PJ05.35_HP_7	Y	Human Performance	When an aerodrome is opened in an MRTM the video system shall automatically display it without the need for additional ATCOs manual actions	When an aerodrome is opened in an MRTM, the video system shall automatically follow this, and no additional activation click shall be needed on the video system's user interface.	Workshop W2	Accepted		





PJ05.35_HP_51	Human Performance	ormance Meteo information shall be integrated and displayed in the scan path of the ATCOs and shall be automatically handed over according to the established module configuration after split and merge procedures.	The MET window shall be linked to the EFS bay i.e. it should move together with the EFS and radar map during an aerodrome change.	W2 RTS/Works hop	Accepted		The ATCO display should allow a flexible allocation of the position of the transferred aerodrome s or The system behaviour should be user friendly during an aerodrome switch (i.e. between and within MRTM). The MET window should be linked to the EFS bay i.e. it should
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				move together with the EFS and radar map during an aerodrome change.





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
PJ05.35_HP_5	Ν	Human Performance	Supervisor planning tool HMI and ATCO's module HMI shall be locally assessed before the deployment of the RTC with flexible allocation of airports between modules.	High level requirements for RTC HMI for both ATCOs and SUP positions are defined at solution level, but they need to be locally assessed and customised based on the specific environment needs	RTS/ Workshop V3	Accepted		
PJ05.35_HP_49	Ν	Human Performance	The visual panorama and the ATCO head- down display shall allow a user- friendly flexible allocation of the position of the transferred aerodromes established by ATCOs	Position of displayed airports in the Visual Panorama and in the CWP head down displays shall be flexible, established by ATCO. The flexible positioning shall be user-friendly e.g. avoiding complex interactions to	W2 RTS/Works hop	Accepted		The ATCO display should allow a flexible allocation of the position of the transferred aerodrome s





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
				positioning a specific aerodrome in the desired position; automatic resize according to the available screen.				
PJ05.35_HP_44 became OSED REQ-05.35- SPRINTEROP- TM01.0011	Y	Human Performance	Fatigue tends to accumulate toward the end of the shift and shall be locally assessed before the deployment to establish proper shift length	Local assessment of fatigue is required to establish the shift length	W2 RTS/Works hop	Accepted		Fatigue tends to accumulate and toward the end of the shift and shall be locally assessed before the deploymen t





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
PJ05.35_HP_42	N	Human Performance	The HMI of the RTC technical system shall be locally assessed and designed in relation to the specific operational environment, depending on the size and type of the RTC	High level requirements for RTC HMI for both ATCOs and SUP positions are defined at solution level, but they need to be locally assessed and customised based on the specific environment needs	RTS/ Workshop V3	Accepted		The HMI of the RTC technical system shall be locally assessed and designed in relation to the specific operational environme nt, depending on the size and type of the RTC.
PJ05.35_HP_41	Ν	Human Performance	Supervisor tool HMI shall display the status of the MRTM and the traffic load expected at each single aerodrome	The supervisor is responsible of the allocation of the aerodromes between the modules. The allocation shall be	RTS/ Workshop V3	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
			under his/her supervision to properly establish the flexible allocation of aerodromes to the available RTC Modules	established depending on the aerodromes and traffic conditions (e.g. meteo, load etc.). The HMI shall provide all the required information in order to establish the aerodrome allocation				
PJ05.35_HP_40	Ν	Human Performance	The receiving ATCO shall be responsible to finalise the transfer of control and complete the handover procedure	While Supervisor and ATCO can initiate the handover procedure, it's ATCO responsibility to establish when completing the Handover procedure and finalise the split and merge	W2 RTS/Works hop	Accepted		





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
PJ05.35_HP_39 became OSED REQ-05.35- SPRINTEROP- TM01.0004	Y	Human Performance	Handover Operational procedures and check lists for nominal conditions, abnormal and degraded mode shall be locally established to support the RTC.	Handover Operational procedures and check lists for nominal conditions, abnormal and degraded mode shall be locally established to support the RTC.	W2 RTS/Works hop	Accepted		
PJ05.35_HP_38	Ν	Human Performance	The RTC supervisor role shall monitor the RTC aerodromes conditions and traffic load to establish the aerodromes allocation to the RTC modules	The supervisor is responsible of the allocation of the aerodromes between the modules. The allocation shall be established depending on the aerodromes and traffic conditions (e.g. meteo, load etc.)	W2 RTS/Works hop	Accepted		The supervisor shall monitor the RTC traffic load to establish the aerodrome s allocation to the RTC modules





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
PJ05.35_HP_37	Ν	Human Performance	Capacity of MRTM shall be locally assessed as it depends on the complexity of the aerodromes in the RTC	Number of aerodromes that can be assigned to each module shall be locally assessed as it depends on the complexity and size of airports. Number of endorsements for each ATCO is also affecting the number of aerodromes that can be allocated to each module	W2 RTS/Works hop	Accepted		
PJ05.35_HP_35 became OSED REQ-05.35- SPRINTEROP- AL01.0002	Υ	Human Performance	If any Safety net is available in current tower environment (e.g. conflicting clearances alerts etc.) it shall be available in the RTC.	Safety net already in place in standard tower and in single remote tower environment are a pre-requisite of the RTC.	W2 RTS/Works hop	Accepted		

