



# Validation Plan & Objectives

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PJ05

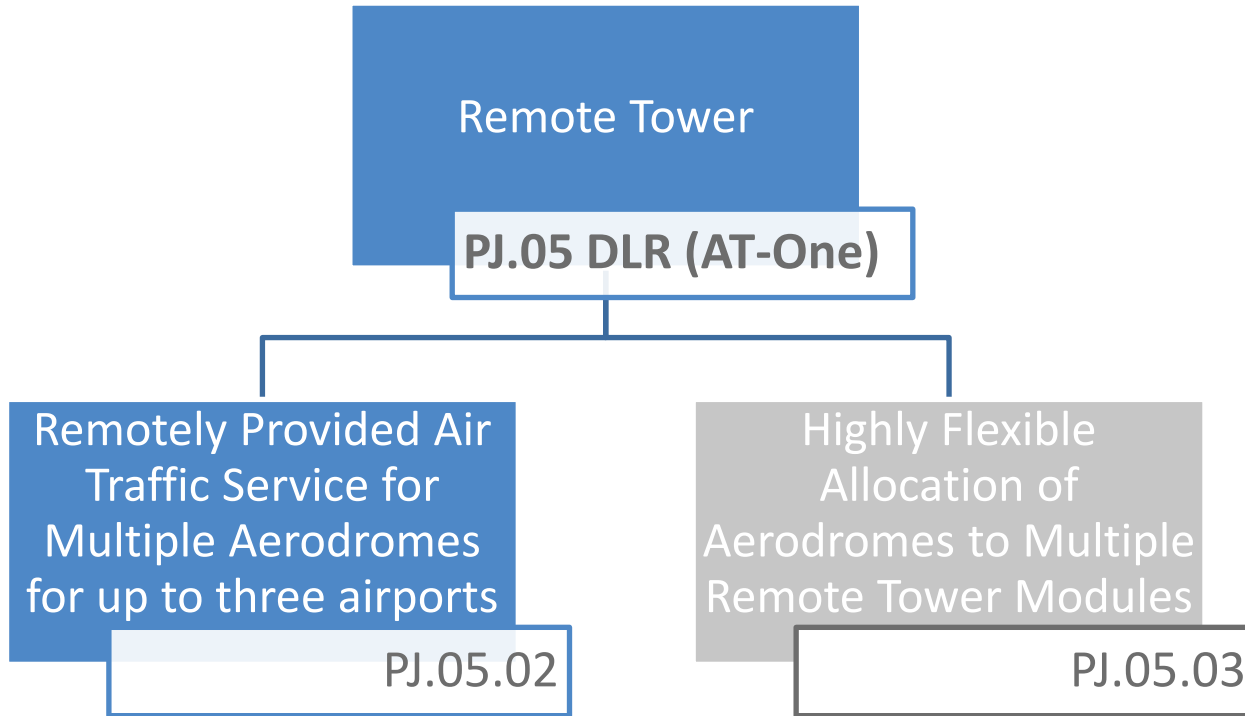
Braunschweig, 22 of November 2017



founding members



# Validation Plan



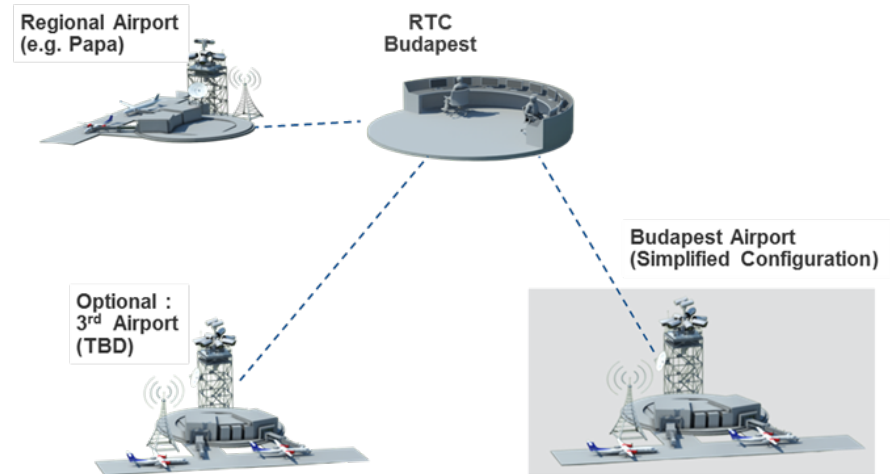
# Operational Environment

		Environment
Services	TWR	Including Clearance delivery / Ground Control / Tower Control / TWR Apron Control
	Opening Hours	Up to 24H (including night)
Staffing	Number of ATS staff	One ATCO per MRTM More than one ATCO in the RTC, including MRTMs and RTC Supervisor
Airspace	Airspace Classification	Class C and/or D
	Control Zone	10- 15 NM radius/rectangular, Vertical extension up to 3000 ft MSL
	Procedures	Specific IFR routes & approach procedures Established VFR routes



