REMOTE TOWER

Multiple Remote Tower – Bane or Boon?

Jörn Jakobi
DLR, Institute of Flight Guidance, Braunschweig
DATS Workshop, 11/02/2021

Founding Members
EUROPEAN UNION EUROCONTROL

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SESAR JOINT UNDERTAKING

What is ‘Multiple’ Remote Tower?

SESAR2020 PJ05, DLR Braunschweig

SESAR2020 PJ05, LFV, Sturup

‘multiple mode of operation’
means the provision of ATS from one remote tower/remote tower module for two or more aerodromes at the same time
(i.e. simultaneously);

EASA, Annex I to ED Decision 2019/004/R

Past ‘Multiple’ Research

First DLR Multiple trials (2010)

SESAR P06.09.03 & P06.08.04 (2014)

SESAR2020 Wave 1 (2016-2019)

PJ05 Remote Tower for Multiple Airports

WP2 Solution PJ.05-02

Multiple Remote Tower Module

WP3 Solution PJ.05-03

RTC with Flexible Allocation of Aerodromes to MRTMs

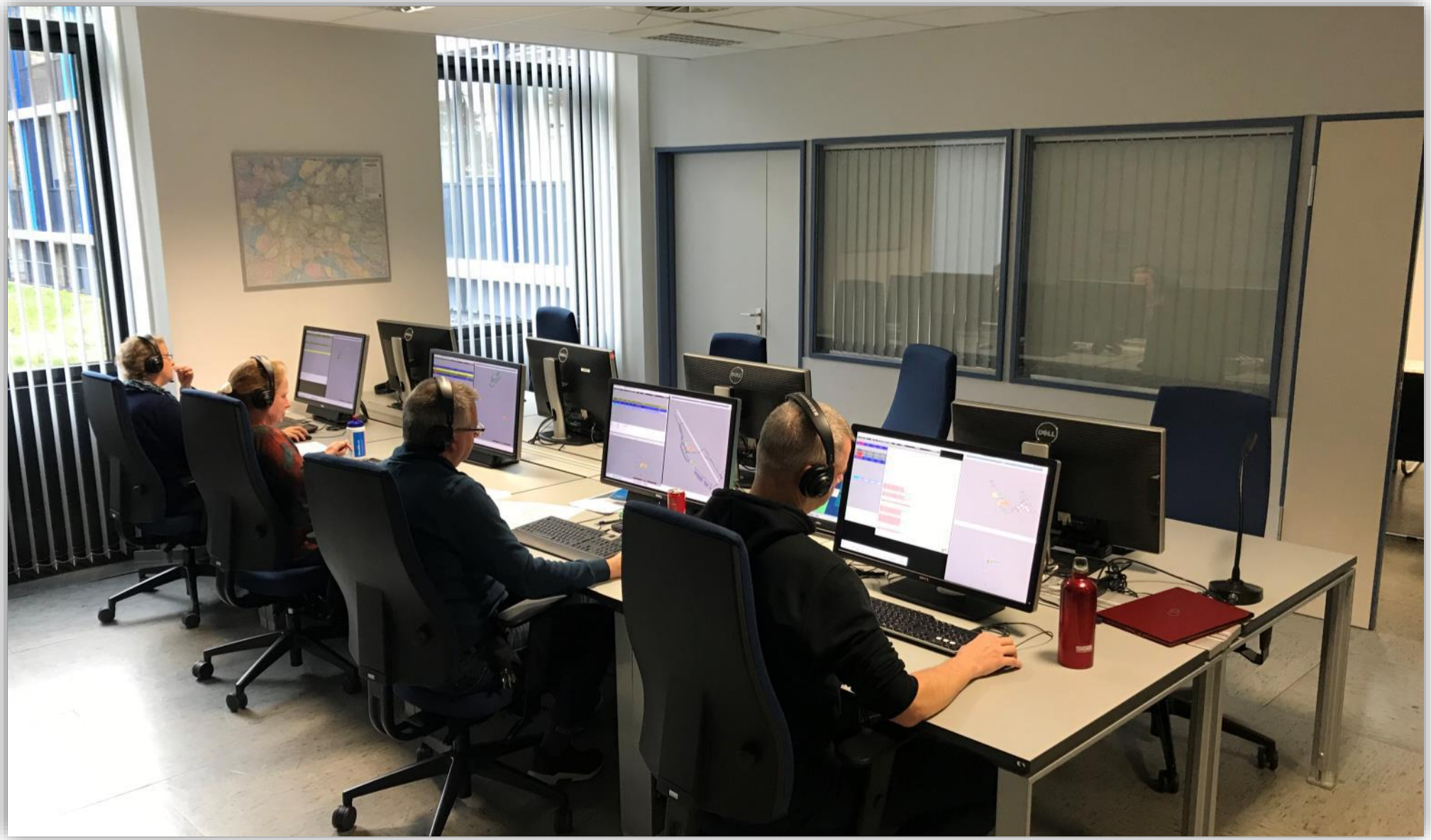
Validation Set Up

Typical Traffic Scenario

TIME	CALLSIGN	AC	DESTINATION	SID	SQK	STAND	RWY	REMARKS	
08:02:00	BMI77E	A321	Sofia (LBSF)	ERLOS1D	2177	3	13R		EYVI
08:10:00	TAPUP7	A320	Vilnius (EYVI)		1733	4	13R		
08:12:00	4AITT	C550	Vilnius (EYVI)		1516	R115	13R	Landing	
08:08:00	TRA72Q	B737	Rotterdam (EHRD)	GILEP1D	1514	R110	13R		
08:09:00	WZZ5JO	SF34	Timișoara (LRTR)	ERLOS1D	2170	107	13R		
08:15:00	FIRE2	FIR1	Vilnius (EYVI)		2100	26		Support EIN8NM, Standby in TWY C	
08:23:00	EIN8NM	A320	Vilnius (EYVI)		3772	108	13R	Engine failure	
08:20:00	DLH4TN	A320	Frankfurt (EDDF)	BADOV1D	1515	2	13R	Report debris during takeoff	
