



Multiple Remote Tower – Challenges and Solutions

Validation Exercise with ON (B4)
SESAR PJ.05.02

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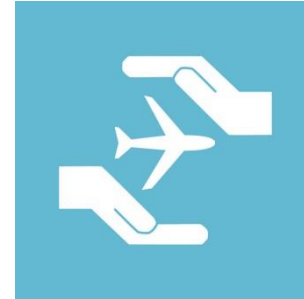


Knowledge for Tomorrow



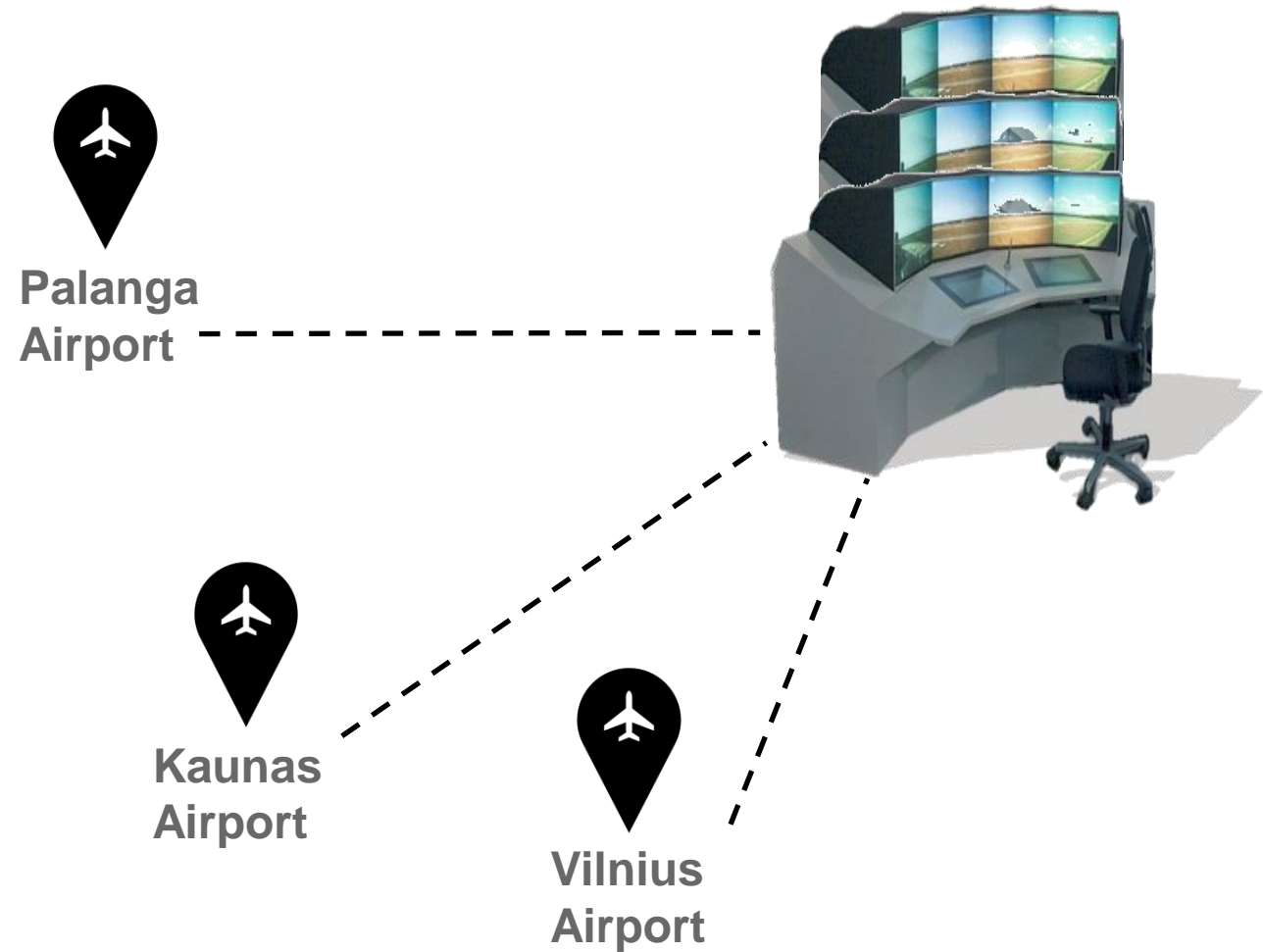
Validation Context PJ.05.02

- Which impact does Multiple Remote Tower have on
 - Human Performance
 - Safety
 - Capacity
 - Cost Efficiency?