# EXE-05.02-V2-2.4 - HC

- ATS provided to three small size aerodromes including a military aerodrome
- real-time simulation
- Validation platform is the DLR NARSIM, extended by Frequentis and SELEX
- A set of 4 scenarios (Scenario)



	Airport A	Airport B	Airport C
<b>Airport name</b>	Pápa (military)	Debrecen (civil)	RWY 1 – Budapest
<b>IFR flights / VFR flights</b>	100 % / 0 %	70 % / 30 %C	50 % / 50 %
<b>Ground movements per hour</b>	1	2	16

# Overview Scenario

Scenario ID	Number of airports	Duration	mvmt/hr	Mixture	Use Cases
Training	2 (LHBP-LHPA)	40 min	20	mix VFR (20%)/IFR (80%)	1;6
Scenario 1	3	50 min	20	mainly IFR - VFR (10%)/IFR (90%)	1;2;3;4;5;6; 7;8
Scenario 2	3	50 min	20	mix VFR (20%)/IFR (80%)	1;2;3;4;5;6; 7;8
Scenario 3	3	50 min	30	mainly IFR - VFR (10%)/IFR (90%)	1;2;3;4;5;6; 7;8
Scenario 4	3	50 min	30	mix VFR (20%)/IFR (80%)	1;2;3;4;5;6; 7;8

# Team Procedure

Begin	End	Day One	Day Two
9:00	9:30	Briefing	Briefing
9:30	10:30	Training	Scenario3
10:30	11:30	Training	Scenario2
11:30	12:30	Scenario1	Scenario4
12:30	13:30	Lunch	Lunch
13:30	14:30	Scenario4	Scenario1
14:30	15:30	Scenario2	Debriefing
15:30	16:30	Scenario3	
16:30	17:00	Debriefing/Short	



# PJ05-02 Use Cases

## NORMAL CONDITIONS

- UC 1:1 / Provide ATS with simultaneous movements (ground and air) at different aerodromes from one MRTM
- UC 1:2 / Provide ATS to co-operative RPAS and normal aircraft to different aerodromes
- UC 1:3 / Control of Vehicles in the Manoeuvring Area to different aerodromes
- UC 1:4 / Provide ATS to simultaneous landings at different aerodromes
- UC 1:5 / Provide ATS to simultaneous departures at different aerodromes
- UC 1:6 / Provide ATS to a landing and a departing aircraft simultaneously at different aerodromes
- UC 1:7 / VFR flight in the traffic circuit with an arriving IFR flight with simultaneous movements on another aerodrome
- UC 1:8 / Ensure that the ATCO is able to avoid task overload, ATCO able to prioritize and control traffic to reduce current workload, e.g. RWY incursion, several simultaneous VFR arrivals, aircraft with malfunction

# Validation Objectives

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Validation Objectives	Number of Success criteria
HUMAN PERFORMANCE – SITUATION AWARENESS	4
HUMAN PERFORMANCE – WORKLOAD	1
HUMAN PERFORMANCE – ACCEPTANCE OF OPERATING METHODS / ROLES	3
HUMAN PERFORMANCE – USABILITY and UTILITY	3
SAFETY - GENERAL	2
SAFETY	3
CAPACITY	1
COST EFFICIENCY	1

- Each success criteria has to be measured with a metric
- Can be independent from the scenario or at the end in the final debriefing

# Success criteria for HUMAN PERFORMANCE – SITUATION AWARENESS

Success criteria ID	Success criteria Description	Covered by	Mid - Run	Post – Run	Debriefing / Interview
CRT-PJ05.02-V2-VALP-H02-010	ATCOs situation awareness is at an acceptable level	questionnaire, debrief		Situational Awareness for SHAPE Questionnaire (SASHA), AR25	GA01, GA02
CRT-PJ05.02-V2-VALP-H02-020	ATCOs can priorities tasks	questionnaire, debrief	Modified Cooper-Harper-Scale	AR01, AR02	GA03, GA04, Interview06
CRT-PJ05.02-V2-VALP-H02-030	ATCOs confirm that the user interface design supports a sufficient level of individual situation awareness	debrief			System Usability Scale (SUS), GA05, GA06, GA07, GA08, GA29
CRT-PJ05.02-V2-VALP-H02-040	ATCO maintain an adequate level of SA, despite having to divide their attention to several airports with different procedures and characteristics (geographical area, urban infrastructure, weather conditions etc.)	questionnaire, debrief	Modified Cooper-Harper-Scale	SASHA extended, AR19	GA10, GA30, GA31, GA32, Interview13, Interview14