08:26:00	AIRSIDE1	FOL1	Vilnius (EYVI)		2101	26		FOD check on runway	
08:33:00	BRU888	SF34	Timișoara (LRTR)	ERLOS1D	2174	R112	13R		
08:42:00	EWGAR2	SF34	Vilnius (EYVI)		3771	109	13R		
08:42:00	POIJP	C550	Paris (CDG) (LFPG)	GILEP1D	2203	R116	13R		
08:50:00	BMIA4B	A321	Vilnius (EYVI)		1517	5	13R		
08:47:00	SWR337U	A320	Zurich (LSZH)	GILEP1D	2172	R114	13R		

TIME	CALLSIGN	AC	DESTINATION	SID	SQK	STAND	RWY	REMARKS	
08:06:00	WZZ559	A320	Santa Cilia de Jaca (LECI)	VERIG5D	3102	2	05R		EYKA
08:15:00	FINH7Y	A319	Kaunas (EYKA)		3105	15	05R		
08:21:00	IFA7753	FA50	Kaunas (EYKA)		3107	2	05R		
08:35:00	BRU8925	CRJ2	Minsk (UMMS)	PERIT5D	3104	14	05R		
08:45:00	YELLOW4	FOL1	Kaunas (EYKA)		3106	3		RWY check	
08:51:00	SASL7L	MD83	Burgas (LBBG)	NARKA5D	3110	1	05R		
08:57:00	TVL8LJ	B738	Kaunas (EYKA)		3112	14	05R		

TIME	CALLSIGN	AC	DESTINATION	SID	SQK	STAND	RWY	REMARKS	
08:21:00	RYRK8G	A320	Palanga (EYPA)		3504		34	Touch&Go	EYPA
08:23:00	HB66C	BE36	Palanga (EYPA)		3512	M2	34	Landing	
08:31:00	RYRK8G	B738	Palanga (EYPA)		3506		34	Touch&Go	
08:35:00	ACEC8	P28A	Palanga (EYPA)		3507			Crossing	
08:39:00	AZA943	A320	Palanga (EYPA)		3511	M1	34		
08:42:00	RYRK8G	A320	Palanga (EYPA)		3506		34	Touch&Go	
08:40:00	GAF612	A320	Cologne (EDDK)	BELED3D	3513	M3	34		
08:52:00	RYRK8G	A320	Palanga (EYPA)		3503		34	Touch&Go	



Mid - Run

- ISA – Scale

Post – Run

- NASA-TLX
- SASHA
- AIM
- Safety
- Tailored questions

Debriefing

- open questions to:
  - acceptance and
  - recommendations for improvement

Safety Assessment

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?