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Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
PJ05.35_HP_34	Ν	Human Performance	ATCO shall be provided with accurate and reliable traffic and planning information through the ATCO Planning tool.	Further development of the ATCO planning tool with focus on reliability and accuracy is needed.	W2 RTS/Works hop	Accepted		ATCO Planning too shall provide accurate and reliable traffic forecast





PJ05.35_HP_3 became OSED REQ-05.35- SPRINTEROP- TM01.0006	Y	Human Performance	When a handover is completed and accepted all systems and information that belongs to the same aerodrome shall be accepted in a single action.	he video system shall follow the ATM system's split and merge state, and the unnecessary aerodrome should not be displayed in the video system's menu.	Previous wave	Accepted	The video system shall follow the ATM system's split and merge state, and the unnecessa y aerodrom should not be displayed in the vide system's menu. Also when an aerodrom is opened in an MRTM, th video system shall automatic lly follow this, and not
							this, and n additional





click shal be needer on the video system's user					
					video system's





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
PJ05.35_HP_29	Ν	Human Performance	When a handover is initiated or performed all systems and information that belongs to the same aerodrome shall be transferred in a synchronized way.	The ATCOs HMI shall allow automatic transfer of all the displays and information during the split and merge	RTS/ Workshop V3	Accepted		The ATCO HMI shall automatica Ily fit all the informatio n in the display during the handover of the airports between the modules









Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
PJ05.35_HP_21	Ν	Human Performance	Number of aerodromes in the RTC and allocated to each supervisor shall be locally assessed as it depends on the complexity of the aerodromes	Number of aerodromes in the RTC and allocated to each supervisor is dependent on the complexity and size of the operating environment and it needs to be assessed locally	W2 RTS/Works hop	Accepted		
PJ05.35_HP_20 became OSED REQ-05.35- SPRINTEROP- CO01.0002	Ŷ	Human Performance	The overlapping of air-ground communication shall be minimized for the ATCO.	It should be avoided that ATCOs receive air-ground communication at the same time to not overload ATCOs and affect situation awareness. E.g. coupling of frequencies.	W2 RTS/Works hop	Accepted		The overlapping of air- ground communica tion shall be minimized for the ATCO.





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
PJ05.35_HP_2	Ν	Human Performance	The RTC supervisor role shall be provided with ATCOs availability and their valid endorsements	RTC Supervisor need an overview of ATCO availability and their endorsements at the aerodromes connected to the RTC to enable the allocation of ATCOs. The following safety requirement(s) of [SAR] comply with this OSED requirement: SR- 27.	W2 RTS/Works hop	Accepted		The RTC Supervisor role shall be provided with ATCO availability and their valid endorseme nts

EUROPEAN PARTNERSHIP





PJ05.35_HP_19	Y	Human Performance	Supervisor	Supervisor planning	W2	Accepted	ENAV:
became OSED			planning tool	tool shall use up-to-	RTS/Works		Supervisor
REQ-05.35-			shall use up-to-	date and real time	hop		planning
SPRINTEROP-			date and real	data to proper			tool shall
SP01.0001			time data to	support the short			use up-to-
			proper support	term workload			date and
			the short term	assessment.			real time
			workload				data to
			assessment.				proper
							support the
							short term
							workload
							assessment
							Supervisor
							planning
							tool HMI
							and ATCO's
							module
							HMI shall
							be
							reviewed
							for the
							deploymen
							t of the RTC
							with
							flexible
							allocation
							of airports





				between modules.





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
PJ05.35_HP_17	Ν	Human Performance	Visual Presentation requirements shall be locally refined to support the deployment of the RTC with flexible allocation of airports between modules.	Size, type and quantity of information to be displayed in the MRTM shall be locally defined as it depends on the complexity and size of the local environment	W2 RTS/Works hop	Accepted		ENAV: Out of the window view requiremen ts shall be refined finally to support the deploymen t of the RTC with flexible allocation of airports between modules.





Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
PJ05.35_HP_14 became OSED REQ-05.35- SPRINTEROP- SR01.0001	Y	Human Performance	Supervisor role shall assess and balance the workload between the modules	There is the need to always properly balance the workload in order to minimise the impact on situation awareness	W2 RTS/Works hop	Accepted		ENAV: there is the need to always properly balance the workload in order to minimise the impact on situation awareness





PJ05.35_HP_13 became OSED REQ-05.35- SPRINTEROP- TM01.0008	Υ	Human Performance	Visual Presentation and head down displays shall have the same layout for all the possible aerodrome configurations	To avoid confusion the displayed layout shall be consistent among possible aerodrome configurations in the head up and head down visual displays	W2 RTS/Works hop	Accepted		COOPANS: Having same layout on the WACOM screen for e-strips for single, double and triple aerodrome mode. ENAV: Emergency button HMI in the ATCO module CWP shall be reviewed for the deploymen t of the RTC with flexible allocation of airports
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				between modules.





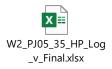
Reference	Includ ed in the OSED Y/N	Type of requirement	Consolidated Requirement description/Rew ording or New Requirement	Rationale	Assessme nt source + Reference report	Require ment status	Ration ale in case of rejecti on	Comments
PJ05.35_HP_11 3	Y	Human Performance	ATCOs and SUP tools shall use actual traffic	The ATCOs and SUP tools data shall be updated according to the evolution of the traffic to provide the latest view and proper support for the allocation of aerodromes	W2 RTS/Works hop	Accepted		

Table 19: HP Requirements



Appendix D – HP Log

All the HP-Log information have been included in the word document. For traceability purposes HP-Log is also included.





-END OF DOCUMENT-