Set-Up EXE-05.02.V2-2.1 – ON

- One multiple Remote Tower module 3:1
- ATS provided to three small sized airports
Vilnius (EYVI), Kaunas (EYKA) and Palanga (EYPA)
- DLR Real-time Simulation Platform
- Frequentis new control unit prototype
- 6 ATCOs from Oro Navigacija (ON)
- 4 scenarios



Key Parameters for PJ.05.02



Fixed Variables for all 4 Scenarios

Parameter	Parameter description
Traffic Distribution	Uneven : EYVI = 45%; EYKA = 32%; EYPA = 23%
Operational Modes	Normal operations and 1 abnormal operation
Runway Tarmac Conditions	All good
Wind Conditions	All with calm winds
Visibility Conditions	All VMC with CAVOK no clouds
Time of the Day	Daytime at all three airports



Scenarios with Independent Variables (IV)

IV 1

IV 2

Scenario ID	N° Aerodromes	Time	Traffic Volume (in mov/h)	Traffic Complexity
Training	2	00:40	20	IFR = 90 % ; VFR = 10 %
SCN 1	3	00:50	24	IFR = 90 % ; VFR = 10 %
SCN2	3	00:50	24	IFR = 80 % ; VFR = 20 %
SCN3	3	00:50	24 + 2	IFR = 90 % ; VFR = 10 %
SCN4	3	00:50	24 + 2	IFR = 80 % ; VFR = 20 %



Use Cases

UC ID	UC Description	N° Aerodromes
UC 1:1	Simultaneous Departures	2 ; 3
UC 1:2	Simultaneous Arrivals	2 ; 3
UC 1:3	Simultaneous Departure/Arrival	2 ; 3
UC 1:4	Other simultaneous movements	2 ; 3
UC 1:5	Arrival/Departure Separation	2 ; 3
UC 1:6	AC not vacating runway as expected	1



Agenda for the Exercise Days

Start	End	Time	Day 1	Day 2
09h00	09h30	00:30	Briefing	Briefing
9h30	10h30	01:00	Training	SCN3
10h30	11h30	01:00	Training	SCN1
11h30	12h30	01:00	SCN1	SCN4
12h30	13h30	01:00	Lunch	Lunch
13h30	14h30	01:00	SCN3	SCN2
14h30	15h30	01:00	SCN2	Debriefing
15h30	16h30	01:00	SCN4	
16h30	17h00	00:30	Debriefing	

ATCO 1

ATCO 2



Role Distribution

ATCO 1

Active Training

- Layout aerodromes
- Overview traffic
- Use of working tools
- ATC at 2 different aerodromes

Active ATC

- Provide ATC as usual
- Answer ISA-Scale
- Answer your partner when he asks about your workload

ATCO 2

Passive Training

- Layout aerodromes
- Overview traffic
- Working place and procedures
- Use of Observation Scale

Observation

- Observation of scenario, working situation and how Active ATCO handles it
- Evaluation of efficiency and safety due to the situation

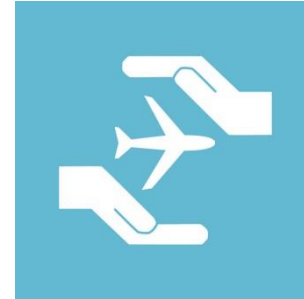
Day 1	ATCO 1	ATCO 2
Briefing	Briefing	
Training	Active Training	Passive Training
Training	Passive Training	Active Training
Scenario 1	Active ATC	Observation
Lunch	Lunch	Lunch
Scenario 3	Observation	Active ATC
Scenario 2	Active ATC	Observation
Scenario 4	Observation	Active ATC
Debriefing	Debriefing	Debriefing

Day 2	ATCO 1	ATCO 2
Briefing	Briefing	
Scenario 3	Active ATC	Observation
Scenario 1	Observation	Active ATC
Scenario 4	Active ATC	Observation
Lunch	Lunch	Lunch
Scenario 2	Observation	Active ATC
Debriefing	Debriefing	