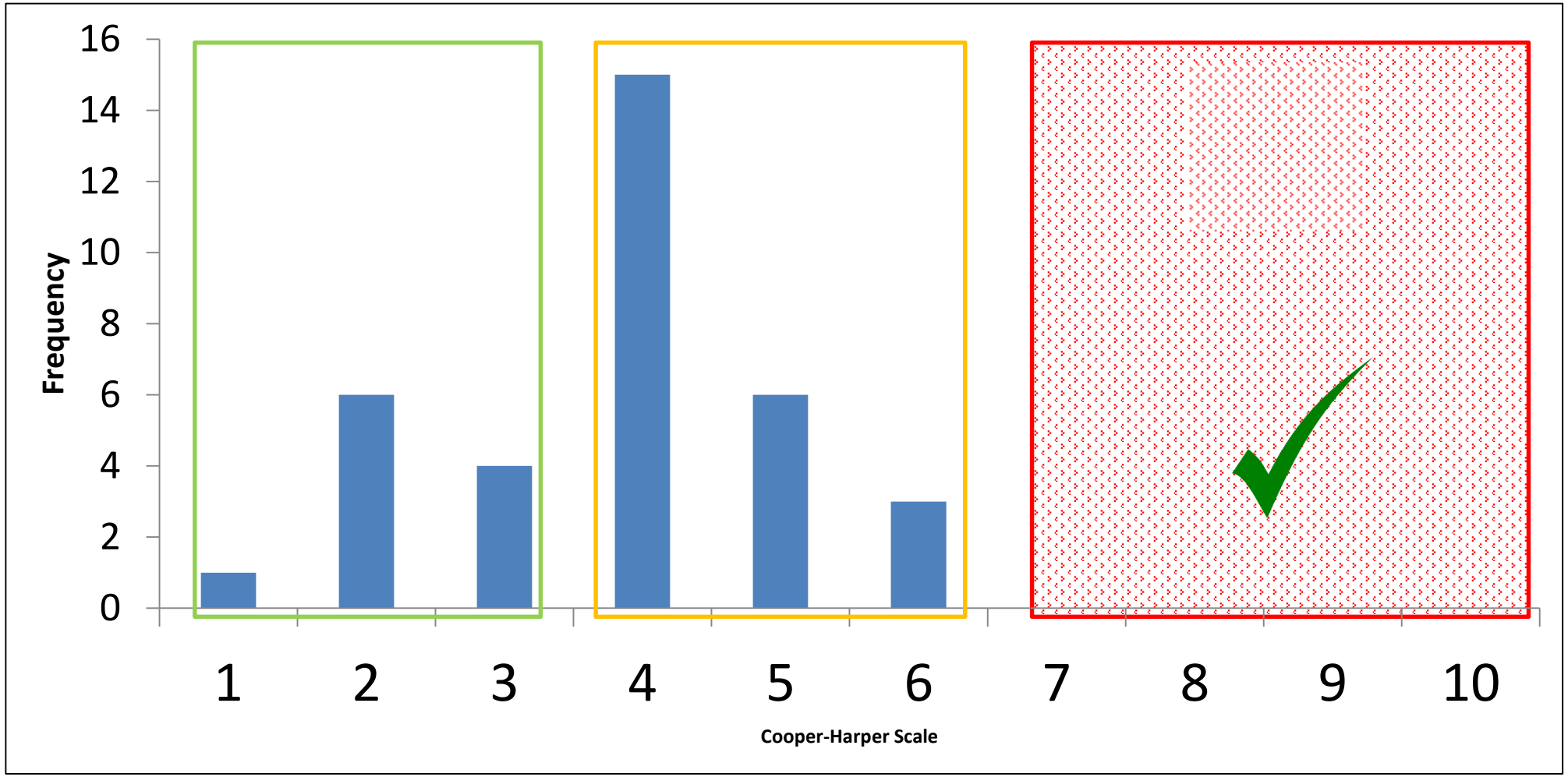
YES → ATCO workload is too high and should be reduced

NO →

Impairment of safety

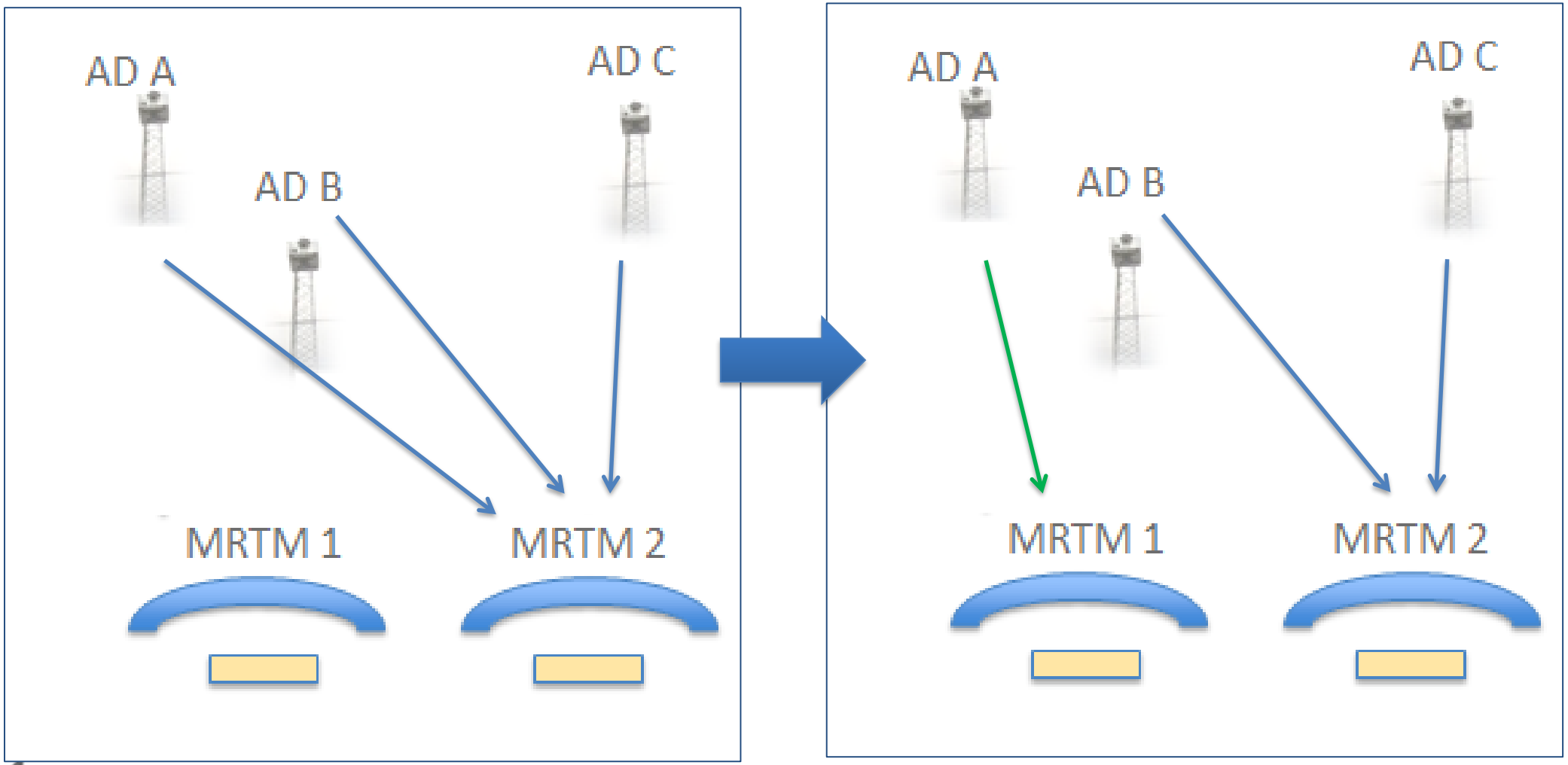
Impairments in prediction of traffic development	ATCO directs traffic sporadically, abruptly and does no longer plans ahead.	7
Impairments due to information processing	ATCO cannot build a complete picture of the traffic situation, confuses information and corrects himself/herself often.	8
Impairments 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