# Objectives to Metrics

## Mid - Run

- ISA – Scale
- Modified Cooper Harper Scale

## Post – Run

- NASA-TLX
- SASHA
- AIM
- 26 Tailor maid questions

## Debriefing

- 33 Tailor maid questions
- 24 Open questions
- System Usability Scale (SUS)

# Modified Cooper Harper Scale - Top

Use case evaluation scale for EXE-05.02-V2-2.4 - HC

Evaluation by system matter expert

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## 1. Situation

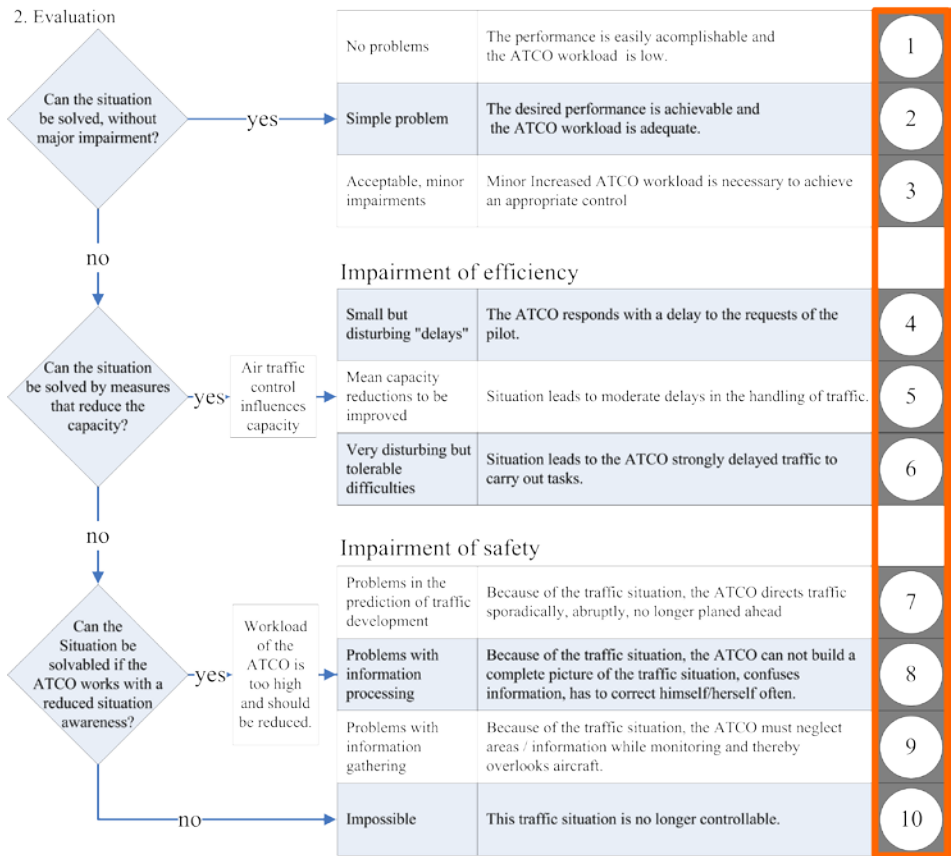
*Sim-time:*

<input type="radio"/>	Simultaneous movements at different aerodromes
<input type="radio"/>	Co-operative RPAS and normal aircraft at different aerodromes
<input type="radio"/>	Vehicles in the maneuvering area at different aerodromes
<input type="radio"/>	Simultaneous landings at different aerodromes
<input type="radio"/>	Simultaneous departures at different aerodromes
<input type="radio"/>	Simultaneous landing and departure at different aerodromes
<input type="radio"/>	VFR flight in the traffic circuit with an arriving IFR flight with simultaneous movements on another aerodrome
<input type="radio"/>	Priorization and control traffic to reduce current workload

<input type="radio"/>	LHBP
<input type="radio"/>	LHDC
<input type="radio"/>	LHPA
<input type="radio"/>	
<input type="radio"/>	Aircraft
<input type="radio"/>	Vehicle
<input type="radio"/>	RPAS