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Day 2	ATCO 1	ATCO 2
Briefing	Briefing	
Scenario 3	Active ATC	Observation
Scenario 1	Observation	Active ATC
Scenario 4	Active ATC	Observation
Lunch	Lunch	Lunch
Scenario 2	Observation	Active ATC
Debriefing	Debriefing	



Observation Sheet – 1. Situation, Example

1. Situation

Use Cases	IFR	VFR
UC 1:1 / Simultaneous departures		
UC 1:2 / Simultaneous arrivals	2	1
UC 1:3 / Simultaneous departure/arrival		
UC 1:4 / Other simultaneous movements		
UC 1:5 / Arrival/departure separation		
UC 1:6 / AC not vacating RWY as expected		

Simulation Time:

EYVI	✗
EYKA	✗
EYPA	✗

Aircraft	3
Vehicle	

- Which traffic situation do we have?
- Which aerodromes are concerned?
- Which kind of transportation mean is concerned?

- ✓ *2 IFR movements and 1 VFR movement*
- ✓ *At 3 aerodromes*
- ✓ *3 aircraft implied in 3 arrival situations*



Observation Sheet – 2. Observer Evaluation

2. Observer Evaluation



Can the situation be solved without major impairment?

YES

No impairment Good	ATCO workload is low to easily achieve the desired performance.	1
No impairment Good	ATCO workload is adequate to achieve the desired performance.	2
Minor impairment Fair	ATCO requires a minor increased workload to achieve the desired performance.	3

NO



Can the situation be solved by measures reducing capacity?

YES

ATC influences capacity

Impairment of efficiency

Minor Unpleasant delays	ATCO responds with delay to pilot's requests.	4
Moderate Disturbing delays	Situation leads to moderate delays in the traffic management.	5
High Very disturbing delays	Situation leads to strongly delays in the traffic management.	6

NO



Can the situation be solved by measures reducing safety?

YES

ATCO workload is too high and should be reduced

Impairment of safety

Impairments in prediction of traffic development	ATCO directs traffic sporadically, abruptly and does no longer plans ahead.	7
Impairments due to information processing	ATCO cannot build a complete picture of the traffic situation, confuses information and corrects himself/herself often.	8
Impairments due to information gathering	ATCO must neglect areas/information while monitoring and therefore misses aircraft.	9
Major Impairment	ATCO cannot longer control the traffic situation.	10

NO



Observation Sheet – ATCO Evaluation

3. ATCO Evaluation

Please let the ATCO rate his/her current workload.

1	2	3	4	5
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Post Exercise Questions

ID	Question
PE01	I was generally able to perform the necessary ATC tasks.

ID	Question
PE01	I was generally able to perform the necessary ATC tasks.
PE02	My situational awareness was sufficient at any time.
PE03	I was generally able to prioritize tasks.
PE04	I was generally able to set up a traffic sequence (e.g. VFR into IFR; sequence on final).
PE05	I was able to identify all relevant aircraft.
PE06	I was able to identify all relevant vehicle

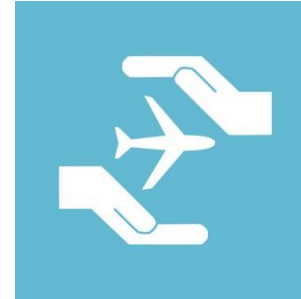
PE19	I was able to work with the radar information presentation at each aerodrome.
PE20	I confused the displayed airports when searching for flights on the system.
PE21	...were clear to me.
PE22	...were consistent for me.
PE23	...were acceptable for me.
PE24	...were applicable for me.
PE25	...which aircraft I was communicating to
PE26	...which aerodrome I was giving instructions to
PE27	...which aircraft belonged to which aerodrome
PE28	I was confused by the different local procedures of the aerodromes
PE29	I mixed the geographical characteristics of the various aerodromes
PE30	...the total number of movements is of relative importance in terms of traffic complexity.
PE31	...the traffic mixture (IFR/VFR) is of relative importance in terms of traffic complexity.
PE32	...the traffic distribution between airports is of relative importance in terms of traffic complexity.



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Thank you for your attention 😊



Get in touch:
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