Safety Results



N = 35
M = 3.80
SD = 1.24

Splitting & Merging



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CHECKLIST Handover

CHECKLIST Handover

1. REQUEST from ATCO-HANDOVER to ATCO-TAKEOVER to take control of Aerodrome X (& Y)

ATCO-HANDOVER Handover Aerodrome X (Y)

ATCO-TAKEOVER Go Ahead / Standby

2. ATCO-HANDOVER provides following information:

* Relevant weather information (visibility, wind, etc.)

* Runway in use (Runway condition)
* Equipment failure (only if failures exist)
* Aerodrome restrictions/closures (if any)
* Traffic on Frequency (VFR/IFR) including
  * position
  * intentions
  * clearances

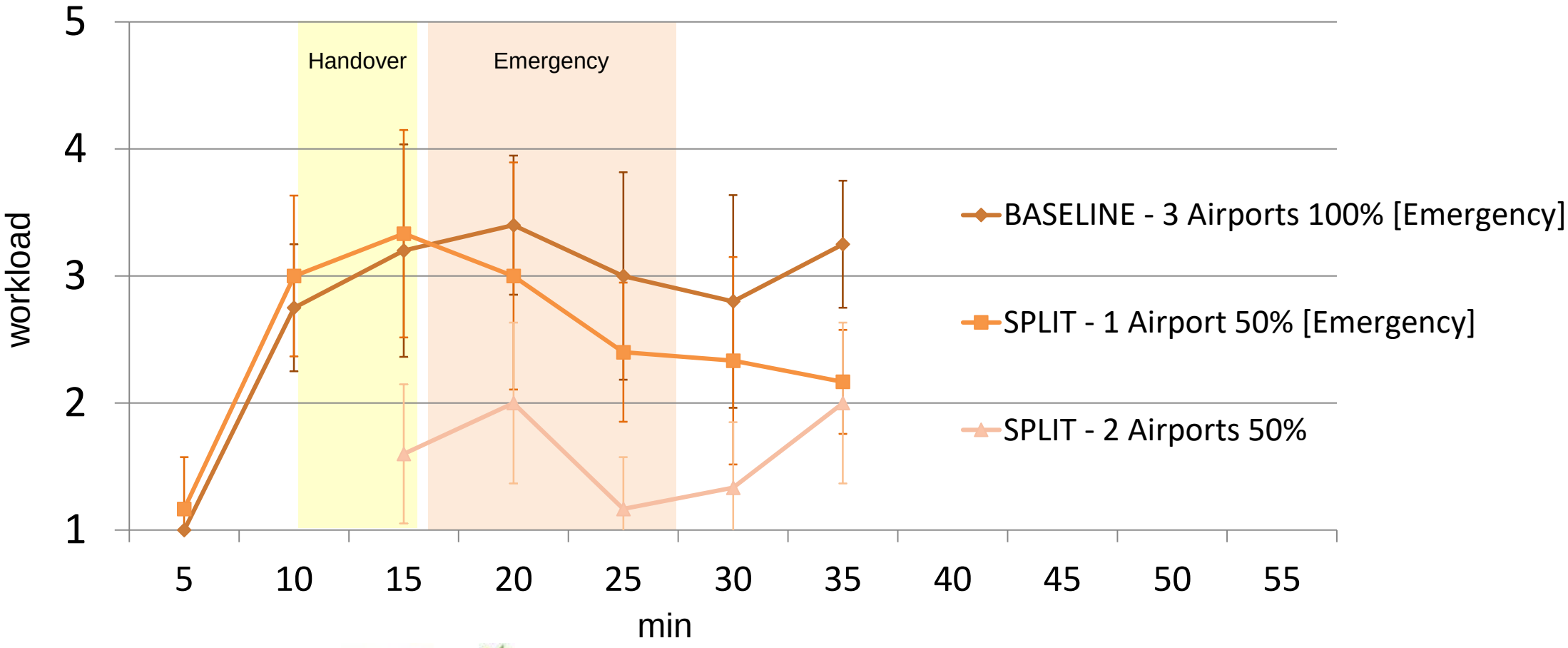
3. Actual HANDOVER

ATCO-TAKEOVER Information copied. Taking over

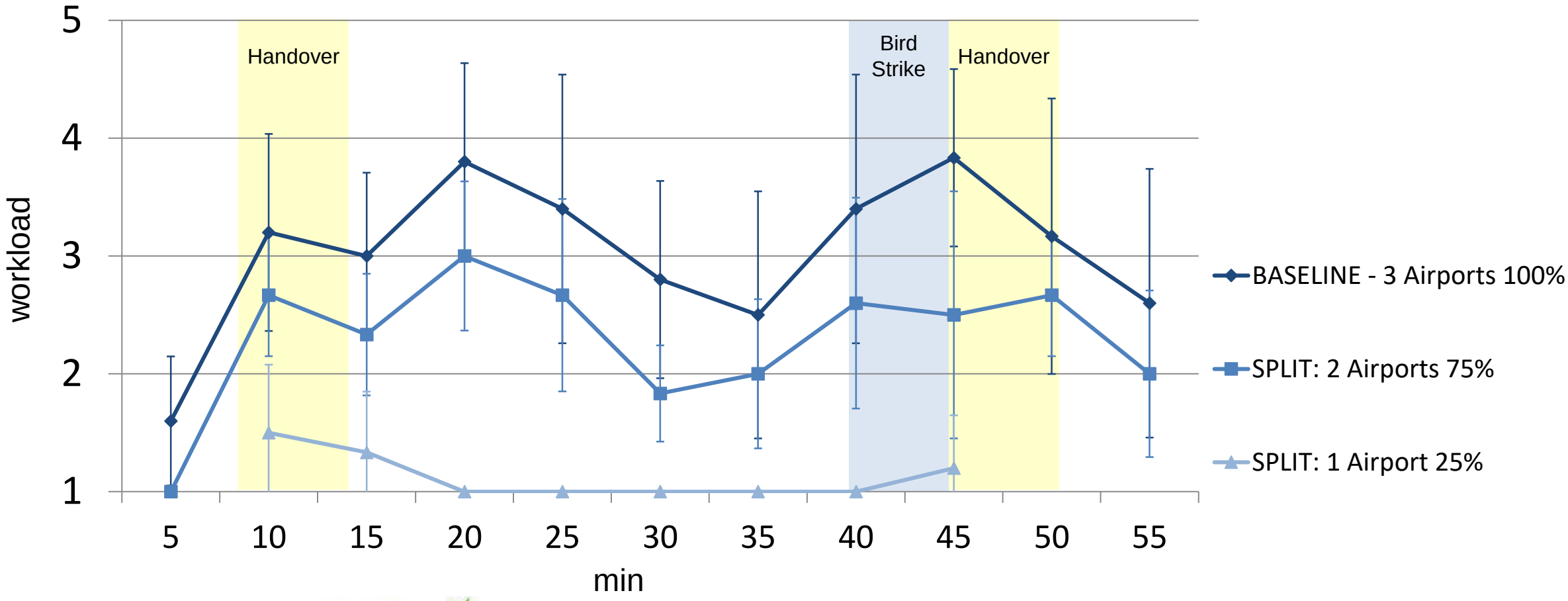
ATCO-HANDOVER Roger

** handover of an aerodrome should happen best in a "clean configuration", that is, most probably no need to intervene for the next 30 seconds.*