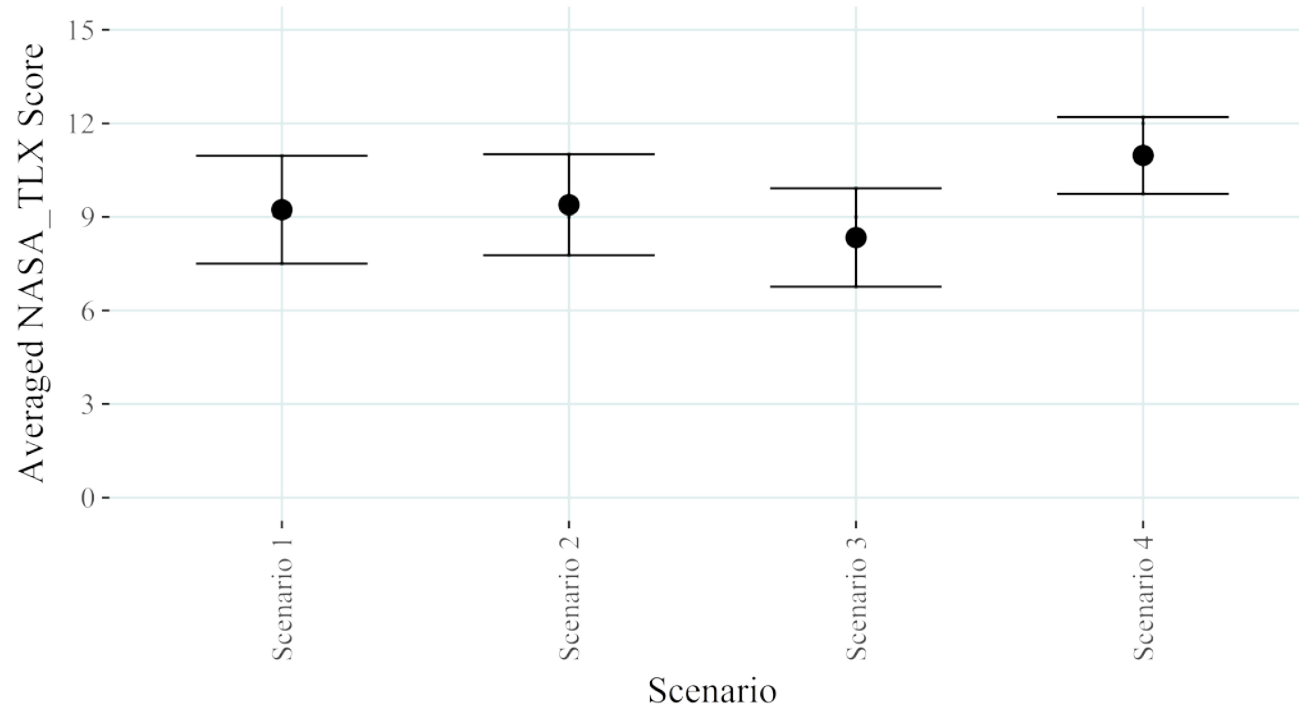
<input type="radio"/>	RWY incursion
<input type="radio"/>	Several simultaneous VFR arrivals
<input type="radio"/>	
<input type="radio"/>	Aircraft with malfunction
<input type="radio"/>	

# Modified Cooper Harper Scale - Body



# Example Results NASA-TLX Score

Analyze\_Nasa-TLX - Average  
for each Scenario and Standard Error





# Reference Documents

## **Project Management and Administration:**

- SESAR 1 P06.08.04-D94-OSED Single Remote TWR Ph2 – Final Update
- SESAR 1 P06.08.04-D103-Multi Remote Advanced – OSED Update (P06.09.03 D04)
- SESAR 1 P12.04.07-D09-Remote tower specifications-final Consolidated DEL
- SESAR 1 P12.04.06 / P12.04.08 final deliveries

## **Project Management and Administration:**

- PJ05 GA Annex 1 Part A and B
- SESAR 2020 Programme Execution Framework – Project Hand-Book
- Participant Portal H2020 Online Manual – Reports and payment requests ([http://ec.europa.eu/research/participants/docs/h2020-funding-guide/grants/grant-management/reports\\_en.htm](http://ec.europa.eu/research/participants/docs/h2020-funding-guide/grants/grant-management/reports_en.htm))
- Participant Portal H2020 Online Manual – Amendments to the Grant Agreement ([http://ec.europa.eu/research/participants/docs/h2020-funding-guide/grants/grant-management/amendments\\_en.htm](http://ec.europa.eu/research/participants/docs/h2020-funding-guide/grants/grant-management/amendments_en.htm))



Overview of Validation Plan & Objectives in SESAR 2020

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Thank you very much  
for your attention!



founding members