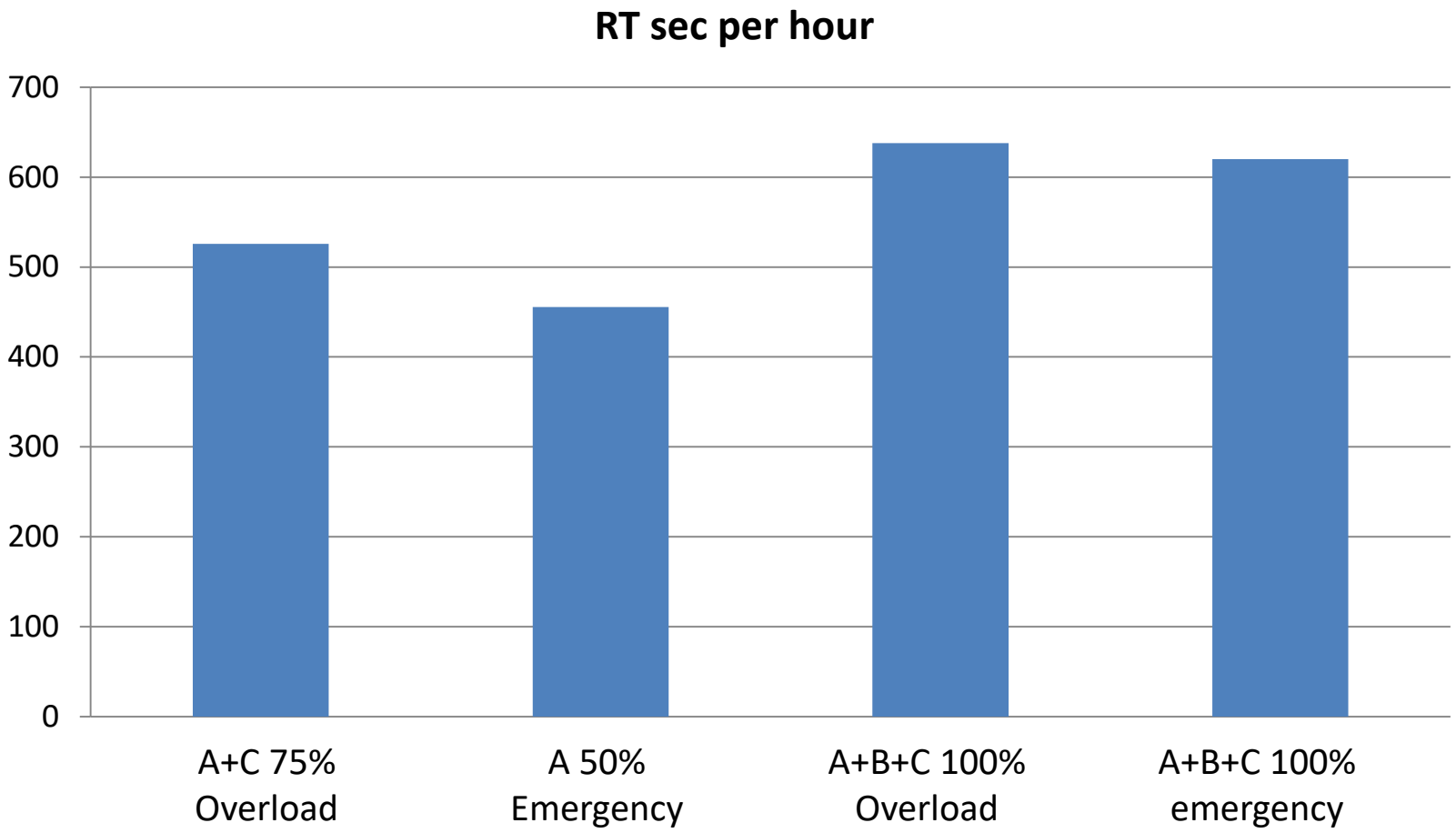
I.S.A. Workload over the time



I.S.A. Workload over the time



Radio Transmission [duration]



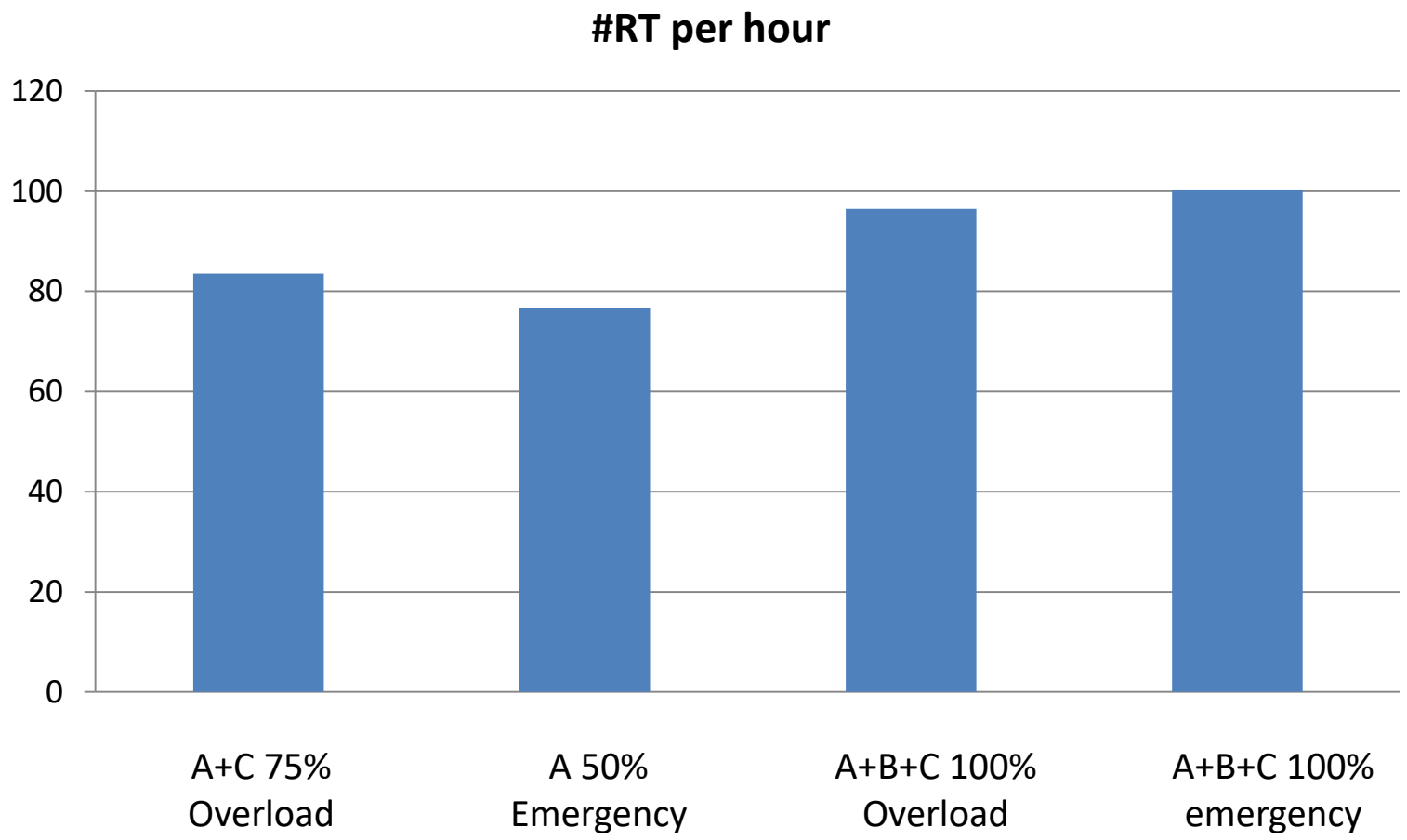
3 airports = 30mov/h

Airport A = 50%

Airport B = 25%

Airport C = 25%

Radio Transmission [number]



3 airports = 30mov/h

Airport A = 50%

Airport B = 25%

Airport C = 25%

Myths to Multiple Remote Tower

- An ACTO is not able to work multiple
- *Multiple* needs new procedures
- *Multiple* only works with additional ground surveillance
- ATCOs do not like working *multiple*

Be prepared for
the future !

Jörn Jakobi (PJ05 Project Coordinator)
DLR Institute of Flight Guidance
Braunschweig, Germany
Joern.Jakobi@dlr.de

www.remote-tower.eu

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The modernisation of air traffic management is one of the main challenges of current aeronautics research.The Single European Sky ATM Research (SESAR) project defines, develops and deploys what is needed to increase ATM performance and build Europe's intelligent air transport system.

Part of SESAR are the projects **PJ05 "Remote Tower for Multiple Airports"** and **PJ05-W2 "Digital Technologies for Tower"**, which focus on the safe and efficient airport of the future. By bringing the concept of remotely controlling multiple airports as well as HMI interaction modes for airport towers to higher maturity levels, the SESAR projects aim at providing small and medium sized airports with more cost-efficient and service tailored air traffic services.

The current programme is SESAR 2020 supports projects to deliver solutions in four key areas, namely airport operations, network operations, air traffic services and technology enablers. It is running from 2016 to 2024 with a budget of 1.6 billion Euro.

Recent News

Ever wondered whether Multiple Remote Tower can also solve your problems?
9. October 2020

Article about Remote Tower Results on CORDIS website
12. May 2020

These projects have received funding from the SESAR Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 730195 and No 874470.

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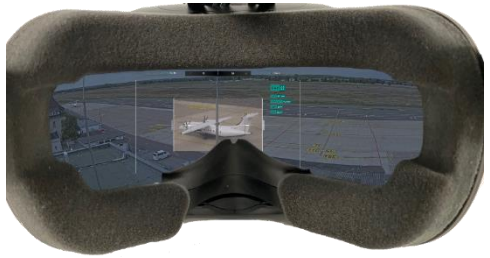
Remote ATS for non-controlled Airports

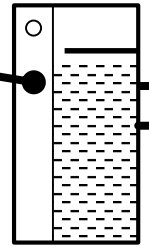
PTZ-Camera
3.500 €

2 Panorama-Cams
1.500 € each

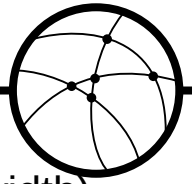


VR-Brille
from 500 €

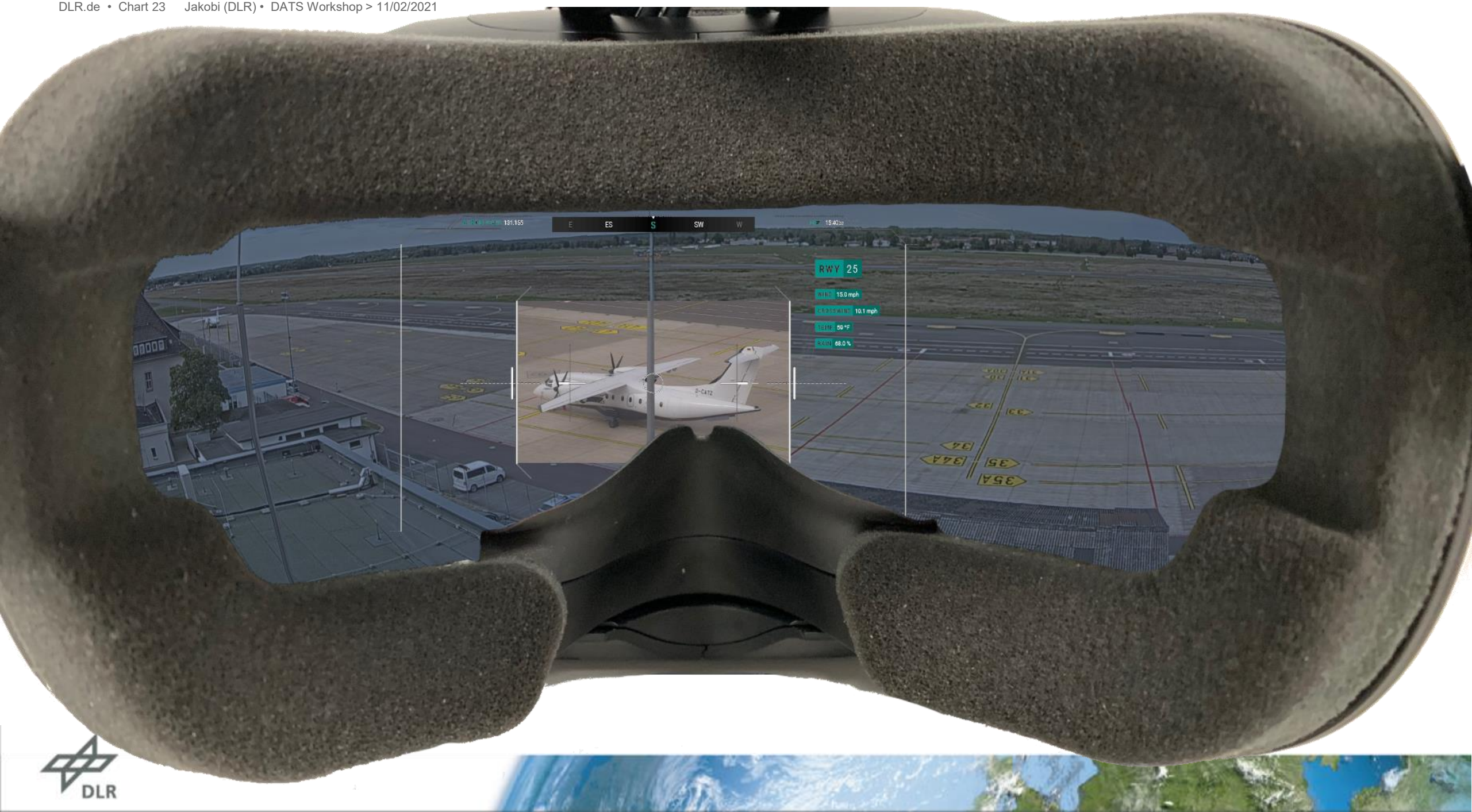
Computer
ca. 2.000 €



Bandwidth
ca. 17 Mbit/s
(would match 4G bandwidth)



Reuschling, Fabian and Jakobi, Jörn (2020) *Remote AFIS: Entwicklung und Validierung kostengünstiger Remote Tower-Konzepte für unkontrollierte Flugplätze.* DLRK 2020, 1.-3. September 2020, Online (ursprünglich Aachen, Deutschland).
Supporting small airports using virtual reality - DLR Portal


131.155
E
ES
S
SW
W
RWY 25
WIND 15.0 mph
CROSSWIND 10.1 mph
TEMP 59 °F
RAIN 68.0 %
D-CATZ
33
34
34A
35
35A

W 285 300 NW 330 345 N 15 30 NE 60 75 E 105 120 SE 150 165 S 195 210 SW 240 255
W2 W1 N2 N1 C E2 E1 ST M
5 km 14 km 4 km 8 km 11 km 5 km 8 km 14 km 12 km
85
EDAZ
Flightplan
14:30:20
N60MK | c210 | N60MK | EDKB | EDAZ
D-EMUX | M7 | D-EMUX | EDAZ | EDFE
HB-KMA | S22T | HB-KMA | EHGG | EDAZ
D-EDUF | D-EDUF | EDAZ | EDAZ
D-EANG | c172 | D-EANG | EDLD | EDAZ
N60MK | c210 | N60MK | EDKB | EDAZ
create new
310°
15.0 kn
1009.8
Radio Volume
Ambient Sound